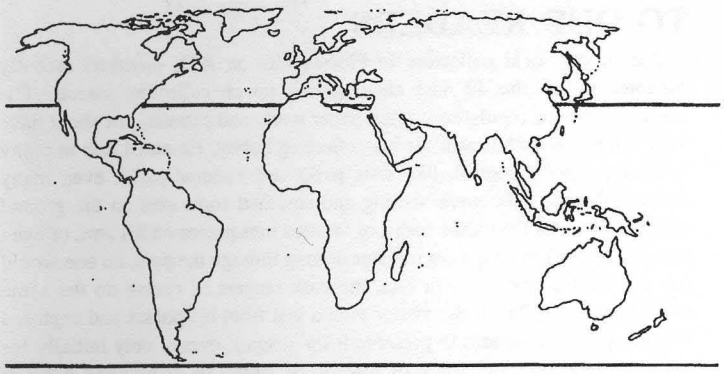


LEPIDOPTERA NEWS

September 1998 **No. 3**

1998 ATL Awards

HENRY BATES AWARD

In Recognition of Outstanding and Extraordinary Efforts Toward the Knowledge and Conservation of Tropical Lepidoptera

Dr. Jon D. Turner

The 1998 ATL Henry Bates Award for outstanding original research and noteworthy contributions to the study and conservation of tropical Lepidoptera is presented to Dr. Jon D. Turner, of Huntsville, Alabama.

In the very best traditions established by Henry Bates a century-and-a-half ago, Dr. Turner has worked indefatigably in the tropical rainforests of the Amazon, and elsewhere in the tropics, to discover fascinating new information on the biology and classification of the butterflies, particularly among the metalmarks, family Riodinidae. Simultaneously, he has exerted exceptional efforts towards the conservation of the rainforests in central Rondônia, Brazil, and in eastern Ecuador. The Rondônia site, after several years' work, now encompasses a rainforest reserve of some six thousand acres, protecting one of the world's greatest species diversity for butterflies and moths. The Ecuadorian site is just beginning as a forest reserve. Both reserves were threatened by imminent development until saved through the leadership role and commitment of Dr. Turner. To him, all of the members of the Association for Tropical Lepidoptera express their deepest thanks and their united desire to honor him with this award.

Dr. Turner is a charter member and a life member of ATL, and has been on the Advisory Council since 1994 and on the Board of Directors since 1996.

JACOB HÜBNER AWARD

In Recognition of Significant Contributions for the Advancement of the Systematics of Lepidoptera

Dr. Eugene G. Munroe

In honoring Dr. Munroe with the ATL Hübner Award for 1998, we recognize a lifetime of research and publication on Lepidoptera, primarily on moths of the family Pyralidae. He graduated from McGill University, Canada, in 1940, then received a Ph.D. from Cornell University, Ithaca, New York, in 1947. Before his retirement, he was long-time curator of Lepidoptera at the Canadian National Collection, Agriculture Canada, in Ottawa. He also was on the scientific advisory council of the Canadian government at various times beginning in the late 1960s.

His studies have resulted in over 200 publications since the late 1940s, and have included papers on species from most faunal regions. His major works have involved Pyralidae from the New World and from east Asia: the most notable works include monographs on the Nearctic Odontiinae (1961), on *Udea* species (1966), Pyraustinae of east Asia (1968-71*), American *Dioryctria* coneworm moths (1969-93*), species of Midilinae (1970), the European corn borer genus *Ostrinia* (1970*), the genus *Nomophila* (1973), the genera *Vitessidia* and *Vitessa* (1980**), and two Pyralidae parts of the *Moths of America North of Mexico* series (1972-73 and 1976). Besides these revisions and monographs, there are dozens of significant papers since 1950 on various smaller genera and new species from all parts of the world. Dr. Munroe also contributed the Lepidoptera section to the McGraw-Hill *Synopsis and Classification of Living Organisms* encyclopedia (1982) and an earlier contribution on Lepidoptera for a summary in *Canada and Its Insect Fauna* (1979), as well as a number of papers on Lepidoptera biogeography. He also worked on some butterfly groups, including a large paper on the classification of Papilionidae (1960).

Dr. Munroe is a charter member of the Lepidopterists' Society and has served in several capacities, including President in 1959, and Vice-President in 1973, and was made an honorary life member in 1972. He also is a charter member of ATL, and has been on the Advisory Council since 1990 and on the Board of Directors since 1993.

(cont. on p. 3).

* co-authored with A. Mutuura

** co-authored with M. Shaffer

Fig. 1. Dr. J. D. Turner (left) receiving the ATL 1998 Henry Bates Award from ATL Chairman, Dr. J. B. Heppner (right), at the Gainesville meeting, April 18, 1998.

ATL EXPEDITIONS: Jan 1999 – CHILE: deserts, high Andes and the Lake District!

LEPIDOPTERA NEWS

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

Published by the
Association for Tropical Lepidoptera, Inc.
Publication Office: c/o Florida State Collection of Arthropods
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.

JOURNAL SEPARATES (1990-95 only): $1 first page, 25¢ each added page. Specify author and citation. Past journal issues: $10 each (1990-92), $15 each (1993-95), $20 each (1996-97). *TL News*: $5 per year.
CONTENTS for the journals will be issued in 1998.
EXPEDITIONS:
CHILE (Santiago, Concepción, and Lake District) January 1999
VENEZUELA: cancelled due to lack of progress, or any decision, on the permit process from the Venezuelan government.

TO OUR READERS

One of our local collectors in Florida (not an ATL member) recently lamented to me that he was about giving up on collecting insects. The interminable new regulations, rules, paper work, and permits, just about have undermined his enthusiasm for his collecting hobby. He noted that in many areas under strict control, like state parks and national parks, even many national forests, if he were visiting and smashed some ants on the ground with his shoes on the public paths, or swatted mosquitoes on his arm, or even impaled butterflies on his car radiator driving through the park, no one would pay the least attention — in fact, the park rangers of course do the same thing every day! But, if the visitor took a vial from his pocket and captured the mosquito off his arm to preserve it for *science*, even if only initially for his own collection and study of insects, he would be committing a grave "crime," punishable by various fines and prosecution designed to protect native wildlife, no matter if it be a mosquito or roach or bear or bird! This particularly affected our Florida collector as an amateur not connected with a large museum or university. There are similar stories that could be told for any number of countries around the world, some countries having now protected almost everything within their boundaries from the great "peril" of the amateur insect collector, no matter that logging companies can clear-cut any number of national forests, etc., in the interest of profit.

Is there not something wrong with this Alice-in-Wonderland, "1984" mentality (or is it insanity?) that confronts us? Is it the amateur who is to blame for the endangered species due to decimation of forests and wetlands, or is it the large corporation clear-cutting everything for profit (which the government gets a share of!)? This situation is somewhat similar to the simpleton thief who robs a store of $5 and gets 10 years in jail, while the stock broker who bilks people out of their life savings at the rate of millions of dollars nationwide gets a fine, probation, and possibly house arrest for a year. Not that collecting is stealing, but the scales of retribution are similar in the two examples. Somehow the entire system is upside down; and in most countries *profit* comes before anything else.

Should we not encourage the amateur to study and collect insects? Should we not control rapacious corporations from clear-cutting, particularly in the few remaining ancient forests that they always are most anxious to cut, or the remaining untouched tropical forests?

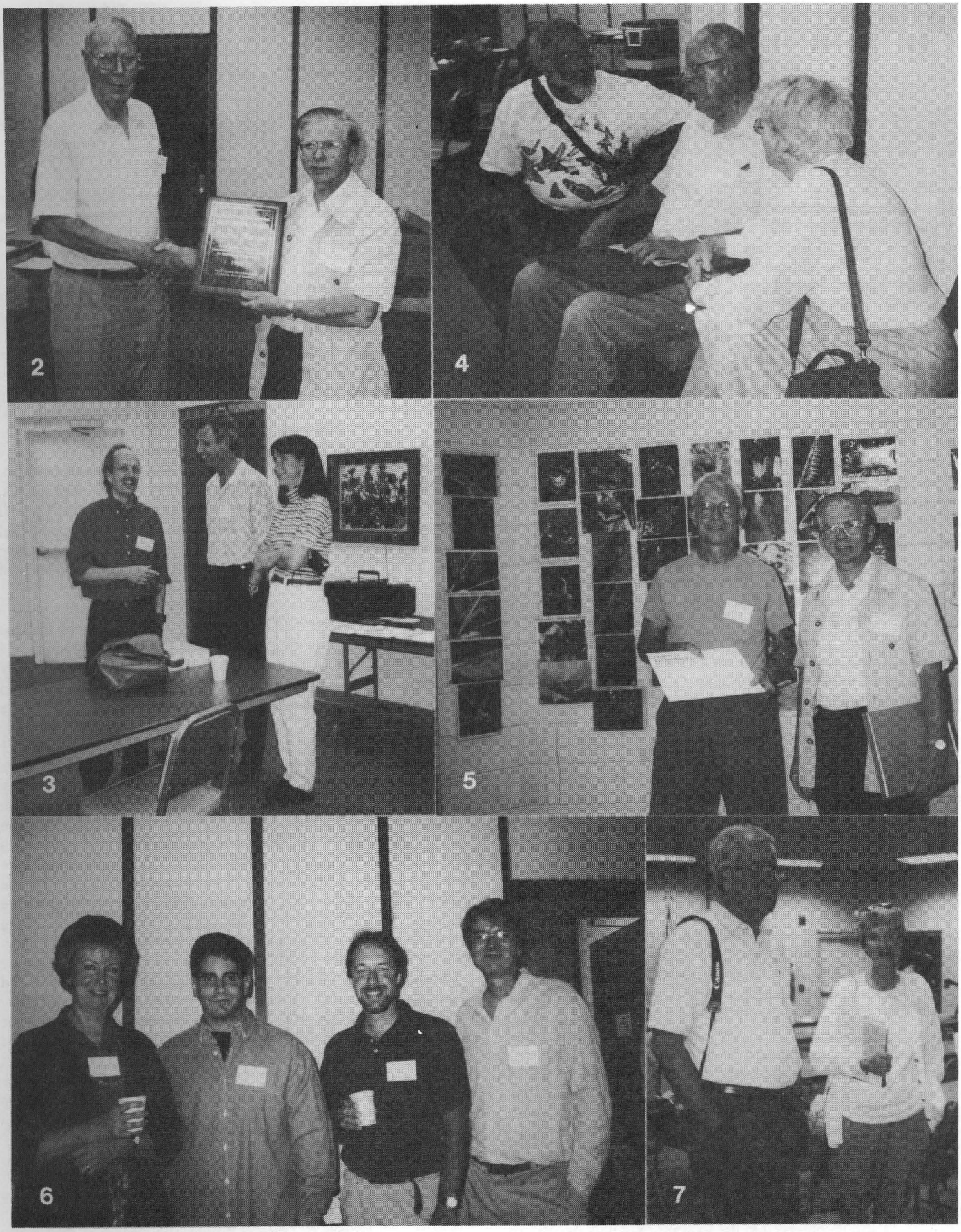
I hope you will voice your opinions to local and national political leaders and educate them about the conservation laws, written originally for mammals and birds, but often now just having the insects added to them with mindless none-thought about the consequences. Only we have the knowledge to educate these politicians, for no one else will do it. So, do your part and speak out! When a park visitor can step on any number of roaches or ants and be welcomed, but the lowly amateur naturalist who captures one specimen for science without a permit gets fined, or jailed — as if a bear had been shot — or has his catch taken away, then we really are in serious trouble, both mentally and morally, and also in regard to the future of science. And, remember that most permit processes are not simple, but often involve endless red-tape designed for the exacting needs of permits to study endangered mammals or birds, not insects!

Although I write this in personal recognition of our Florida friend's lamentation about collecting, ATL does approve of responsible collecting of insects, as well as knowledgeable conservation. Commercial-scale collecting is not condoned, but the valued amateur naturalist needs to be encouraged, not hindered, and especially regarding insects, where it has never been documented that even localized collecting has done any harm to the local insects. Try exterminating the roaches in your house!

J. B. Heppner
Executive Director

NOTES

1. **1999 Annual Meeting**: April 16-18 in Gainesville.
2. **1999 Annual Photo Contest**: deadline is March 15, 1999.
3. **Address changes**: members are urged to keep their address current for the mailing of journals and the newsletter. With new postal fees, it now costs your society over $4 to pay the postage on returned journals in the USA and remail them to your new address when we are not notified of address changes ahead of time! This is the kind of thing that can require higher dues to cover costs, so please help us all out and let us know when you move.



ATL 1998 ANNUAL MEETING: More Photos. **Fig. 2**. Dr. Eugene Munroe (left) receiving the ATL 1998 Jacob Hübner Award from ATL Chairman, Dr. J. B. Heppner (right). **Fig. 3**. Dr. Philip J. DeVries (left), the 1998 ATL Invitational Speaker, with Dr. and Mrs. J. D. Turner. **Fig. 4**. Dr. Mark Scriber, of Michigan State University (left) talking with Dr. Eugene Munroe, Ottawa, Canada, and his wife, Isabel Munroe. **Fig. 5**. Leroy Simon (left) receiving his award for winning 2nd and 3rd prizes for butterflies in the 1998 ATL Annual Photo Contest, from ATL Chairman J. B. Heppner (right). **Fig. 6**. Left to right: Jane Ruffin (Rosemont, Pennsylvania), and Mark Salvato, Jaret Daniels and Akers Pence (Gainesville, Florida). **Fig. 7**. Ron Boender (left) and his wife, Grace Boender, of Butterfly World, Coconut Creek, Florida.

NOTES ON THE EFFECT OF THE EL NIÑO PHENOMENON AND FOREST FIRES ON LEPIDOPTERA POPULATIONS OF PALAWAN, THE PHILIPPINES, DURING 1997-98

Jan S. Petersen

P. O. Box 171, Puerto Princesa City, 5300 Palawan, Philippines

During the latter part of 1997 and beginning of 1998, most of Southeast Asia experienced a very severe drought, evidently caused by the natural El Niño phenomenon. Throughout the region widespread and extensive bush and forest fires raged for weeks or even months. The island of Palawan did not avoid its share of destruction and in fact was the hardest affected place in the Philippines in respect to subsequent fires. Some 15,000 hectares of grassland and virgin forests have been reported lost in these blazes, but since many Municipal Forestry Departments have failed to report their respective losses to the Provincial Environment and Natural Resources Office (PENRO), a total assessment is difficult to make. However, it seems fairly reasonable to put the figure at a total of 25,000 hectares, as some of the municipalities not reporting are known to have been severely affected.

Most severely affected by the fires were the Rizal and Quezon Municipalities on the SW coast, where more than fifty uncontrolled fires destroyed vast areas during late March and early April 1998. Unlike previous years, when it was largely grasslands being lost, extensive stretches of virgin forests along the lower flanks of Palawan's highest peak, Mt. Mantalingahan (2085m), went up in smoke. Due to the mentioned failure of reporting to PENRO, I am unfortunately not able to provide more precise information for Palawan as a whole at this point.

On 2 June 1998, I had the opportunity to personally inspect a primary forest area that had been devastated by a fire a few days earlier, just inland of the village of Napsan, west-central Palawan. The environment had been severely damaged, but what had most obviously happened was that the excessive amount of dry foliage on the ground, brought about by the El Niño drought, had caught fire and the trunks of climbing plants, bushes and young trees had been heated to the extent that the plants would wither. This appears to be the most probable cause of the simple fact that the canopy was still green and most secondary growth still present, but in a withered condition.

The rainy season (May to December) of 1997 was quite mild, with the last major rains virtually stopping already as early as October. A dry and relatively cool climate was experienced until late February when temperatures increased rapidly, as is natural for the dry season (March and April).

During December 1997 and January 1998, most of the small and medium-sized rivers in central Palawan dried up and by late February trees growing on thin soil, on rocky ground, in the foothills were withering. At this point, Heterocera populations started to dwindle. December and January is naturally the main low density period of Rhopalocera populations in Palawan. Towards March and April, Rhopalocera populations increase in density, but during the same period of 1998, populations gradually reduced to such an extent that even common, widespread species like *Appias lyncida enaretina* Fruhstorfer (Pieridae) turned into an irregular sight in the foothills. Several other species, like *Troides plateni* Staudinger (Papilionidae), which usually keep unchanged population densities in the foothills during the March/April dry period, had disappeared completely by November 1997.

In the case of Heterocera, an obvious reduction in population densities could also be observed in the foothills. Not only did Heterocera populations decrease in densities, but a very remarkable phenomenon was that moth populations took on very different species compositions. This I have not observed during previous normal dry seasons.

The major change in species compositions of Heterocera could be stated as follows: species that were normally very common maintained their abundance in an estimated 2/3 of the cases. The remaining third was obviously affected, but still fairly numerous. A large bulk of species that can normally be considered fairly common to common were as a great whole affected so much, that they quantitatively were reduced to less than 50% of normal population densities. At the same time, there were species, which are normally quite infrequent visitors at the light trap, that suddenly showed up in either greater quantity or just more frequently.

As an example, three of the *Acosmeryx* spp. (Sphingidae) occurring on Palawan showed interesting trends. *Acosmeryx shervillii* Boisduval and *A. anceus subdentata* Rothschild & Jordan are normally the common species at light traps, with *A. pseudonaga* Butler as a very irregular visitor. During the January to May period of 1998, *A. pseudonaga* was not only more numerous than the two other species, I even could observe more specimens on a single night than I would have done in a one year period under normal climatic conditions! Otherwise, in the case of the Sphingidae, one could see a very strong reduction both in the quantity and variety of species coming to light traps.

Much natural (i.e., drought) and human (i.e., fires) destruction of a wide variety of habitats could be observed, especially during the first five months of 1998: in the case of Lepidoptera, this destruction had a devastating effect, at the very least in the short term. As previously mentioned, March and April is the natural dry season, so the flora and fauna must to some extent have adapted to this yearly cycle. In the case of forest fires, these areas, as a large whole, probably will take quite some time to recover. It would be fairly reasonable to anticipate that the understory within the primary forest, which was lost in the blazes, soon after the first rains would sprout once more, thereby providing fresh food sources for a variety of Lepidoptera, so even an extended dry period as the 1997-98 El Niño should not really threaten the very existence of any Palawan Lepidoptera species, except on a local basis. Furthermore, throughout the El Niño period, the interior hills of Palawan have sustained Rhopalocera populations with the same density as usual, even down to altitudes of around 300m above sea level, which still is within the lowland ecological zone. Some species of Rhopalocera even showed increased population densities in these areas during the El Niño.

Considering that the major part of the Palawan lowland habitats and Lepidoptera population was largely destroyed by the El Niño and fires, it can be expected that, with the onset of the rainy season, large areas of land virtually will turn into "virgin" breeding grounds as lots of potential food sources will sprout and germinate. All in all, I expect a great quantitative come-back for most species of Rhopalocera by then. This prediction still needs to stand its test and as a follow-up to this article, at least one more article is planned as soon as adequate material and observations are at hand.

ACKNOWLEDGMENTS

I would like to thank Stephen K. Hall and David Lees for checking up my English grammar and for useful comments and suggestions on the manuscript. Thanks to Mrs. Melinda R. Felizardo-Amihan, GIS Manager of the Palawan Tropical Forestry Protection Programme (PTFPP), for kind assistance in the attempt to obtain reliable data for this article. Likewise, thanks to Colin G. Treadaway for his continued support and encouragement of my studies of Palawan Lepidoptera.

AN EXOTIC DESTINATION IN THE HEART OF THE JUNGLE: POOK'S HILL NATURE RESERVE, BELIZE

Rimantas Puplesis[1] and Simon R. Hill[2]

[1]Zoologijos kat. VUP, g. Studentu 39, LT-2034 Vilnius, Lithuania

[2]Westminster University, Middlesex, England

As part of a research project (R. Puplesis and G. S. Robinson, principal investigators), financed by NATO and managed by the Royal Society of London, field work was conducted at a Neotropical site to investigate primitive leafmining Lepidoptera. There usually are problems in finding a convenient place for intensive and successful Lepidoptera collecting: easy access, well-maintained, located within an area of natural diversity, and where sampling is welcome.

During a one month intense field survey in Belize, we discovered a very suitable site of great natural interest: Pook's Hill Nature Reserve. Pook's Hill is a 300-acre private nature preserve of pristine jungle in the foothills of the Maya Mountains of Belize. It is bordered next to the Tapir Mountain Nature Reserve, by the Roaring River, located 12 miles from Belmopan and 21 miles from San Ignacio.

On arrival, we found ourselves in a small hillside clearing closely surrounded on all sides by dense and scenic tropical forest. It is possible to set light traps in the clearing near the visitor lodge or to select a site in the forest along one of the paths. The owners of the reserve, Vicki and Ray Snaddon, plan to provide as many facilities for research work as possible, with electricity. They are both very hospitable and enthusiastic, so entomologists, amateur collectors, or just tourists who are interested in wildlife, are very welcome. Accomodation is in the form of cozy detached cabanas with private bathroom (hot showers); there even is a bar/restaurant serving European cuisine, with a flavor of the Caribbean added. Pook's Hill Reserve also offers horse riding, mountain biking, birding, etc.

If you go, follow the Western Highway to mile marker 52.5 at Teakettle Village, turn south onto a dirt road for 4 miles, then turn right where the Pook's Hill Reserve entrance is about 3/4 mile along this road, then a further 3/4 mile to the lodge. The route is well posted. You can get in contact with the friendly owners by e-mail to Vicki or Ray Snaddon: pookshill@bit.net. Check their website at: www.belizenet.com/pookshill.html

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THE PIONEER CENTURY OF AMERICAN ENTOMOLOGY

by H. B. Weiss

Continued from Chapter I-II (see *Lepidoptera News*, June 1998) – J. B. Heppner, Editor

CHAPTER III

THE EARLY YEARS OF THE 19TH CENTURY
(1800 to 1817)

At the beginning of the 19th century, the American Philosophical Society offered a prize "for the best method of preventing the premature decay of peach trees." The amount of the prize was $60.00 and two of the papers submitted were of such equal merit that the prize was divided equally between the two authors. John Ellis, of New Jersey, was one of the prize winners and his paper was printed in the *Transactions* of the Society in 1802 under the title "Account of a method of preventing the premature decay of peach trees" (vol. 5, appx. No. 1, pp. 325-26). His paper dealt with the peach-tree borer, its type of injury, deposition of the eggs by the "wasp-like" adult, etc. His method of control was to clear away the soil from the base of the tree to a depth of about three inches and to then apply a band of straw, one inch thick and three feet long, binding it around the tree at three places, and having the band extend to the bottom of the hole. The soil was then replaced. Upon the approach of frost the straw was removed. By this method egg deposition was prevented within three feet of the root. Ellis tried this method on numerous trees and found that it worked.

The other prize winner was Thomas Coulter of Bedford County, Pennsylvania. His paper appeared in the same volume of the *Transactions* (appx. No. 2, pp. 327-28) that carried Mr. Ellis' paper, and was entitled "Description of a method of cultivating peach trees, with a view to prevent their premature decay; confirmed by the experience of forty-five years, in Delaware State and the western parts of Pennsylvania." Coulter claimed that the death of young peach trees was due principally to planting, transplanting and pruning the same stock and then gave his observations concerning the culture of the trees, plowing, manuring, etc., but said nothing about insects. Apparently the committee of award was not overbalanced, entomologically.

In 1803 John Drayton, the governor of South Carolina, wrote to the secretary of the American Philosophical Society about the "Destruction of Carolina pine trees by an insect" and this letter was read at the meeting of October 7 (*Proc. Amer. Philos. Soc.* vol. 22, appx. p. 342). The extent of Governor Drayton's interest in entomology is unknown. In 1801, he used his influence for the establishment of South Carolina College. Probably his timber holdings were at the bottom of his interest in insects.

The status of economic entomology at the beginning of the 19th century is perhaps shown by the references to insects and the remedies proposed in *The Domestic Encyclopaedia or A Dictionary of Facts and Useful Knowledge comprehending a concise view of the latest discoveries, inventions, and improvements chiefly applicable to rural and domestic economy*, etc., etc., by A. F. M. Willich, M.D. The first American edition of this encyclopaedia with additions by James Mease, M.D., was published in Philadelphia in 1803 and it is from this edition that the following notes and extracts have been made:

For the control of ants on plantations the following recommendation is made: "A small quantity of human feces, when placed in their hills, will not only destroy great numbers, but expel the rest from their habitations."

As a protection against the "black fly" or plant louse that attacks turnips, cabbages, etc., it was suggested that the seed be impregnated with sulphur. For bed-bugs, the remedy was 1/2 ounce of camphor in 1/2 pint of spirit of wine or turpentine, with which the beds, furniture, etc., were to be anointed. Another remedy was the mixture of 1 ounce of quicksilver and the whites of 6 or 8 eggs. These were beaten together until the quicksilver appeared as a black sediment on the bottom of the vessel. It was then to be applied with a brush to furniture.

The canker-worm is described as "a species of insects particularly destructive to corn, grasses, and every other vegetable in which it can harbour . . . . These worms, every fourth year, become flies, when they deposit their spawn in the ground." The canker-worms were supposed to originate from injudicious pruning, "leaving the foot-stalks of fruit on trees after it was gathered; bruises arising from the use of ladders in collecting fruit; nailing trees against walls, with too tight trelisses; wet autumns which prevent the young wood from ripening, and are succeeded by severe frosts that kill the shoots; birds and insects devouring the buds," etc. Apple trees particularly were subject to attack.

The caterpillar, or *Eruca*, is "a genus of insects comprehending many species, of which that most generally known is the common, or garden-caterpillar." Then follows several pages devoted to specific caterpillars. *Coccus* is described as "a genus of insects comprising twenty-two species, which are principally denominated from the plants they frequent."

Cockroach, "or *Blatta*, L., a genus of insects, resembling the beetle, and consisting of ten species, the most remarkable of which is the *orientalis* or eastern cockroach. These insects are frequently found in America; they penetrate chests, drawers, &c. and do considerable injury to clothes. They seldom appear till night, when they infest beds, and bits very severely, leaving an unpleasant smell. Their food is bread, meat, whether raw or dressed, linen, books, silkworms, and their cods, &c. According to Sir Hans Sloane, the Indians mix the ashes of the cockroach with sugar, and apply them to ulcers, in order to promote their suppuration."

Cricket, "the Common, or Hearth-cricket, *Gryllus domesticus*, an insect which delights in new built houses, where the moisture and softness of the mortar enable it to penetrate between the joints of the bricks or stones, and thus to open communications to different rooms." An easy method of destroying them was to place phials half full of beer near their holes whence they would crawl in to them and could not escape. Cats, it is stated, were fond of crickets and would eat vast numbers of them.

Dog-Fly, "or *Cynomia*, L. a genus of insects common in woods, and among bushes: they are particularly troublesome to dogs, and usually seize upon their ears; it is believed that they can be prevented only by being killed."

Flea, "or *Pulex*, L. in zoology, a genus of insects requiring no particular description," etc., etc. "Children and females are remarkably liable to the attacks of this little enemy; a circumstance which must be attributed to their more tender skin, their purer blood, longer clothes, and in some individuals, perhaps to a peculiar state of perspiration." Cleanliness was stressed. Rooms

were to be sprinkled with a decoction of wormwood. Dogs and cats were to be anointed with sweet oil.

Grasshoppers, "or *Tettigonia*, L. are a family of insects belonging to the genus of *Gryllus*, and comprising 69 species," etc., etc., etc.

Hornet, "or *Vespa Crabro*, L. a well known insect, which is about one inch in length, and builds its nest in hollow trees," etc., etc.

Various other insects are mentioned, such as the horse-fly, lackey moth, louse, mole cricket, moth, silk-worm, etc., but enough has been quoted to give one an idea of the kind of entomology that circulated in the encyclopedias.

BENJAMIN HENRY LATROBE (1764-1820)

It is a relief to turn from this to a paper that appeared in the *Transactions of the American Philosophical Society* (vol. 6, pt. 1, No. 15, pp. 73-81, 1 pl.) called "On two species of *Sphex*, inhabiting Virginia and Pennsylvania and probably extending through the United States." This was read January 21, 1803, by Benjamin Henry Latrobe and dealt with *Sphex coerulea* Linn., and *Sphex pennsylvanica* Linn. The author states that these "probably" are the species but refers to them as being known commonly as the "blue wasp" and the "mason and dirt-dauber." He then describes them, rather loosely, their method of building cells, their habits and the fact that they fill the cells with spiders of numerous genera, but especially those not building webs. Mr. Latrobe opened cells, counted the spiders, weighed them and weighed the larvae of the wasps. One poorly drawn plate illustrates the wasps, larvae, and cells. Reference is also made to John Bartram's paper in the *Transactions of the Royal Society of London* (vol. 43, No. 476, 1745) referring to these insects. Latrobe's account is an early effort to record interesting things about the domestic economy of wasps. It is readable, not technical. Some of his observations were made at Ripponlodge, in Virginia. The author was inclined to believe that *Sphex pennsylvanica* reasoned, because it had repaired several injuries which he had made to its cells.

Benjamin H. Latrobe was an architect who was born in Yorkshire, England, May 1, 1764. He was educated in a Moravian seminary in Saxony and at the University of Leipzig. In the Prussian army he saw active service. Returning to England, he was made surveyor of the public offices, and engineer of London in 1789. He came to this country in 1796 and was the engineer of the James River and Appomattox canal. In addition, he built the penitentiary in Richmond, Virginia, and many private mansions. In 1798 he moved to Philadelphia, where he designed the old Academy of Art, the Bank of the United States and additional buildings. In 1800 he was the first to supply Philadelphia with water pumped by steam from the Schuylkill River. He was the architect of the Roman Catholic cathedral in Baltimore and in 1803 he was appointed by Thomas Jefferson as surveyor of public buildings. Latrobe was even interested in steamboats and built the "Buffalo" at Pittsburgh, the fourth steamboat to descend the Ohio River. After the burning of the Capitol in 1814, Latrobe was engaged to rebuild it. He resigned in 1817 and went to New Orleans to build a water works. Here he died on September 3, 1820.

CHARLES COTESWORTH PINCKNEY (1746-1825)

The author of the famous phrase, "Millions for defence, but not a cent for tribute," Charles Cotesworth Pinckney, statesman, brigadier-general in the Revolutionary War, Washington's aid-de-camp, lawyer, United States Minister to France, etc., wrote in 1804 to the American Philosophical Society a letter "On the worm supposed to destroy the South Carolina pines." This was read on October 5, according to the *Proceedings* (vol. 22, appx, p. 362), but apparently it was never printed. Pinckney was born in Charleston, South Carolina, in 1746, and died there in 1825.

JOHN BARTRAM (1699-1777)

In 1804, a posthumous paper by John Bartram, to whom reference has been made [see Chapter II], appeared in the *Philadelphia Medical and Physical Journal* (vol. 1, pt. 1, Nov. 13, art. 16, pp. 56-9), the manuscript having been in the possession of the editor, B. S. Barton. The title was "Additional observations on the *Cicada septendecim*." Bartram, in his brief paper, records the appearance of the periodical cicada in the vicinity of Philadelphia on May 10, 1749, and describes their positions on grass, bushes, rails, trees, etc., together with a few notes on their habits, egg laying, etc. The editor then appended a note saying that the earliest notice he had been able to find concerning locusts was that by Nathaniel Moreton in his work *New England's Memoriall*, &c., printed at Cambridge, Massachusetts, 1633, in which Moreton speaks of a sickness in 1633 that carried off many Indians and whites in and near Plymouth. In the spring before this sickness, numerous "Flies" (locusts) appeared and made "such a yelling noise." The Indians said that sickness would follow. Previous to that time, the English had never seen or heard them in this country. Towards winter, the sickness disappeared.

S. WRIGHT (17??-c.1804)

In the same [1804] issue of the *Medical and Physical Journal* (vol. 1, pt. 1, Nov. 13, art. 28, pp. 103-7) appeared a posthumous paper by Mrs. S. Wright, late of Lancaster County, Pennsylvania, on "Directions for the management of silk-worms." This paper covers the care of eggs, young larvae, feeding, care of cocoons, etc., and according to the editor, did not contain much new information, but was published because it was useful. Mrs. Wright's paper was printed from a manuscript account found among the papers of the editor's father, the Rev. Thomas Barton of Lancaster. Mrs. Wright "was a woman of uncommon powers of mind, and directed much of her attention to the management of silk-worms, and to other subjects of public utility, at a time (at least forty years ago) when she stood alone in her exertions in this way."

CHARLES GOTTHOLD REICHEL (1751-1825)

Another paper on the periodical cicada appeared in the first volume of the *Medical and Physical Journal* (vol. 1, pt. 1, Nov. 13, art. 15, pp. 52-6) and was by Charles Reichel. It had been written at Nazareth, Pennsylvania, August 2, 1793, but was not printed until 1804. It is entitled "Some particulars concerning the locust of North America." Mr. Reichel, in his letter to the editor, mentions a Jacob Rubel, of Bethlehem, Pennsylvania, who claimed that the "locusts" in 1727 were far more numerous than in 1793. Reichel cites the opinions and observations of old residents of Nazareth and Bethlehem. His own observations led him to say that apple trees had been injured by egg deposition in the tender branches, and that seven, eight and nine years were perhaps necessary from egg to adult. Because the larvae were found at depths of seven or eight feet below the surface, some persons thought that the eggs, for three or more years, sank deeper and deeper into the mould. He observed that as population and cultivation increased, the cicadas decreased in numbers. A note by the editor calls attention to the fact that although parts of Reichel's article are false, the paper was interesting enough to be

published.

Charles Gotthold Reichel was a Moravian bishop who was born at Hermsdorf, Silesia, July 14, 1751. He came to this country in 1784 and opened a boy's boarding school at Nazareth, Pennaylvanla, over which he presided for sixteen years. At one time he lived at Salem, North Carolina, and the University of North Carolina conferred upon him the degree D.D. In 1811 he was made presiding bishop of the northern district of the church, and he moved to Bethlehem, Pennsylvania. In 1818 he returned to Europe and retired from active service, dying April 18, 1825, at Niesky, Prussia.

WILLIAM MASON WALMSLEY (17??-18??)

Apparently the *Philadelphia Medical and Physical Journal* was not averse to publishing entomological observations. In 1805 we find another insect paper, this time by William Mason Walmsley on "Observations relative to the wheat-moth of Pennsylvania, and other parts of the United States" (vol. 1, pt. 2, May, Sect. 1, Art. 20, pp. 119-26). Mr. Walmsley, who lived at Byberry, near Philadelphia, repeats what he heard from a "very respectable old gentlemen" and others and notes the spread of the insect around Philadelphia. Mr. Walmsley knew little about the habits of the species and admitted it. His paper, being made up chiefly of hearsay and suppositions, is of little value entomologically. The editor appended a note stating that the species in question was a species of *Phalaena* of Linnaeus, belonging to the *Tineae*.

THOMAS WALMSLEY (1781-1806)

Mr. W. M. Walmsley had a brother, Thomas, and he too was interested in entomological questions. After his brother's death, W. M. Walmsley found among his effects a paper on "Facts, experiments, and observations, relative to some American species of *Lampyris*, or fireflies . . . ." This was sent to the *Medical and Physical Journal* and appeared in 1807 (vol. 2, pt. 1, Nov. 27, Suppl. No. 1, Mar. 7, Sect. 2, Art. 4, pp. 118-23).

Mr. Thomas Walmsley said that when the *Lampyris* was immersed in water, it drowned in fifteen to twenty minutes but it shone with almost as much brilliancy as when in the open air. Immersed in spirit of wine, it lived for five or six minutes, remained "opake" for two or three minutes, then flashed for three or four times, losing part of its opacity after each flash. In a "perfect Torricellean vacuum" it shone for a short time and then became "opake". Upon the admission of the least amount of air, it shone again. Walmsley tried carbonic acid gas, hydrogen, oxygenated muriatic acid gas, oxygen and azotic gas and noted their effects upon the luminosity of the beetle. He then describes the part emitting the light and states that he will show that the air taken in by the spiracula has no communication with the luminous part. He does this by cutting what he calls the *scuta*, which is of a pale or whitish straw-color and transparent, and which covers the part emitting light. He believed that the air came into contact with the phosphorescent substance some other way. He then outlines his further cutting and his concluslons.

Dr. Thomas Walmsley was born near Philadelphia in 1781. At the age of nineteen he began the study of medicine and in 1803 he received his M.D. from the University of Pennsylvania. He was a well-liked and competent physician, first in Chambersburg, Pennsylvania, and then in Elizabethtown, Maryland. He died on August 15, in his twenty-fifth year. During the years immediately preceding his death he was much interested in the light of fireflies and in the natural history of such insects.

FREDERICK VALENTINE MELSHEIMER (1749-1814)

Although it may seem far-fetched to connect the first book on insects printed in this country with the American Revolution, yet there is a relation between the two and it may be said, with a degree of truthfulness, that one of the indirect effects of the Revolution was the publication of such a book.

When the Brunswick auxiliaries left Wolfenbuttel [Germany] on February 22, 1776, for Quebec to fight under Burgoyne, the Duke of Brunswick's dragoon regiment included a chaplain named Frederick Valentine Melsheimer. Melsheimer accompanied Burgoyne's expedition from Canada to the Hudson, which started so successfully by taking Fort Ticonderoga and ended so disastrously at Saratoga, and it is recorded that he was present at the battle of Bennington, where Burgoyne met his first defeat, and that he was wounded in the arm and later taken prisoner. According to the *Journal of the Hessian Regiment Von Huyn*, Melsheimer was on parole at Newport October, 1778, with other Brunswick officers. Burgoyne's army, after its surrender to Gates, marched to Boston and later to Virginia. Desertions were frequent and by the end of the war it had disappeared in the American public. Melsheimer was no exception. He, too, stayed in this country to save souls and do pioneer work in entomology.

He was born in Regenborn, in the Dukedom of Brunswick, Germany, on September 25, 1749. During his early youth he attended a school at Holzminden and at the age of twenty entered the University of Helmstaedt, where he prepared for the ministry. He was finally (1775) ordained a clergyman in the Lutheran church and in 1776 received his appointment as chaplain of the Brunswick Dragoons. From his early youth he had been interested in birds, plants and insects, and this interest was, no doubt, encouraged by his father, who was superintendent of forestry for the Duke of Brunswick and who studied botany and the healing properties of herbs. Frederick also was quite friendly with A. W. Knoch, and both collected plants and insects around Regenborn. After Melsheimer came to America he continued his friendship with Knoch by correspondence and by sending him numerous specimens of insects. Doctor Knoch, in a book dedicated to Melsheimer and published in Germany in 1801, acknowledges the receipt of seven hundred specimens of American insects from his friend.

After Melsheimer left the military service he went to the Moravian settlement at Bethlehem, Pennsylvania, where he met friends from Germany. He married Mary Agnes Mann of Bethlehem on June 3, 1779, and during the same year became pastor of five Lutheran churches in the territory now known as Dauphin County. He later moved to Manheim, Lancaster County, and in 1785 to New Holland. It was during this time that he began collecting and studying American insects, which activity furnished some of his parishioners with mild amusement.

When Franklin College was chartered at Lancaster in 1787, Melsheimer left New Holland to take charge of its German department, and he was also the second president of the college. In 1789 he became pastor of St. Matthew's church at Hanover, Pennsylvania, and here he lived until his death on June 30, 1814. He was the father of eleven children. His eldest son, Johann Friedrich, inherited his father's position, collection, books and manuscripts, and at his death they passed into the hands of another son, Ernest Friedrich, a physician and coleopterist who lived near Dover, a town north of Hanover.

In 1806 Melsheimer published his *Catalogue of Insects of Pennsylvania*, which was the first separate publication on insects to appear in America. Before this time American insects had been described in Europe by Degeer, Linnaeus, Fabricius and others;

John Bartram had published on American insects in the *Philosophical Transactions* (London) and brief accounts had appeared in our own early journals, but up to 1806 there had been no publication devoted exclusively to insects.

Melsheimer's catalogue is a small book, 12mo, vi + 60 pages, the title page of which is as follows: *A Catalogue of Insects of Pennsylvania*, by Fred. Val. Melsheimer, Minister of the Gospel. Part First, Hanover, York County: Printed for the Author, by W. D. Lepper, 1806. In the preface Melsheimer writes,

> "I hereby offer to the Friends of Natural History a Catalogue of Insects, in the Collection of which I have spent my Hours of Recreation for some Years past. To the best of my Knowledge, I have but few Predecessors in the United States in this Undertaking. For this Reason I may calculate on the Indulgence of the experienced Naturalist in case some slight Errors should be found in it. It is an undeniable Fact, that Entomology has been considerably extended by American Insects; but yet there are many non-descript Genera and species, to be met with by an observant Naturalist, which fully repay the Trouble of his Exertions. Hence arise the urgent Requests, and Invitations of European Naturalists; hence the ardent Desire to possess American Insects, and this is likewise the strongest Inducement for American Entomologists to make themselves more intimately acquainted with the Production of their Country."

Melsheimer then states that if his catalogue is well received he will continue it, also that he is willing to exchange his duplicate specimens for others that he does not possess, and that he is ready to sell collections of different species at a rate of five dollars per hundred. He also says that in his classification he has followed the system of Fabricius and Doctor Knoch's suggestions.

His catalogue lists 1,363 species of beetles, each page carrying a single column. Dr. H. A. Hagen, writing in 1884, said that only 205 species could be recognized, but Dr. E. A. Schwarz in 1895 was able to identity over 400 species from the names given, many of which had been derived from the names of food plants. Schwarz called attention to the few foot notes in the catalogue referring to the time of appearance, injurious habits and the nature of the damage for some species, indicating that Melsheimer took more than a possessive interest in his specimens. Because of the fact that the catalogue lists manuscript names, it never had a scientific value, but its position in the inception of entomology in this country and its associations make its historical value absolute.

According to Morris, Melsheimer was the author of a book on mineralogy and a journal of a tour in Pennsylvania which were published in Germany. Prowell states that Melsheimer's first book was published at Hanover, Pennsylvania, in 1797, and dealt with a theological controversy which he had with Rev. Father Brosius, pastor of the Church of the Sacred Heart, on the Conewago creek near Hanover. In 1809 he wrote and published a work on *Christian Worship and the Beauty of Holiness*, and at Frederick, Maryland, in 1811, another on the *Truth of the Christian Religion*. These last three books are in German.

Melsheimer also kept a journal of his trip to America which was published at Minden, 1776. In this he described the weather, coast of England, happenings on the boat, and the fortifications, churches, buildings, people, Indians and scenery of Quebec, where he landed.

His *Catalogue of Insects of Pennsylvania* is quite scarce. Mr. William J. Fox has advised me that the library of the Academy of Natural Sciences of Philadelphia has two copies and that there is another copy in the library of the American Entomological Society. Miss Ina L. Hawer states that the library of the National Museum has a copy which was presented to them by Doctor Schwarz. This is probably the copy which Schwarz mentions, in his account, as having been used by Melsheimer and as containing numerous manuscript corrections and additions by the author and by his son, J. F. Melsheimer, who corresponded with Thomas Say. In Catalogue 24, *Books on Insects* [1935], of Mr. John D. Sherman, Jr. (Mount Vernon, New York), a copy is offered for sale, and Mr. Sherman has written to me that in addition to the one which he has listed he knows of the existence of three other copies. One is in the library of the Museum of Comparative Zoology, another in the library of the New York State College of Agriculture, at Cornell University, and another is in his own library.

EARLY PAPERS

Enoch Perley in 1804 wrote on the injuries by *Mytilaspis pomorum* and the means of preventing them to young apple trees in Maine (*Papers on Agric.* 1804, vol. 2, pp. 103-105; *Mass. Agric. Repos. & Jour.* May, 1814). Mr. T. Parsons in 1807 described an invasion, probably of *Leucania unipuncta*, and suggested the remedies to use against palmer worms (*Mass. Soc. Prom. Agric. Papers*, 1807, pp. 32-33).

A general and entomologically unimportant paper on the periodical cicada, written by Dr. Calvin Jones of Raleigh, North Carolina, under the title "Observations on American locusts" appeared in 1807 in the *Philadelphia Medical and Physical Journal* (Suppl. No. 1, Mar. 7, Sept. 2, art. 13, 1807). Doctor Jones refers to the insects in the middle and western parts of Pennsylvania in May, 1803, describes them, their musical apparatus, egg laying, etc., and quotes other writers. The editor then adds additional facts and observations.

In London in 1804, there was published in twelve volumes *The Wonders of Nature and Art, or a concise account of whatever is most curious and remarkable in the world*, etc., by the Rev. Thomas Smith. This was revised and corrected and improved by James Mease, M.D., and carried a Philadelphia imprint in 1806 and 1807. Volume 14, the last one of the American edition, contains a short chapter on insects which starts off by mentioning the periodical cicada, the years it had appeared in Pennsylvania, its emergence, music, egg deposition, copulation, and ends by stating,

> "There are two distinct species of cicada in North America: the one here described being much larger than the other. The smaller species has a black body with golden eyes and remarkably yellow veined wings."

The Hessian fly is then mentioned and following this is a list of various species, each briefly treated. A statement is made that they have been covered by Doctor Barton in a memoir (still unpublished) for which he obtained the Magellanic Premium from the Philosophical Society of Philadelphia. The list includes the pea bruchus, grass caterpillars, a cimex injurious to wheat, Indian corn, etc., *Lytta vittata* Fab., cucumber beetle, rose chafer, blister beetles, etc.

In 1807 the *Medical Repository* carried an anonymous paper, "History of the worm which spread terror, through New York and the neighboring states, in June and July, 1806" (vol. 10, No. 1, July, pp. 98-100). The portion of this paper referring to the newspaper accounts is quoted below in full, as the same criticism is applicable today of "newspaper entomology:"

> "There are times when mankind are easily frightened, and readily listen to stories tinctured with the marvellous. After the solemnity of the eclipse, on the 16th of June, and before the festivity of the 4th of July, there was a considerable dearth of foreign and domestic news. Nothing occurred either at home or abroad of sufficient moment to satisfy the public appetite. At this

puncture a discovery was alleged to be made of a worm which infested the Lombardy poplars. This was, in fact nothing new, as the creature had been observed years before. However, it passed for a new and hitherto unobserved animal, and was reported to be one of the most poisonous of all reptiles. Tales were propagated and extensively believed, that dozens of men, women, and children had been killed by their bites: and that cats, dogs, and horses had fallen victims to their venom. There was a general panic. The greater part of the citizens were engaged in discussions about the 'asp' (for so they named it) which lived on the poplars, and darted upon passengers; and some persons actually yielded to the delusion so far as to cut down their trees. The newspapers contained various accounts of the animal."

The cause of all this was an active caterpillar which the anonymous author bred through to the adult stage to a species of *Phalaena.*

Articles on silk-worms continued to be popular and sometimes foreign ones were translated and published, such as the one translated by E. Cutbush from an Italian memoir and printed under the title "On the Prevention and Cure of Certain Diseases of the Silk-Worm," in the *Philadelphia Medical and Physical Journal* in 1808 (Part 1, vol. 3, pp. 20-24).

In order to combat the prevailing idea that insect abundance and human disease were not necessarily connected, the *Medical Repository and Review of American Publications on Medicine, Surgery and the Auxiliary Branches of Philosophy*, published in 1810 (Vol. IV, pp. 304-305) in part of its "Medical and Philosophical News," an unsigned statement entitled "Insects in Abundance not Necessarily Connected with Sickly Seasons" from which the following extracts are quoted:

"In describing pestilential seasons, it has been very common to notice the innumerable swarms of insects. Some observers of the phenomena attendant on times of sickness have even been led to an opinion that the growth and multiplication of these tribes of animals is promoted by that condition of the atmosphere and the waters which is unfriendly to the health of man. We suspect however this is by no means correct. The summer & autumn of 1800 was very productive of insects in the states of New York, Jersey & Pennsylvania & still no considerable degree of sickness occurred either in city or country. Locusts were so thick in West Jersey & the eastern parts of Pennsylvania — as to keep up a continuous noise."

Other cases are cited where insects were numerous among forest trees, and no remarkable illnesses prevailed:

"There is therefore no necessary connection between swarms of insects & pestilential seasons. But it is nevertheless true that during some periods of epidemic sickness, there have been great numbers of insects. These however have been merely accidental coincidences & by no means indicate a law of nature on the subject. On the contrary — some insects are killed by pestilential air as has been often observed of common house-flies vast numbers of which died on the approach of the sickness in New York toward the latter part of the summer of 1799. For the future, physicians & others who describe pestilential seasons, should be careful not to use the broad & unqualified term 'insect'— but instead particularize the species which is abundant. This is the safest & will mean more to readers."

JOHN B. DAVIDGE (17??-18??)

The *Philadelphia Medical and Physical Journal*, which printed so many entomological articles at this time, carried an interesting one in 1807, by Dr. John B. Davidge, a physician of Baltimore, on "Experiments and observations on the caterpillar which infests the Lombardy poplar" (Suppl. No. 1, Mar. 7, Sect. 2, art. 6, pp. 139-57). Doctor Davidge starts off as follows:

"In a letter from Dr. Vaughan to you, are sentiments attributed to me which I assure you never had a place in my thoughts. I have written to the Dr. on the subject and he appears from his answer to be really impressed with the idea that the construction given by him was the immediate and natural construction to me and I believe to all who are acquainted with the French authorities on the subject, and these were only alluded to, the letters wholly unsusceptible of the interpretation indulged in by the Dr. And certainly, any opinion formed, by any person whatever, must be subject to the control of the authorities quoted. And further, how a gentleman could permit himself to say publicly that I supposed the poplar caterpillar 'would perish in the chrysalis state because it did not subsequently to this state pass into a butterfly,' when the authorities appealed to determined that if it were spurious it would become a large fly, this to me [is] resolvable only into that haste which too frequently explains itself by errors. It was at least incumbent on the Dr. to have consulted the authorities.

Apparently there had been a dispute concerning the poisonous hairs of a poplar caterpillar. John B. Davidge states that,

"the thing at issue is not whether the caterpillar when raised to its winged state would possess poisonous qualities, but what its properties might be while still a reptile."

The author then quotes authorities by which he determined whether the caterpillar belonged to the real or false caterpillars, based on the number of legs. He finally decides that his reptile is of the "class of caterpillar." Many paragraphs are devoted to this phase. He then mentions several experiments involving the placing of two supposed reptiles on an old cat in perfect health, These reptiles, it appears, "bit the cat;" the following morning the cat possessed her usual character of health. In the afternoon the cat refused to take food. In the evening the physician who performed this experiment was called away from home and did not return until early next morning. Upon his return the cat was dead. From this the author concludes that he did not have definite proof that the reptiles killed the cat, but that the experiment raised the venomous properties of the poplar caterpillar high on the scale of probability. Various European authors are mentioned and the experiences of these authors with stinging or nettling caterpillars are outlined. The poplar caterpillar is then described externally and internally, very sketchily.

AMOS HAMLIN (1766-1843)

Dr. Amos Hamlin, of Durham, Greene County, New York, communicated his thoughts on horse bots to Doctor Mitchill and they duly appeared in 1809 in the *Medical Repository* (vol. 12, No. 1, July, pp. 124-125) entitled "Observations on bots in horses." In May, 1800, one of Doctor Hamlin's horses was troubled with bots and voided a lot of them. Doctor Hamlin collected some, put them in dried horse dung in a tightly stoppered bottle and finally saw them change to pupae in which state they continued for about five weeks, finally hatching into what was called, in the country, a "horse-bee" or "nitter." He obtained eggs and found that they hatched into tiny creatures like the bots. However, in separating the hair in the vicinity of the eggs, he found that the tiny bots appeared to be penetrating the skin so far as to be almost out of sight. How they finally got into the stomach of the horse, he left to more able naturalists. He suggested that the eggs be scraped off every two or three days, and stated that wetting the eggs in common rum or spirits of terebinthina, diluted, would prevent hatching. He tried many medicines to dislodge the bots from the "bowels" and was sometimes successful when he gave *Rad. Irid. Palustris.*

Amos Hamlin was born in Sharon, Connecticut, August 8, 1766. As a boy he worked on a farm, "read books by the light of pine knots, became a learned man and a popular physician." He

served in the Revolution and settled in Durham, New York, about 1800. At one time in his life he made a cruise around the world, for two years, with Captain Cook. He was president of a medical college, a whig candidate for Congress and he owned slaves which he liberated from conscientious motives, in advance of the New York act. He died at Durham, April 17, 1843.

NATHANIEL DWIGHT (1770-1831)

Nathaniel Dwight, physician, and one of the brothers of Timothy Dwight, one time president of Yale College, wrote "An account of the American cantharis or *Meloe Americae*" on September 9, 1800, and did not get it published until 1810 when it appeared in the *Memoirs of the Connecticut Academy of Arts and Science* (vol. 1, pt. 1, pp. 99-102). Doctor Dwight refers to Doctor Chapman's account which had appeared in the *Medical Repository* (vol. 2, No. 2, p. 174) and to his own experience in Farmington, Connecticut, in 1800, with the vesicating property of the beetle. The main reason for Dwight's paper was the fact that the beetles he noted answered Chapman's description except in color and he wanted to call attention to the color variations. Some had their elytra margined with a narrow stripe of light dirty brown. He thought the color might change as the season advanced and he observed the black ones and those with margined elytra, copulating.

Nathaniel Dwight was born at Northampton, Massachusetts, January 31, 1770, and studied medicine in Hartford, Connecticut. After practicing there he became assistant surgeon in the United States Army. Later he practiced in Westfield, Massachusetts, and at New London and Withersfield, Connecticut. In 1812 he entered the ministry and settled at Westchester, Connecticut, until 1820, at which time he resumed the practice of medicine at Providence, Rhode Island, and Norwich, Connecticut. As early as 1812, when insane persons were still kept in cellars and 'exhibited like wild beasts," he proposed, in a communication to the Connecticut Medical Society, the establishment of a "hospital for lunatics." He was, among other things, the author of a school geography and a history of the signers of the Declaration of Independence. His death occurred at Oswego, New York, June 11, 1831.

JOHN BRADBURY (1768-1823)

When John Bradbury was sent to America, to collect specimens, by the Liverpool Botanic Garden, it was supposed that he would make New Orleans the headquarters for his activities. However, upon the suggestion of Thomas Jefferson, St. Louis was selected, bccause of the more varied topography in the upper reaches of the Mississippi valley. Bradbury arrived in St. Louis, December 31, 1809, and made plans for taking care of the specimens he planned to obtain during the following spring and summer. During 1810 he made frequent trips into the "wilderness," but never more than one hundred miles away from St. Louis. During such excursions he explored, collected specimens and met people. Although his activities were chiefly of a botanical and mineralogical nature, in his "Journal" he did have something to say about bees and the naturalization of the European honey-bee in America, and his remarks are quoted as follows:

> "The honey-bees have been introduced into this continent from Europe," he explained, but at what time I have not been able to ascertain. Even if it be admitted that they were brought over soon after the first settlement took place, their increase appears astonishing, as bees are found in all parts of the United States; and since they have entered upon the five countries of Illinois and Upper Louisiana, their progress westward has been surprisingly rapid. It is generally known in Upper Louisiana that bees leave not been found westward of the Mississippi prior to the year 1797. They relate in St. Louis that a French lady of that place having received a present of honey from Kaskaskias was much delighted with it, and being told that it was produced by a kind of fly, she sent a negro with a small box to Kaskaskias to get a pair of the flies in order that she might obtain the breed. They are now found as high up the Missouri as the Maha nation having moved westward to the distance of 600 miles in 14 years. Bees have spread over this continent in a degree and with a celerity so nearly corresponding to that of the Anglo-Americans that it has given rise to a belief, both amongst the Indians and the Whites, that bees are their precursors, and that to whatever part they go the white people will follow. I am of the opinion that they are right, as I think it as impossible to stop the progress of one as of the other."

When Bradbury returned to England, he found that the plants which he had sent to Liverpool had been looked over by Pursh, who had studied them and published on the new ones. This aroused Bradbury's ire and he refused to have anything further to do with the specimens. Soon afterward he left England permanently and returned to St. Louis where he had previously formed friendships with prominent families. He died at Middletown, Kentucky, March 16, 1823.

WILLIAM SMITH (c.1754-1821)

On October 10, 1810, William Smith wrote a letter from Norwalk, Connecticut, to Doctor Mitchill, editor of the *Medical Repository* about "Observations on the decay of fruit trees, and on lean and shriveled fruit, as caused by insects" which was published in 1811 (vol. 14, No. 4, pp. 350-54).

It appears that some peaches on exhibition in New York were destitute of pulp, juice and flavor. Some resemblance was traced between their external form and that of hickory nuts, and this led to a belief that they represented a mongrel production. The Rev. William Smith inquired into the facts, found that the orchard from which they came belonged to Moses Hanford, of Canaan, and concluded that the trouble was caused as follows:

> "some fly to which the apricot and nectarine trees are more accessible than others, injects its eggs or semina, which contaminate the juices of the tree so powerfully as to stop the fructification, at an earlier or later stage, according to the strength of the trees."

It is also stated that the tree in question showed exudations of gum and numerous insect incisions. The fruit was dried and shrivelled like walnuts, Probably the trouble was due to the shot-hole borer or to the disease known as "little peach," or perhaps to a combination of both.

Dr. William Smith, who took such an interest in fruit, wrote a good deal on various subjects, for the press. He was a native of Scotland, born about 1754, and came to this country as an ordained minister in 1785. Shortly after his arrival, he was located in Maryland. After two years he went to Narragansett, Rhode Island, then in 1790 to Newport, and in 1797 to Norwalk, Connecticut, always as a minister to various churches. About 1800 he opened a grammar school in New York City and earned a high reputation as a teacher. In 1802 he became principal of the Episcopal Academy at Cheshire, but in 1806 he returned to New York and gave private classical instruction, until his health failed, upon which he returned to Connecticut where he officiated in one or two small congregations. He died in New York, April, 1821. It has been recorded, that when scholarship was at a low ebb in this country, Doctor Smith left a lasting monument in the *American Common Prayer Book in the Office for the Induction of Ministers*, of which he was the sole author or compiler, and also in his works on *Church Vocal Music*.

EARLY WEST COAST ENTOMOLOGY

Fort Ross, established in 1812 by the Russians seventy-five miles north of San Francisco on the northern California coast, the surroundings of which interested them as a fur-trading, hunting and farming area, was visited by many naturalists from Russia, who were the first to study the plants and animals of the region, In 1816, Johann Friedrich Eschscholtz, as physician on the ship Rurik of the Russian Imperial Navy, arrived in San Francisco Bay and stayed a month. Eight years later, or in 1824, on the ship Predpriatie, he paid another visit to California and during short excursions, visited Fort Ross and other places. On both trips he was a member of the party under Otto von Kotzebue in his two voyages around the world. Many insects were collected and described by Eschscholtz, and after his death by Dejean.

During the few years previous to the abandonment of Fort Ross, in 1841, by the Russians, a number of collectors and entomologists visited the place, and as a result the museums of St. Petersburg, Moscow and other Russian cities were enriched by the addition of American specimens.

At various times, the fur trading and semi-military posts in California afforded collecting opportunities for such men as Chamisso, Mannerheim, Maeklin and Motschulsky, all particularly interested in beetles.

Dr. J. L. LeConte, in his paper on the Coleoptera collected during the explorations for a route for a Pacific railroad near the 47th and 49th parallels of north latitude, stated that Eschscholtz in his Zoological Atlas had made known, as early as 1829, many Coleoptera of the western coast of North America. Eschscholtz's death prevented the completion of his work and his collections remained undescribed for several years. In the meantime Mannerheim published a coleopterous fauna of California and Russian America, which contained descriptions of 300 species. This was followed, at intervals, by three supplements devoted to the Coleoptera of Russian America, and the last one, published in 1853, brought the total number of species known from those parts up to 540 species. When LeConte made up his report (published in 1860), he had before him a series of more than 200 species from Russian America, named by Count Mannerheim and sent to LeConte by Baron Chaudois, a smaller series sent to him by Colonel Motschulsky, fifty species collected by the late J. K. Townsend, M.D., in Oregon, a collection made at Fort Vancouver by Colonel McCall, the collections of Doctor Cooper, made at various places in Oregon, but chiefly at Vancouver and Shoalwater Bay, the collections of Doctor Suckley and of George Gibbs, made principally at Steilacoon, his own collection made at San Francisco and San Jose, two collections made in the Sacramento Valley by J. Wittick and presented to LeConte by S. S. Rathvon of Lancaster, Pennsylvania, two collections (one made in the Sacramento Valley and the other at San Francisco) by Mr. J. Child and given to LeConte by Rathvon, and a small collection from the vicinity of San Francisco, given to LeConte by Mr. J. P. Wild, of Baltimore. LeConte said that the beetle fauna of Washington and Oregon territories was still imperfectly known. He held that California constituted a peculiar zoological district with sufficient relation to other American districts to prove that it belonged to the same continental system and that the California district was divided into several sharply defined sub-districts each having a close resemblance to the other, furthermore that the local distribution of a small number of species was characteristic of the eastern Pacific region.

Edward L. Blaschke, a colonial physician employed by the Russian American Company in Alaska and California, collected many interesting insects about Ross and Sitka. Another early collector of California insects was Tschernikh, also a member of the Russian American Company. Many Coleoptera, later described, for the most part, by Mannerheim, were collected by him at Ross and Sitka. He was at Ross during 1833-35 and again around 1841. In 1840 and 1841 Ilya Gavrilovich Vosnesensky, of the Zoological Museum of the Academy of Natural Sciences, St. Petersburg, was at Ross and he made an extensive collection of insects from the San Francisco Bay region. Baron von Wrangell, Governor of Russian America, who lived at Sitka, also visited Ross in 1833 and again in 1835. A number of beetles collected by him and sent to the Museum at Moscow were subsequently described by Mannerheim.

EARLY JUVENILE LITERATURE ON INSECTS

It is doubtful if many entomologists are familiar with the elementary entomology found in the *Orbis Pictus*, the first children's picture book, written by Comenius, the eminent educator of the seventeenth century, and published in 1657. For a hundred years and more, this was a popular text-book in Europe and mothers instructed their children from its text and pictures. The first edition was published at Nuremberg, and a little later (1658) it was translated into English by Charles Hoole. In 1812 it was republished in America.

The author had very definite aims in mind when he wrote his book. He wanted to please the children with the pictures so that they would be happy to go to school. He wanted to arouse their attention and to take "especially flickering wits and prepare them for deeper studies." In his preface, he dwells at some length on how his book should be used in schools and it is evident from his remarks and advice that his practices contained the beginnings of systems later connected with the names of Pestalozzi and Stow.

The scope of the book is indicated by the title of the 1728 London edition, *Orbis Sensualium Pictus*. The chief things of the world include animals, plants, minerals, fishes, the heavens, air, water, etc., and the employments of men cover hunting, fishing, cooking, merchandising, the tormenting of malefactors, fencing, and so many more that Comenius' *Orbis Sensualium Pictus* is indeed "a world of things obvious to the senses drawn in pictures."

Two chapters or parts are devoted to entomology — such as it is — XXV, to "Flying Vermin" and XXXII to "Crawling Vermin." A woodcut at the head of each chapter illustrates the flying and crawling vermin. The flying vermin include such insects as the bee, wasp, hornet, gnat, cricket, butterfly, beetle, glow-worm, etc., and the crawling vermin such species as the earthworm, caterpillar, grasshopper, moths, roaches, lice, ticks, silkworm, etc. Only a word, or two, accompanies each mention of the insects and the pictures of the insects are worse than those of any other objects in the book. I am sure that the illustrations of the "skipping flea," the "lowse" and other "crawling-vermin" did not entice witty children to them, nor did they "serve to stir up the attention."

Regardless of the lack of technical skill of the artist, if we except the entomological drawings which are meaningless, the illustrations are quaint and entertaining and no doubt amused and instructed the children.

Among the numerous titles which circulated in the American nursery of long ago, we find certain ones on natural history. Many such books appeared after Goldsmith's *Animated Nature* had paved the way and made nature stories popular. In fact Goldsmith is supposed to have written, at the request of Newbery, such books as the anonymous *Jacky Dandy's Delight; or the History of Birds and Beasts in Verse and Prose* and *Tommy*

Trip's History of Beasts and Birds.

Gradually the number of natural history books increased; many were reprints of English accounts, and the publishers in America showed little or no originality. The same texts and illustrations in some instances were used over and over, the only changes being in the title pages and imprints. It may be of interest to mention some of the titles of these nature books, such as the *Children's History of Birds and Beasts* from the Sandbornton Press (1836); the *Natural History of Animals*, published by Boyd and White, Concord, N.H. (1839), and by S. H. Colesworthy, of Portland, Maine; *Trip's History of Beasts; being a trifle for a good boy* printed by E. & E. Hosford, Albany, New York (1818); *A History of Birds for the use of children*, published by Rufus Merrill, Concord, New Hampshire (1843); *The History of Animals*, published by J. Babcock and Son, New Haven, Connecticut (1824), these being toy-books of from 8 to 32 pages and about 2 ¼" x 3 ½" in size. Then there were the more ambitious ones such as *The Child's Book of Nature*, published by Carter, Andrews, & Company, of Lancaster, Pennsylvania, with its colored plates; the *Book of Birds* published by R. Merrill, Concord, New Hampshire (1851), running to 24 pages and of almost pamphlet size, 4 x 6 inches, and *A Concise Natural History of Birds*, of 36 pages (3 1/2" x 5 3/4"), published in Boston, Massachusetts, by Thomas B. Wait and Company, and Charles Williams about 1817. Nor should Bewick's *Quadrupeds* be forgotten.

As a rule the natural history books were generously illustrated, sometimes with engravings verging on the grotesque, but more often just dowdy. The smaller ones frequently carried a page devoted to the alphabet, and many were encased in colored wrappers, blue, yellow and green seeming to predominate.

One branch of natural history, however, was somewhat neglected. This was entomology. Toy-books about insects were, apparently, not numerous, probably because of the specialized nature of the subject and probably because of the little public interest in that particular branch of natural history. Nevertheless, a few toy-books on insects managed to circulate along with their more popular neighbors, those on birds and mammals. In 1816 Samuel Wood & Sons printed and sold at their juvenile book store 357 Pearl Street, New York, a toy-book of 28 pages (4" x 2½") entitled *The History of Insects*. After a quotation from Barbauld and a short introduction designed to impress one with the wonders of insects, fourteen examples are treated graphically and textually. Included therein are such common insects as the grass-hopper, the cricket, the flea, the louse, the honey-bee, the dragon-fly and ants, and such uncommon ones, at least in this climate, as the elephant beetle, and the scorpion, which latter creature, of course, is not an insect. In the accounts, there is an attempt to supply facts of an interesting kind, but from an entomological view-point the statements are frightfully elementary and not always correct. However, this perhaps did not detract from the pleasure which the youthful readers obtained from handling the tiny books, and reading the accounts of something which perhaps they had already noted in the fields. The accounts are didactic in the extreme and have none of the unconscious humor which is so apparent in the text of some of our early toy-books.

The number of editions of the Samuel Wood & Sons' *History of Insects* is not known, nor is it known if the *History* appeared before 1816. However, in 1821 Samuel Wood & Sons, of 261 Pearl Street, and Samuel S. Wood & Co., No. 212 Market Street, Baltimore, published a *History of Insects* which, except for the changed imprint on the title page and the addition of covers (including various alphabets on page 2 of the cover), is identical with the 1816 edition. Perhaps the 1816 edition at one time had covers, in which event the two editions differ but slightly.

About 1860 Bailey & Noyes, of Portland, Maine, published *The History of Insects* as one of a series of twelve titles. This is a little sixteen-page, paper-covered book measuring 3 5/8 x 2 1/2 inches. It contains fewer accounts than the Wood *History of Insects*, but the text of these is the same as the text in the Wood editions. The illustrations are different and much weaker than the Wood illustrations.

These nursery books on insects were both crude and elementary, and sometimes misleading, but perhaps they served a purpose in amusing and instructing the children and in stimulating their interest in natural history. As for their mistakes, most of us carry through life an amazing amount of misinformation on various topics, picked up through diverse channels and from various sources.

EARLY ECONOMIC ENTOMOLOGY

In the *Massachusetts Agricultural Repository and Journal* for May, 1814, Mr. C. Edwards described and figured a bellows for blowing tobacco dust through sheep's wool in order to kill *Melophagus ovinus*.

In 1815 the canker-worm came in for some attention from Mr. J. Lowell, (perhaps John Lowell, who was active in the Massachusetts Agricultural Society and editor of its *Journal*) whose article in the *Massachusetts Agricultural Repository and Journal* (vol. 3, p. 316, 18), "Remarks on the cankerworm," called attention to the fact that after being free from infestation for nearly twenty years, the orchards, due to a frost on May 17, 1794, were again overrun with them. He claimed that the expense of tarring an orchard for several years was too great and in addition there was injury to the trees from the tar. He was in favor of the improvement, introduced by Mr. Parsons and others, of surrounding the trees with canvass and rope yarn, and of stopping the descent of the tar by a bandage of coarse hemp, together with a mixture of tar and oil which remained soft. These improvements, he stated, had diminished the evils of the old practice, but much remained to be desired. He was in favor of more effective, more simple, and less expensive remedies, and also in favor of constant experiments. He, himself, had the turf dug in around sixty of his apple trees and the soil laid smooth. Then three hogsheads of air-slaked lime were applied. This resulted in a layer, one inch thick, on the ground, extending from two to three feet away from the base of each tree. In addition, the trees were tarred. Where the trees were limed, he did not catch a single "grub." Although satisfied with these results, he hoped others would try his remedy.

Mr. Lowell also wrote "Some remarks on the destructive powers of the rose bug" (*Mass. Agric. Repos. Jour.*, 1826); and "Cankerworms & Slug worm" (*N. E. Farmer*, 1828).

As early as 1816 there was apparently some slight interest in foreign insects, for at the April meeting of the Boston Society of Natural History in that year Judge Davis gave an "Account of several insects from China." Unfortunately no record of his remarks appears to have been preserved. John Davis was a jurist, a graduate of Harvard, 1781, and held many public offices. He was president of the Massachusetts Historical Society from 1818 until 1843 and was especially noted for his knowledge of the history and antiquities of New England.

A new insect now makes its appearance in our literature, the bee moth, and Mr. G. W. Van Schaick in 1816 had his letter on "Observations on the worm which of late has proved so destructive to bees . . . ," published in the *Transactions of the Society for*

the Promotion of Useful Arts (Albany, vol. 4, pt. 1, pp. 145-50). Mr. Van Schaick describes the caterpillar as having sixteen legs and gives many details of its habits and life history, much of which was probably taken from the writings of European authors. The moth is described as having "granulated horns and a crooked proboscis." Mr. Van Schaick first noted the bee moth in Greene County, New York, in 1813, where it did considerable damage. And he stated that it was moving north. In 1815 he noted it in Rensselaer and Saratoga counties and believed its rate of spread in that direction to be about twenty miles per year.

For control, he recommended raising the hive about one inch above the floor. This would allow the bees to discover and kill their enemy. Furthermore, the stand and the rim of the hive should be made of such material as would afford no place of concealment for the moth or its eggs. If all expedients should fail, the author states that some consolation may be drawn from the fact that the Hessian fly (which he has not found described by naturalists and which he is inclined to think is a species of *Phalaena*) was once a scourge of a portion of the vegetable kingdom, but has long since discontinued its ravages. Whether it has disappeared or migrated to more palatable food, the author leaves for naturalists to determine. And he suggests that the bee moth may, after a short time, cease to be a pest of beehives. Mr. Van Schaick was probably a descendant of the family of the same name which furnished Albany with Mayor Sybrant Van Schaick from 1756 to 1761, and the French and Indian War and the Revolutionary Army with a soldier who eventually became Brigadier-General Gozen Van Schaick.

In 1816 and 1817, sheep insects began to attract attention. At a meeting of the New York Lyceum of Natural History on November 10, 1817, James Clements read a,

> "highly interesting and important paper on the *Oestrus ovis* of Linnaeus, describing it in its various stakes, accompanied by specimens in all its forms, and exhibiting a recent head of the sheep, showing the effects produced by its attacks on the frontal and maxillary sinuses, &c."

This was published in *The American Monthly Magazine & Critical Review* (vol. 2, No. 4, pp. 249-250, Feb. 1818), under the title "Description of the *Oestrus ovis*, or the Botts of Sheep." In this paper which Clements had sent to the editors, the habits of the insect, effect of infestation, description of the larvae, the adult fly, and general life history are all outlined, but no remedies are suggested. James Clements was a veterinary surgeon, whose name appeared in the New York City directories from 1805 to 1819. His will, dated November 26, 1819, proved January 8, 1820, in New York City, mentioned a wife, two sons and two daughters.

On April 1, 1816, Mr. H. B. Brown wrote from Woodstock to John Prince, Jun., on "Further information on the prevalence of the worm in the head of sheep" and in this communication he describes the symptoms, death of the sheep, etc. Mr. Brown syringed the nostrils of the sheep with vinegar and a small quantity of camphorated spirits and this caused some of the worms to be voided. From the head of a dead buck, he obtained twenty maggots from a cavity in and below the horn. He attributed the increase of the fly to the practice of allowing dead carcasses to remain, unburied, in the neighborhood of large flocks, and he suggested that heads should be buried.

Other papers on the same subject, all appearing in the *Massachusetts Agricultural Repository and Journal* in 1816, were written by E. Ticknor, D. Humphrey, and H. B. Brown. In addition, Mr. Humphrey wrote on sheep ticks.

For the control of the canker-worm, John Kendrick (*Mass. Agric. Jour.* 1816, vol. 4, pp. 168-170) proposed that the soil surrounding the trees be removed and replaced with rich soil and manure taken from an uninfested locality.

Apparently nearly every one had something to say about the Hessian Fly. At the New York Lyceum of Natural History "sitting of June 30, 1817," Dr. S. L. Mitchill the president, made a report on the character of the Hessian Fly which had been brought to the meeting by Mr. Clements in both the pupal and adult stages. Doctor Mitchill believed the insect to be a *Tipula* and as it was attached to green and vegetating wheat, he had given it the specific name *tritici*.

A quite orderly and scientific paper, for its time, was read before the New York Lyceum of Natural History on April 21, 1823, by Doctor Mitchill and published in the *New York Medical and Physical Journal* (vol. 2, pp. 336-59, Sept. 1823). Its title was "A Methodical enumeration of the principal Parasitical Animals; read to the New York Lyceum of Natural History, as the Zoological Lecture, on the 21st of April, 1823. By Samuel L. Mitchill, M.D. President of the Society, Professor of Botany and Materia Medica, in the University of New York, &c." This is a general paper confined to parasites that live in the bodies or animals all of during a part of their lives. It does not include gnats, flies, spiders, leeches, etc., which occasionally extract blood. Various classes are enumerated, the characters of each class are described and specific parasites and their hosts are discussed. Among the insects he treats are lice, fleas, bot flies, Hymenopterous parasites of insects, etc.

David Thomas, an early pomologist and traveler, was impressed by the numerous bedbugs in Indiana taverns and also by the destructiveness of army worms in the vicinity of Shakertown, Indiana, in 1816. Some protection was afforded to corn and timothy fields "by deep furrows, in which logs were constantly drawn by horses," so long as the caterpillars continued to approach. Thomas also described in his account (1816) a mechanical "fly-flapper" for use over a table. Other travelers at this time wrote about fleas and mosquitoes. William Cobbett, for instance, writing in 1828 from near Princeton, Indiana, said,

> "Our horses were very much tormented with flies, some as large as the English horsefly and some as large as the wasp; these flies infest the prairies that are unimproved about three months in the year, but go away altogether as soon as cultivation begins."

While on the subject of Indiana, it may be just as well to mention that beginning with the first report of the Indiana State Board of Agriculture in 1851, references were made to the injuriousness of such species as horse bots, wireworms, chinch bugs, Hessian fly, cut worms, etc.

JAMES TILTON (1745-1822)

In the *Transactions of the Society for the Promotion of Useful Arts* published in 1816 (vol. 4, pt. 1, pp. 70-78, Albany), there appeared a paper by James Tilton entitled "Remarks on a species of *Curculio*, remarkably destructive to fruit." This paper had been extracted from the first volume of the *Memoirs of the Philadelphia Society for Promoting Agriculture* and was republished because the curculio was doing extensive damage in Albany and in the adjacent county.

The author tells how the curculios come from the earth in swarms, how they crawl up the trees and puncture the fruit, how the grub lives in the fruit, how the fruit falls to the earth, how the grubs escape into the soil where they remain all winter, changing to beetles in the spring, how the curculio is reluctant to use its wings and how it delights in fruits such as nectarines, plums, apricots, etc. As for remedies, hogs are useful in eating fallen fruit, horned cattle and others are useful in trampling the insects

to death or in packing the soil so firmly that the curculio larvae cannot penetrate it, after leaving the fruit. Jarring the trees also has a place in the control methods,

> "Col. T. Forest of Germantown having a fine plum tree near his pump, tied a rope from the tree to his pump handle, so that the tree was gently agitated every time there was occasion to pump water. The consequence was, that the fruit on this tree was preserved in the greatest perfection."

Little pieces of board, dipped in tar, three to five strips hung in the tree, were said to act as repellents. Turpentine could be used instead of tar. A sure protection was a pavement around a tree, of flat stones, cemented. Plums, cherries, etc., should be planted in lanes and "hard beaten yards." Other peach insects are discussed also, the accounts having been taken from Doctor Mease's edition of the *Domestic Encyclopaedia*. For example, boiling water applied to the roots in the fall, after the earth had been removed, was useful against the peach-tree borer. In the spring the soil was replaced in the form of a mound.

For destroying insects generally, two methods were looked upon favorably. One was boring a hole in the tree and filling it with mercurial ointment and then corking it. The other was boring a hole in the north side of a tree, filling it with spirits of turpentine and corking it.

Dr. James Tilton was born June 1, 1745, in Kent County, then one of the lower counties of the province of Pennsylvania, but now of the state of Delaware. He obtained his M.D., from the Philadelphia School of Medicine and as a practitioner in Dover, Delaware, he entered the army in 1776 as a surgeon of the Delaware regiment. He saw much active service until his appointment in 1778 to the grade of hospital surgeon. While having charge of hospitals in Trenton and New Windsor, he introduced the hut system. In 1780, the medical department was reorganized and he was appointed senior hospital physician and surgeon and he worked hard to obtain reforms in the medical organization of the army. After the close of the war, he served a term in Congress, and later many terms in the state legislature, during which time he practiced medicine and indulged in horticultural pursuits as a recreation. He served several times as president of his state medical society and published on military hospitals. He died at the age of seventy-six, on May 14, 1822. Tilton never married. He drank neither tea nor coffee and he had no cups or saucers in his home. Furthermore, he believed that a farmer should live on the produce of his own land.

JOHN PIERCE BRACE (1793-1872)

At a meeting of the New York Lyceum of Natural History on November 3, 1817, Mr. Pearce read a communication from Mr. J. P. Brace, a corresponding member, on the nature and habits of the cutworm. At this meeting, Mr. Rafinesque was present and read a memoir on the new species, *Xanthium maculatum*. Mr. Brace's paper was published in the *American Journal of Science and Arts* (vol. 1, No. 2, Nov., art. 13, pp. 154-155) under the title "Description of the *Phalaena devastator*, (the insect that produces the cutworm)." In it he described the specific characters of the moth and detailed the feeding habits of the larva, which was injurious to all kinds of vegetables. He stated that pupae exposed to the sun died and recommended plowing about the first of July so as to expose the pupae to the sun's rays. He was aware that a good method of control was lacking.

John Pierce Brace, of Litchfield, Connecticut, was a teacher, editor, author and an amateur in natural history. In addition he was well informed on heraldry, astrology, the deciphering of cyphers and the composition of music. He was born in Litchfield, February 10, 1793. His aunts, who ran the Litchfield Female Academy, sent him to Williams College, from which he graduated in 1812. For come years he taught at the Academy. In 1820 he married the sister of the second Mrs. Lyman Beecher, Miss Lucy Porter. He moved to Hartford in 1833, becoming the principal of the Hartford Female Seminary, one of his pupils being Harriet Beecher Stowe. In 1850 he was the editor of the *Hartford Courant*. Although his botanical interest was only one of many, he published the earliest local flora of any part of Connecticut, in *Silliman's Journal* in 1822. He died on October 18, 1872.

TIMOTHY PICKERING (1745-1829)

Timothy Pickering supplied the *Massachusetts Agricultural Repository & Journal* (July, 1817, vol. 4, pp. 326-328) with a "Description of a brush for destroying caterpillars' nests," which dealt with the adaptation of a common bottle brush fastened to a pole. In 1823 the same thing appeared in the *New England Farmer* (vol. 1, p. 308). Pickering also wrote on the control of *Bruchus pisi*, by the late sowing of peas (*Mass. Agric. Repos. & Jour.*, June, 1822, vol. 7, pp. 122-7) and this too appeared in the *New England Farmer* (1822, vol. 1, p. 2).

Timothy Pickering was a graduate of Harvard, a Massachusetts lawyer, a Judge of the court of common pleas for Essex County, Massachusetts, a quartermaster general in Washington's army, postmaster general of the United States, then secretary of war, and secretary of state, and finally United States Senator. Toward the latter part of his life he settled on a farm in Danvers, Massachusetts, and later in Wentham, Massachusetts. He was born in Salem, Massachusetts, July 17, 1745, and died there January 29, 1829.

JOHN TORREY (1796-1873)

John Torrey, who later became the foremost American botanist of his day, dipped into entomology in his early years. A note in the *American Monthly Magazine and Critical Review* (vol. 1, No. 5, p. 377, Sept. 1817) under the subtitle "Transactions of Learned Societies" reads that at a meeting of the New York Lyceum of Natural History on August 4, Doctor Mitchill, the president, stated that "Mr. Torrey, the lecturer on Entomology, reported that the insect presented by Mr. Bigelow is the *Curculio Imperialis* of Linnaeus." The characters of the genus and species were then given and it was designated as an inhabitant of South America. Rafinesque was present at this meeting. Several years later, as reported in the *American Journal of Science and Arts* (vol. 6, No. 2, p. 364, May, 1823), at a meeting of the New York Lyceum of Natural History,

> "Dr. Torrey read a report on the *Ceraphron destructor*, a parasitic animal that preys upon the *Cecidomyia destructor*, and which has been supposed erroneously to be injurious to wheat."

SAMUEL AKERLY (17??-18??)

Dr. Samuel Akerly, a brother-in-law to Dr. S. L. Mitchill, a large contributor to medical and scientific journals, founder and supporter of institutions for the deaf and dumb and for the blind, author of an *Essay on the Geology of the Hudson River* (1820), *Observations on Deafness* (1821) and other papers, contributed in 1817 "An account of the wheat insects of America, or the *Tipula vaginalis tritici* commonly called the Hessian Fly," to the *American Monthly Magazine and Critical Review* (vol. 1, pp. 275-279). This is a general account intermixed with observations on insects in general. Reference is made to Judge Havens' observations published in the *Transactions of the Agricultural*

Society of New York (vol. 1, p. 96), entitled "Havens on Hessian Fly." In a footnote the author states that Doctor Mitchill, in naming the insect *Tipula tritici*, was aware that one of the same name inhabited Europe and fed upon wheat, but it was so different a creature that he called it *Tipula vaginalis tritici* so as to distinguish it from the European one. Akerly mentions various remedies, such as late sowing, cultivating bearded wheat, "upon which it is fallacious to rely," heavy manuring to stimulate growth, the use of the roller upon young grain in the autumn or spring, ploughing up stubble, and burning stubble. The illustrations accompanying the article are terrible.

CONSTANTINE SAMUEL RAFINESQUE (1783-1840)

A picturesque figure in scientific circles at this time was Constantine Samuel Rafinesque. His ideas were often in advance of his time. He was a pioneer in many fields. He was industrious and enthusiastic. He was careless of established customs. He accomplished much and made many mistakes. He was admired by a few and misunderstood by many. His work on botany, zoology, his explorations, travels, his activities as a college professor, editor, founder, his literary and archaeologic work, his inventions and writings, should be treated anew, by someone with knowledge, sympathy and understanding and perhaps with as great a versatility as that of Rafinesque. The temptation to continue about Rafinesque is considerable, but as there are many short accounts about him and as his contributions to entomology were so few, a lengthy discussion of his work and peculiarities would be out of place here.

In 1817 he contributed to the *American Monthly Magazine and Critical Review* (vol. 1, pp. 360-361) a paper on "Specimens of several new American species of the genus *Aphis*," and in 1818, a second paper (vol. 3, pp. 15-18, 1818) entitled "Second memoir on the genus *Aphis*, containing the description of 24 new American species." Mr. F. C. Hottes, in the *Proceedings of the Biological Society of Washington* (vol. 44, pp. 61-70, June 29, 1931), has recently evaluated Rafinesque's species.

In the *American Monthly Magazine and Critical Review* for December, 1817 (vol. 2, No. 2, p. 143), Rafinesque reviewed the first part of Say's *American Entomology* of which more will be said later, and because of its interest as a piece of contemporary criticism, the review is quoted in full:

> *American Entomology or Descriptions of the Insects of North America, illustrated by coloured figures from drawings executed from nature*, by Thomas Say. Philadelphia, Mitchell and Ames, 8vo first number pp. 40. with six plates and an engraved frontispiece.
>
> "The United States can at last boast of having a learned and enlightened Entomologist in Mr. Say. Those who have preceded him, such as Catesby, Abbot, Melsheimer, Muhlenberg, Barton, Escher, Leconte, Torrey, &c. have merely been collectors, or painters, or nomenclators; but the author of this work shows himself acquainted with the details and improvements of the science; he is at the same time an acute observer and an able painter. This increases our regret that instead of aiming at the glorious title of the American Fabricius, his utmost ambition is to tread in the steps of Donovan! and imitate his uncouth arrangements, desultory style, pompous publications, and costly performances. We regret exceedingly to see those defective modes introduced by the author of this work, and are sorry to foresee that they are not likely to promote his views. This was not the manner in which the labours of Linn[a]eus, Fabricius, and Latreille have been published, yet they are the classical authors of the science. It is true that we are offered an elegant specimen of typography; but the price of it is two dollars. For that sum we have forty pages (of which twelve are quite blank!) printed on beautiful paper and type, and six fine coloured plates, containing only eight species (whereof five are new) of insects, while they might have included sixty! Therefore at this rate, as there are at least eight thousand species of insects in North America, the sum of two thousand dollars will be requisite in order to admire the insects on this new plan! while on the plan of Linn[a]eus, &c. ten dollars might be quite sufficient. It would be well if this style was left for the use of the princes and lords of Europe. When this work shall proceed, we may endeavour to review it at length. C.S.R."

In 1817 there appeared in the December issue of the *American Monthly Magazine and Critical Review* a lengthy article by C. S. Rafinesque entitled, "Survey of the progress and actual state of Natural Sciences in the United States of America, from the beginning of this century to the present time." In this article Rafinesque surveyed every branch of natural history and its outstanding workers, and noted the increase in societies, in professorships of natural history, in private collections and collectors, in botanic gardens, in public museums, and in public lectures. In addition, he mentioned the outstanding works of many naturalists, and of physicians. Of entomology, however, there is only the bare mention of Say and several of his contemporaries.

In 1821 Rafinesque contributed to the *Kentucky Gazette* (new series, vol. 7, No. 28, p. (2) Lexington, July 12), a popular essay on the periodical cicada, then prevalent in Kentucky, and in it references are made to the "locusts" of other countries. The title of his article is "Essay on the natural history of the chirper, or locust, which appears every seventeen years in the United States."

Some eleven years later, we find Rafinesque contributing an article to the *Atlantic Monthly* (vol. 1, No. 1, pp. 13-14, Phila. 1832) that does him no credit. It is called "Confirmation of the Important Discovery of the property of Sulphur in Trees, to destroy all Insects preying on them." And to make matters worse, Rafinesque claims the honor of being the first "tree plugger" in America. His article is quoted below, and from this account the idea apparently originated in France:

> "9. *Confirmation of the Important Discovery of the property of Sulphur in Trees, to destroy all Insects preying on them.*"
>
> "Farmers and Gardeners ought to hail with rapture a safe, certain, easy and unfailing mode of driving away or destroying all the insects, bugs, caterpillars, lice, ants, which prey upon trees and often kill them.
>
> "Numberless have been the means proposed or devised to get rid of these troublesome guests, most of which are dirty, costly, or unavailing. Our farmers appear to have given up in despair the hope of preventing the deadly attacks of curculios on the roots of peach trees, and the fruits of the plumb tree. Yet an efficacious mode is said to have been found several years ago in France, perfectly efficacious and applicable to all cases and all trees. The man who discovered it, deserved a splendid reward, yet his name has not even reached us. But we claim the honor to have been the first to make known the process in America, in 1823 in Kentucky, and in 1827 in Philadelphia. Yet the most useful knowledge is so slow to spread, that the fact is hardly known yet, or doubted by those who know of it.
>
> "We are happy to be able to publish two direct experiments in support of the fact and discovery.
>
> "First. We bored and plugged with sulphur in the usual way, a plumb tree which commonly dropped every year all the plumbs before becoming ripe, the curculios lodging eggs in their germs. This was done when the tree was in blossom. On that year hardly any fruit fell,, and the tree produced quite well.
>
> "Second. We find in the *Genesee Farmer* of January 28, 1832, that a young willow nearly killed by aphis or lice, and pissmires feeding on their honey, was quite revived in three days, and all the lice and ants driven off by boring the tree with an augur five feet from the ground and three-fourths through the diameter, filling with brimstone and plugging tight. The tree has thrived ever since.
>
> "The modus operandi of this singular process is very easy to explain. The vital energy of the tree and sap, dissolves the sulphur,

carries it into circulation, and evolves it in sulphuric gas evaporating through all the pores of branches, leaves and fruits. This gas is a deadly poison to insects and all animals, it suffocates them or drives them away as soon as they begin to smell it; but no injury whatever results to the tree.

"We have never heard yet of any direct experiment on peach trees; but we are sure it will answer quite as well. If the sulphuric emanation could not reach quick enough the roots of the trees which are commonly attacked; the plugging must be done near the root or at the time of the descending sap, when it will sooner reach the roots. Let it be tried and the results made known. C.S.R."

REFERENCES FOR CHAPTER III

Akerly, S. (17??-18??)
1817. An account of the wheat insects of America, or the *Tipula vaginalis tritici* commonly called the Hessian fly. *Amer. Mon. Mag. Crit. Rev.* (New York), 1:275-278.

Anon.
1807. History of the worm which spread terror, through New York and the neighboring states, in June and July, 1806. *Med. Repository* (New York), 10:98-100.
1810. Insects in abundance not necessarily connected with sickly seasons. *Med. Repos. Rev.* (New York), (3) 4:304-305.
1817. *A Concise Natural History of Birds*. Boston: T. B. Wait. 36pp.
1818. *Trip's History of Beasts; being a trifle for a good boy*. Albany: E. & E. Hosford.
1836. *Children's History of Birds and Beasts*. Sandbornton Pr. [Reprinted 1846, Cooperstown: H. & E. Phinney]
1837. *The Youth's Natural History of Animals*. Concord: Atwood & Brown. 16pp.
1839. *Natural History of Animals*. Concord: Boyd & White.
1843. *A History of Birds for the Use of Children*. Concord: R. Merrill.
1851. *Book of Birds*. Concord: R. Merrill. 24pp.
1867. *Tommy Trip's History of Beasts and Birds*. (15th ed.) London: E. Pearson. 124pp.

Bartram, J. (1699-1777)
1745. An account of some very curious wasp-nests made of clay in Pensilvania [sic]. *Philos. Trans.* (London), (B) 43:363-366.
1804. Additional observations on the *Cicada septendecim*. *Phildaelphia Med. Phys. J.*, 1:56-59.

Bewick, T. (1753-1828)
1792. *A General History of Quadrupeds: the figures engraved on wood*. (3rd ed.) Newcastle: S. Hogson. 483pp. [Reprinted 1804, New York: G. R. Waite. 531pp; 1885, London: B. Quaritch. 526pp.]
1816. *The History of Insects*. New York: S. Wood. 28pp. [Reprinted 1821; 1860, Portland, Me: Bailey & Noyes. 16pp.]

Brace, J. P. (1793-1872)
1818. Description of the *Phalaena devastator* (the insect that produces the cutworm). *Amer. J. Sci. Arts* (New Haven), 1:154-155.

Bradbury, J. (1768-1823)
1817. *Travels in the Interior of America in the Years 1809, 1810, and 1811; including a description of upper Louisiana, together with the states of Ohio, Kentucky, Indiana, and Tennessee, with the Illinois and western territories, and containing remarks and observations useful to persons emigrating to those countries*. Liverpool. 364pp. [Reprinted 1817. London: Sherwood, Neely & Jones]

Brown, H. B.
1816. Further information of the prevalence of the worm in the head of sheep. *Mass. Agric. Repos. J.* (Boston), 4:190-193.

Chapman, I.
1798. An account of a species of *Cantharis*, found in Buck's County, Pennsylvania, including observations on its medicinal qualities. *Med. Repos.* (New York), 2:174-177.

Clements, J.
1818. Description of the *Oestrus ovis*, or the Botts of Sheep. *Amer. Mon. Mag. Crit. Rev.* (New York), 2:259-250.

Cobbett, W. (1763-1835)
1828. *Travels*?

Comenius, J. A. (1592-1670)
1657. *Orbis Pictus*. Nuremburg.
1658. *Orbis Sensualium Pictus*. London. 450pp. (transl. by C. Hoole) [Reprinted as rev. ed., 1672, 1728, 1777, 1812]

Coulter, T.
1802. Description of a method of cultivating peach trees, with a view to prevent their premature decay; confirmed by the experience of forty-five years, in Delaware State and the western parts of Pennsylvania. *Trans. Amer. Philos. Soc.* (Philadelphia), 5:327-328.

Cutbush, E. (ed.)
1808. On the prevention and cure of certain diseases of the silk-worm. *Philadelphia Med. Phys. J.*, 3:20-24.

Davidge, J. B. (17??-18??)
1807. Experiments and observations on the caterpillar which infests the Lombardy poplar. *Phildaelphia Med. Phys. J.*, Suppl. 1 (6):139-157.

Degeer, C. (1720-1778)
1752-78. *Mémoires pour servir à l'histoire des Insectes*. Stockholm: Hosselberg. 7 v. [German ed., see Goeze 1776-83]

Drayton, J.
1803. Destruction of Carolina pine trees by an insect. *Proc. Amer. Philos. Soc.* (Philadelphia), 22 (appx.):342.

Dwight, N. (1770-1831)
1810. An account of the American cantharis or *Meloe Americae*. *Mem. Conn. Acad. Arts Sci.* (New Haven), 1:99-102.

Edwards, C.
1814. Machine for killing ticks. *Mass. Agric. Repos. J.* (Boston), 3:113-115.

Ellis, J.
1802. Account of a method of preventing the premature decay of peach trees. *Trans. Amer. Philos. Soc.* (Philadelphia), 5 (appx.):325-326.

Eschscholtz, J. F.
1821. Beschreibung neuer ausländischer Schmetterline. *In* O. von Kotzebue, *Entdeckungsreise in die Südsee*. Band 3:201-219, 11 pl. Weimar: Hoffmann.

Fabricius, J. C. (1745-1808)
1775. *Systema entomologicae, sistens insectorum classes, ordines, genera, species, adiectis synonymis, locis, descriptionibus, observationibus*. Flensburg. 832pp.
1776. *Genera insectorum eorumque characteres naturales secundum numeroum, figuram, situm et proportionem omnium partim oris adiecta mantissa specierum nuper detectrum*. Cologne. 310pp.
1777. *Genera insectorum eorumque characteres naturales secundum numeroum, figuram, situm et proportionem omnium partim oris adiecta mantissa specierum nuper detectarum*. Cologne: Bartsch. 324pp.
1781-[82]. *Species insectorum eorumque exhibentes eorum differentias specificas, synonyma auctorum, loca natalia, metamorphosin adiectis, observationibus, descriptionibus*. Hamburg: Bohn. 2 v. (494pp; 495-514 [1782])

Goeze, J. A. E. (1731-1793)
1776-82. *Abhandlungen zur Geschichte des Insekten aus den französischen übersetzt und mit Anmerkungen*. Leipzig: J. C. Müller. 7 v.

Goldsmith, O. (1728-1774)
1774. *A History of the Earth and Animated Nature*. London: J. Nourse. 8 v. [Reprinted many times]
1820. *Jack Dandy's Delight; or the History of Birds and Beasts in Verse and Prose*. York: Kendrew. 16pp.

Hamlin, A. (1766-1843)
1809. Observations on bots in horses. *Med. Repos.* (New York), 12:124-125.

Havens, J. N.
18??. Observations on the Hessian Fly. *Trans. New York Soc. Promo. Agric.*, 1:89-107. [2nd ed., 1804:71-86].

Hooker, W.
1857. *The Child's Book of Nature*. Lancaster, Pa: Carter, Andrews & Co. [Reprinted, New York: Harpers']

Hottes, F. C.
1931. *Proc. Biol. Soc. Washington*, 44:61-70.

Humphreys, D.
1816. On the worm in the head of sheep. *Mass. Agric. Repos. J.* (Boston), 4:30-33.

Jones, C.
1807. Observations on American locusts. *Barton's Med. Physic. J.* (Philadelphia), Suppl. 1(13):

Journal of the Hessian Regiment Von Huyn. (1778?)

Kendrick, J.
1816. A new a cheap method proposed to exterminate the cankerworm. *Mass. Agric. Repos. J.* (Boston), 4:168-170

Latrobe, B. H. (1764-1820)
1803. On two species of *Sphex*, inhabiting Virginia and Pennsylvania and probably extending through the United States. *Trans. Amer. Philos. Soc.* (Philadelphia), 6:73-81, 1 pl.

LeConte, J. L. (1825-1883)
1860. Report upon insects collected on the survey. In *Reports of Exploration and Surveys for a Railroad Route from the Mississippi River to the Pacific Ocean*, 9(1):1-72, 2 pl. Washington.

Linnaeus, C. (1707-1778)
1758. *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*. (10th ed.). Stockholm. 2 v.

Lowell, J.

1815. Remarks on the cankerworm. *Mass. Agric. Repos. J.* (Boston), 3:316-318 [Reprinted in *New England Farmer Hort. Reg.* (Boston), 2:281
1824. Remarks on the cankerworm. *New England Farmer Hort. Reg.* (Boston), 2:281.
1826. Remarks on the cankerworm. *New England Farmer Hort. Reg.* (Boston), 4:398-399 (1825).
1826. Some remarks on the destructive powers of the rose bug. *Mass. Agric. Repos. J.* (Boston), 9:143-147. [Reprinted in *New England Farmer Hort. Reg.* (Boston), 5:52]
1828. Cankerworms & Slug worm. *New England Farmer Hort. Reg.* (Boston), 7:2.

Mease, J. (ed.)
1803. *Willich's Domestic Encyclopedia.* Philadelphia: W. Y. Birch. 4 v.
1806-07. *Wonders of Nature and Art, or, a concise account of whatever is most curious and remarkable in the world: compiled from historical and geographical works of established celebrity, and illustrated with the discoveries of modern travellers* (rev. ed.). Philadelphia. 14 v.

Melsheimer, F. V. (1749-1814)
1776. *Journal.* Minden.
1806. *Catalogue of Insects of Pennsylvania.* Hanover, Pa. 60pp.

Mitchill, S. L. (1764-1831)
1823. A methodical enumeration of the principal parasitical animals; read to the New York Lyceum of Natural History, as the Zoological Lecture, on the 21st of April, 1823. By Samuel L. Mitchill, M.D. President of the Society, Professor of Botany and Materia Medica, in the University of New York, &c. *New York Med. Phys. J.*, 2:336-359.

Moreton, N. (1613-1685)
1669. *New-Englands Memoriall: or, a brief relation of the most memorable and remarkable passages of the providence of God, manifested to the planters of New-England in America; with special reference to the first colony thereof, called New-Plimouth: as also a nomination of divers of the most eminent instruments deceased, both of church and common-wealth, improved in the first beginning and the after-progress of sundry of the respective jurisdictions in those parts; in reference unto sundry exemplary passages of their lives, and the time of their death.* Cambridge, Ma. 198pp.

Parsons, T.
1807. Grasshoppers and the palmer worm. *Mass. Promo. Agric. Pap.* (Boston), 1807:32-35.

Perley, E.
1804. An account of the lice found on many young apple trees in the district of Maine. *Pap. Agric. Mass.* (Boston), 2:103-105.
1814. Lice infesting young orchards. *Mass. Agric. Repos. J.* (Boston), 3:144-145.

Pickering, T. (1745-1829)
1817. Description of a brush for destroying caterpillars' nests. *Mass. Agric. Repos. J.* (Boston), 4:326-328.
1822a. *New England Farmer Hort. Reg.* (Boston), 1:2.
1822b. *Mass. Agric. Repos. J.* (Boston), 7:122-127.
1823. *New England Farmer Hort. Reg.* (Boston), 1:308.

Pinckney, C. C. (1746-1825)
1804. On the worm supposed to destroy the South Carolina pines. *Proc. Amer. Philos. Soc.* (Philadelphia), 22 (appx.):362.

Rafinesque, C. S. (1783-1840)
1817a. Specimens of several new American species of the genus *Aphis*. *Amer. Mon. Mag. Crit. Rev.*, 1:360-361.
1817b. [Book review: *American Entomology*]. *Amer. Mon. Mag. Crit. Rev.* (New York), 2:143.
1817c. Survey of the progress and actual state of Natural Sciences in the United States of America, from the beginning of this century to the present time. *Amer. Mon. Mag. Crit. Rev.* (New York), 2:???
1818. Second memoir on the genus *Aphis*, containing the description of 24 new American species. *Amer. Mon. Mag. Crit. Rev.* (New York), 3:15-18.
1821. Essay on the natural history of the chirper, or locust, which appears every seventeen years in the United States. *Kentucky Gaz.* (Lexington), (n.s.) 7(28):2.
1832. Confirmation of the important discovery of the property of sulphur in trees, to destroy all insects preying on them. *Atlantic Mon.* (Philadelphia), 1(1):13-14.

Reichel, C. G. (1751-1825)
1804. Some particulars concerning the locust of North Americe. *Philadelphia Med. Physic. J.*, 1:52-56.

Smith, T. (1775-1830)
1804. *Wonders of Nature and Art, or, a concise account of whatever is most curious and remarkable in the world: compiled from historical and geographical works of established celebrity, and illustrated with the discoveries of modern travellers.* London. 12 v. [Reprinted, 1806-07. Philadelphia [see Mease, J.]

Smith, W. (c.1754-1821)
1810. Observations on the decay of fruit trees, and on lean and shriveled fruit, as caused by insects. *Med. Repos.* (New York), 14:350-354.

Thomas, D.
1816. *Travels*?

Ticknor, E.
1816. Enemies to sheep: on the worm in the head of sheep. *Mass. Agric. Repos. J.* (Boston), 4:33-34.

Tilton, J. (1745-1822)
1816. Remarks on a species of *Curculio*, remarkably destructive to fruit. *Trans. Soc. Promo. Useful Arts* (Albany), 4:70-78.
18??. *Mem. Philadelphia Soc. Promo. Agric.*,

Van Schaick, G. W.
1816. Observations on the worm which of late has proved so destructive to bees . . .. *Trans. Soc. Promo. Useful Arts* (Albany), 4:145-150.

Walmsley, T. (1781-1806)
1805. Facts, experiments, and observations, relative to some American species of *Lampyris*, or fireflies . . . . *Phildaelphia Med. Physic. J.*, 2:118-123.

Walmsley, W. M. (17??-18??)
1805. Observations relative to the wheat-moth of Pennsylvania, and other parts of the United States. *Philadelphia Med. Physic. J.*, 1:119-126.

Webster, N.
1812. *The History of Animals.* New Haven: J. Babcock. [Reprinted 1824]

Willich, A. F. M.
18??. *The Domestic Encyclopaedia or A Dictionary of Facts and Useful Knowledge comprehending a concise view of the latest discoveries, inventions, and improvements chiefly applicable to rural and domestic economy.* London.

Wright, S. (17??-18??)
1804. Directions for the management of silk-worms. *Philadelphia Med. Physic. J.*, 1:103-107.

CHAPTER IV

THOMAS SAY AND HIS CONTEMPORARIES
(1817 to 1831)

Philadelphia at the beginning of the nineteenth century was the literary and scientific center of the country. Scientific societies were few in number, however. The American Philosophical Society, founded many years before, had an established position. In 1806 the Philadelphia Botanical Society was organized. In 1807 its name was changed to the Philadelphia Linnaean Society, but with the founding of the Academy of Natural Sciences in 1812 it became inactive and gradually disappeared. However, various individual scientists were active during and before the beginning of the nineteenth century, and books on the natural history of America had been published abroad. The first American botanical work was Humphrey Marshall's *Arbustum Americanum* published in Philadelphia in 1785. William Bartram's *Travels* appeared in 1791, and later, in 1801, Michaux's *Oaks of North America*, although this was published in Paris. In 1803 Prof. B. S. Barton published his *Elements of Botany*, in Philadelphia, and there were other publications by Muhlenberg in 1813, Pursh in 1814, Barton and Nuttall in 1818, all relating to American botany.

The first important original work on American geology was Maclure's *Observations on the Geology of the United States*, published in 1809 and revised in 1817. Vertebrate paleontology began with the activities of Thomas Jefferson and with Rembrandt Peale's account of the skeleton of the mastodon published in 1802. William Peck in 1794 published the first paper on systematic zoology in America, a description of new species of fishes. Eastern birds were being described and written about by Alexander Wilson from 1808 to 1813, followed by Bonaparte's continuation of Wilson's work, and then by the work of Audubon and Nuttall. On mammals, Bewick's *General History of Quadrupeds*, 1804, contained descriptions and illustrations of some American species, and in 1815 there was George Ord's contribution to Guthrie's *Geography*.

The grouping of the scientists of America early in the century into societies led to the establlshment of journals. There were the *Transactions of the American Philosophical Society*, the *Journal of the Philadelphia Academy of Natural Sciences*, the *Annals of the New York Lyceum of Natural History*, the *American Journal of Science*, the *Medical Repository*, the *Philadelphia Medical and Physical Journal*, the *American Mineralogical Journal*, the *Boston Journal of Philosophy and the Arts*, the *Transylvania Journal of Medicine*, and as late as 1834 the *Journal of the Boston Society of Natural History*. To the pages of these journals were contributed the writings of Lesueur, Rafinesque, Storer and others on fishes; the papers of Green, Barton, Harlan, Say, etc., on reptiles; the work of Wilson, Audubon, Nuttall, Ord, etc., on birds; the work of Ord, Godman, Richardson, etc., on mammals; and writings on the crustacea, insects and shells by Say, Hentz, Harris, Lea, Peck and others.

THOMAS SAY (1787-1834)

During the year 1817, a young man, destined to become the leading descriptive entomologist of his time, appeared on the entomological horizon. This was Thomas Say, whose first efforts appeared in print in the shape of six colored plates with descriptive letter press, under the title, *American Entomology or Descriptions of the Insects of North America, Illustrated by Coloured Figures from Drawings Executed from Nature*. This was published in 1817 by Mitchell and Ames, of Philadelphia, and Say hoped that it would excite enough public interest and support for its continuance. But he was disappointed. His second article, published in the *Journal of the Academy of Natural Sciences of Philadelphia* (vol. 1, No. 2, pp. 19-23, June, 1817), was entitled "Descriptions of several new species of North American insects" and in this he made references to his 1817 *American Entomology*. His second paper contains descriptions of seven new species of Coleoptera in the genera *Cicindela, Nemognatha* and *Zonitis* and of one new species of Diptera in the genus *Diopsis*. Say's third paper appeared during the same year, also in the *Journal of the Academy of Natural Sciences of Philadelphia* (vol. 1, No. 3, pp. 45-48, 1 pl.). The title was "Some account of the insect known by the name of the Hessian Fly, and of a parasitic insect that feeds on it." In this paper Say describes *Cecidomyia destructor*, adults, egg, larva and pupa, and states that it is unknown in Europe and was not imported in straw brought over by the Hessian troops during the Revolutionary war. Later, as will be noted, several persons took issue in print with some of Say's statements. Say also gives the life-history of the so-called Hessian fly and describes *Ceraphron destructor* as a larval parasite.

It would be possible to continue, over many pages, listing the species which Say described, but no useful purpose would be served and page after page of scientific names is not particularly readable. Although some time and space could be saved by listing the genera in which Say worked, even a list of this sort has disadvantages. *The Complete Writings of Thomas Say on the Entomology of North America*, edited by John L. LeConte, M.D., was published in two volumes in New York, 1859 by Bailliere Brothers and is available to students of Say's work (reprinted in 1869, 1885 and 1891). According to John G. Morris, Say described 1,150 species of Coleoptera, 225 species of Diptera, 100 species of Hemiptera and 100 species of other groups. His numerous descriptive papers on entomology appeared in the early numbers of the *Journal of the Academy of Natural Sciences of Philadelphia*, in the *Transactions of the American Philosophical Society*, the *Western Quarterly Reporter, Contributions of the Maclurian Lyceum to the Arts and Sciences, Annals of the Lyceum of Natural History of New York*, the *Appendix to the Narrative of an Expedition to the source of St. Peter's River, &c., under the command of Stephen H. Long*, and some were printed at New Harmony, Indiana. Several posthumous papers appeared in the first volume of the *Boston Journal of Natural History* (1835) and the *Transactions of the American Philosophical Society* (1839).

Say's *American Entomology*, in which it was his design "to exemplify the genera and species of the insects of the United States, by means of coloured engravings," did not extend beyond three volumes, all published by Samuel A. Mitchell, Philadelphia. The first one appeared in 1824 and included the plates and text published in 1817, the second in 1825, and the third in 1828, while Say was living in New Harmony. It is dedicated to William Maclure and was upon its appearance characterized as the "most beautiful publication of the kind" ever issued from an American press. That it did not continue beyond the third volume was due probably to the indifference of the public on account of its high price, and to the distance which separated the author and the

publisher.

Say was a prolific author in other fields, his numerous descriptions of fresh-water, marine and land shells were published in Nicholson's *Cyclopaedia*, the *Journal of the Academy of Natural Sciences of Philadelphia*, the "Appendix" to volume two of Long's second expedition, the *New Harmony Disseminator of Useful Knowledge*, the *Transylvania Journal of Medicine*, published at Lexington, Kentucky, and the *American Conchology*. His paleontological writings were published in the first volume of the *American Journal of Science*, and the fourth volume of the *Journal of the Academy of Natural Sciences of Philadelphia*.

On the Mammalia, Say published three papers, two of which were joint ones with George Ord, in the *Journal of the Academy of Natural Sciences of Philadelphia* volumes II and IV. In the footnotes of the *Report of the Long Expedition to the Rocky Mountains* occur his descriptions of such mammals as squirrels, shrews, rats, and a mule deer. In the same place will be found descriptions of the five birds which Say described, most of which still retain his names. And in addition, these footnotes include descriptions of a few species of rattlesnakes, lizards, bats, a tick, a toad, an arachnid, and a species of newt. The early volume of the *American Journal of Science* and the *Contributions of the Maclurian Lyceum.* include Say's five papers on the Reptilia, and in the first volume of the *Journal of the Academy of Natural Sciences of Philadelphia* are his ten papers on the Crustacea.

As to Say's work on the Crustacea, Dr. Henry W. Fowler, in "The Crustacea of New Jersey" (*Reps. N. J. State Museum*, 1911), wrote:

> "The history of the Crustacea of New Jersey, and in fact of North America generally, may be said to begin with the labors of that distinguished veteran naturalist Thomas Say. These are combined in the modest little paper, extending in several parts through the first volume of the *Journal of the Academy of Natural Sciences of Philadelphia*, published in 1818, and entitled 'An Account of the Crustacea of the United States.' This work is the very foundation of North American carcinology. While embracing but a few of the more conspicuous forms now known to occur, in the present instance the work is particularly pertinent, inasmuch as many, if not most, of the species were described from the Great Egg Harbor Bay region in the State of New Jersey. The figures accompanying were made with the characteristic daintiness of C. A. Le Sueur, another distinguished colleague of Say's."

In addition to everything which has been mentioned, one must not forget the ethnological writings of Say, in the accounts of his western travels.

Thomas Say was born in Philadelphia on July 27, 1787. Little is known — in fact nothing is known — of his childhood. Whether he received his earliest education in Friends' schools or from his parents at home is not known. We do know that he escaped the yellow fever epidemics which prevailed in Philadelphia from 1793 to 1796, and that in May, 1799, when he was twelve years old, he enrolled in the Westtown Boarding School as its seventeenth pupil. In 1794 a committee of the Philadelphia Yearly Meeting of Friends had purchased the property at Westtown for the purpose of establishing a Friends' boarding and day school, and Thomas Say was among the first to enter when it was opened. At that time the price of tuition and board was sixteen dollars a quarter, payable in advance, and no child was admitted for less than twelve months.

Say's younger brother, Benjamin, entered the Westtown School about a year later, or in April, 1800, and among other Philadelphia boys enrolled there were George Bartram and Reuben Haines, the former probably a relative of Say's and the latter his life-long friend.

Thomas Say did not care either for his teachers or for what they taught, a not unusual attitude on the part of many pupils, and he acquired a strong dislike of ordinary branches of study, another not unusual attitude on the part of youth, which it is customary and perhaps truthfully so in many cases, to attribute to the incompetency of instructors. Although Say in after years showed a desire for knowledge which was unrestrained, it was for a different type from that offered to him at Westtown, and he was older.

After leaving the school, which must have occurred in a comparatively short time since boys were not allowed to remain after they were fifteen years old, Say helped in his father's apothecary shop, read extensively and collected extracts from poems, which he arranged alphabetically. Later he became interested in natural history and collected beetles and butterflies. In this he was encouraged by William Bartram, of Kingsessing, his great uncle, who induced him and several of his young companions to contribute their findings to his collection of natural history specimens. From that time until he died, natural history occupied his interest almost to the exclusion of everything else.

Although Philadelphia at this time was the principal city in the Union, naturalists were scarce. There were the Bartrams, Muhlenbergs and Bartons, outstanding botanists, Alexander Wilson, who was studying birds, Peale's museum in the State House, and a small, very small, number of amateurs who met in each others' homes. John Speakman, apothecary, and Jacob Gilliams, a leading dentist of the city, were devotees of natural history. Gilliams, Say and Alexander Wilson used to visit William Bartram at Kingsessing, and sometimes some of them and others of their friends would get together in John Speakman's store at the northwest corner of Second and Market streets and discuss their hobbies. At one of these gatherings Speakman made the suggestion of meeting at stated times for the exchange of ideas, and Mr. Gilliams proposed an association. With this idea in mind they met at Speakman's house on Saturday night, January 25, 1812. Dr. Gerard Troost, John Speakman, Dr. C. M. Mann, Jacob Gilliams, John Shinn, Jr., a native of New Jersey and a manufacturing chemist, and Nicholas S. Parmentier, a distiller and manufacturer of spermaceti oil, were present. Speakman acted as chairman and Mann as secretary. This was the origin of the Philadelphia Academy of Natural Sciences.

The next two or three meetings were held at Mercer's Cake Shop, a public house on High or Market street, near the corner of Franklin Place. At the meeting of March 17, 1812, Dr. Samuel Jackson, of the University of Pennsylvania, suggested the title "Academy of Natural Sciences," and it was the decision then that the origin of the association should date from that time.

In the minutes of the meeting of January 25, 1812, mention was made of the absence of Thomas Say, but he is recorded as signing a resolution which was passed at that first meeting. The date of Say's first attendance at a meeting of the Academy is given by one authority as April 16, 1812, but the minutes of the meeting held on March 17, 1812, record Say as being present and mentions all present as being founders.

After Say had acquired some knowledge of the drug business, his father established him in a partnership with John Speakman, the firm being known as Speakman and Say. Speakman very generously assumed the active management of the shop so that Say's time could be devoted to natural history. It is not known when the partnership was formed, although it did not last very long. Speakman and Say endorsed notes for friends, and when they became due the firm had to stand the losses which were so great that the business was wiped out. Even the loose change in

Say's pockets, so one account states, was used in satisfying the creditors. After this unfortunate happening, Say, who was about twenty-five years old, made no effort to recover his losses, but gave himself up entirely to natural history, living in the rooms of the Academy, on the plainest food, usually bread and milk, with an occasional chop or an egg which he himself cooked, and sleeping, so it is said, under the skeleton of a horse. He continued in this style of living for several years, and at times his food did not cost him more than an average of twelve cents a day.

Say's Academy activities were interrupted by the War of 1812-15, during which Philadelphia was intensely patriotic. During these times Thomas Say joined the First City Troop, being elected to membership on September 4, 1814. About this time several friends and relatives enlisted also. General Bloomfield's order of August 27 called only thirty of Captain Ross's men into service, but on October 3 an order from the same General commanded that "Captain Ross will call out as many of the First City Troop as will be sufficient to discharge the duties of videttes, conformably to the order of 27th August last." As Say was not a member when the first thirty started out he probably did not begin service until this time. He is listed among the fifty-four privates who served in this campaign. The Philadelphia Committee of Defence conferred with Major-General Edmund P. Gaines, who commanded the Fourth Military District, and as a result the videttes were placed in the service of the United States. The Troop returned to Philadelphia on December 12 and was discharged.

Following his service at Mount Bull, Say resumed his studies and activities at the Academy, and in 1816, encouraged by his friend Alexander Wilson, who promised to help him, he projected his work on *American Entomology*, already mentioned.

In the autumn of 1817, an expedition to the south was organized and the winter saw Say, Maclure, George Ord and Titian R. Peale visiting the sea islands and adjoining coast of Georgia and penetrating into eastern Florida for the purpose of studying the fauna and collecting specimens. This trip, although productive, was cut short by the bad feeling which existed between the neighboring inhabitants of the United States and the tribes of Florida, which was still under the control of Spain.

In the year 1819, Say was appointed as zoologist on Long's expedition to the Rocky mountains. With a view to establishing military posts on the upper Missouri for the purpose of protecting the growing fur trade, controlling the Indian tribes and lessening the influence of British trading companies on the Indians, a "Yellowstone expedition" was planned by Secretary of War John C. Calhoun. Major Stephen H. Long was placed in command of the scientific observations, which proved to be the only valuable result of the expedition.

After this expedition, once more back in Philadelphia, Say resumed his activities at the Academy, drawing up descriptions of insects, fossil and other shells which he had collected on his southern and western trips and also of those which he had received from many friends and correspondents. Numerous descriptive papers by Say on these subjects began to appear in the pages of the *Journal of the Academy of Natural Sciences of Philadelphia* and in other publications.

In 1821, Say was made curator of the American Philosophical Society, holding this office until 1827. In 1822 he was appointed as professor of natural history in the University of Pennsylvania.

At the instance of Hon. J. C. Calhoun, Secretary of War, an expedition was sent in 1823 to the source of St. Peter's river under the command of Stephen H. Long, Major, United States Topographical Engineers. The other members of the party were Thomas Say, Zoologist and Antiquary; William H. Keating, "Mineralist" and Geologist; Samuel Seymour, Landscape Painter and Designer. James Edward Colhoun joined the party at Columbus, Ohio, on May 20 as astronomer and assistant topographer. Dr. Edwin James, botanist on the expedition to the Rocky mountains, was to have accompanied the party as botanist, geologist and physician, but received his instructions too late to join the party at Wheeling or Columbus. Say therefore undertook the collection of plants that appeared to him interesting, and these were turned over to the Rev. Lewis D. de Schweinitz, whose descriptions of them are in the appendix to the report of the expedition, made to President James Monroe in a two-volume book "compiled from the notes of Major Long, Messrs. Say, Keating, and Colhoun, by William H. Keating, A.M. &c. Professor of Mineralogy and Chemistry as Applied to the Arts, in the University of Pennsylvania; Geologist and Historiographer to the Expedition."

During the early part of the nineteenth century, or while Say was immersed in his descriptions of new species, here and there over America were groups of people dissatisfied with the existing social order, or if not dissatisfied at least idealistically inclined and willing enough to subject their ideals, religious and economic, to practical tests. In fact, long before Say's time, and afterward too for that matter, America was a vast laboratory in which all sorts of sectarian and economic eccentricities were tested, at first unrestricted, but later hampered by the conventions of the rapidly growing industrial age. Although some were primarily sectarian and others economic, the former usually included the economic practice of common ownership. Following the Reformation, various sects, to escape persecution, emigrated from Germany and founded their communities in this country. More numerous, however, were the altruistic economic communities made up almost entirely, of Americans, and we are here concerned with one of these, New Harmony, because of Thomas Say's connection with it.

New Harmony, located on the Wabash River, in Indiana, was settled in 1815 by George Rapp and his disciples, who sold the entire property in 1825 to Robert Owen, a Scotch social reformer and cotton manufacturer, who planned to eatablish an ideal community where man would be given a new existence "by surrounding him with superior circumstances only."

On May 1, 1825, the "Preliminary Society of New Harmony" was formed and a constitution adopted. The purpose of this preliminary organization was to "improve the character and conditions of its own members and to prepare them to become associates in independent communities, having common property." Owen realized the necessity of educating and training the new members before his ideal community could be attained, and so he enlisted the support of William Maclure, wealthy Philadelphia geologist and principal patron of the Philadelphia Academy of Natural Sciences, who had excellent ideas on education but hazy ones on political economy. Maclure, who invested $150,000 in the scheme but limited his liability to $10,000, believed that he could make New Harmony the center of education in America. Between them they brought to New Harmony such celebrities as Thomas Say, Charles Alexander Lesueur, artist and naturalist; Dr. Gerard Troost, geologist; John Chappelsmith, artist and engraver; Professor Joseph Neef, a Pestalozzian educator; Owen's four sons, trained for teaching and chemistry, and others of lesser fame.

On January 25, 1826, it was decided at a meeting of the Preliminary Society to organize a community of equality from among the members, and so a constitution was drawn up which among other things provided that,

"All members of the community shall be considered as one family,

and no one shall be held in higher or lower estimation on account of occupation. There shall be similar food, clothing and education, as near as can be furnished, for all, according to their ages: and, as soon as practicable, all shall live in similar houses, and in all respects be accommodated alike. Every member shall render his or her best services for the good of the whole, according to the rules and regulations that may be hereafter adopted by the community. It shall always remain a primary object of the community to give the best physical, moral and intellectual education to all its members."

Provision was made for dividing the community into six departments: agriculture; manufactures and mechanics; literature, science and education; domestic economy; general economy, and commerce. Each department was divided into occupations, and each department headed by a superintendent. After the adoption of the constitution, members of the Preliminary Society, it was decided, who signed the constitution within three days could become members. Most of them signed. And on February 15, only a month after he had arrived at New Harmony, Thomas Say was elected by the parent community as Superintendent of Literature, Science and Education. Other superintendents were chosen to head up the other departments.

About this time dissensions arose, new communities were formed by members who were not in sympathy with Owen's liberal religious views, and eventually the movement collapsed. After the disintegration of the communities during the middle of 1827, Maclure remained in New Harmony organizing his educational interests, and during the fall of that year he went to Mexico on account of failing health, taking Say with hum. Here they remained until the approach of the summer of 1828, when they returned to the United States.

Say continued to live at New Harmony, looking after Maclure's interests, and continuing his taxonomic work, until his death on October 10, 1834. According to Dr. Benjamin H. Coates, Say died during a season of unusual mortality. Coates believed that Say's habit of going for long periods without food or very little of it, together with the loss of sleep, paved the way long before his death for the repeated attacks of fever and dysentery to which he was subject. Coates also states that when Say visited Philadelphia in 1833, a visit which could not be substantiated by the location of contemporary records, his poor health was apparent at once to his friends. He recovered from one attack only to be prostrated by another, each beginning with bilious symptoms and ending with symptoms of typhus fever and dysentery. New Harmony at that time was malarious, and this may have contributed to or have been the cause of his illness, although Say was not in perfect health during his western travels. Ord said that before going to New Harmony, both Say and Maclure lived frugally and carried their habits of abstinence from food too far.

Say was tall and spare but apparently muscular and strong before his period of ill health, otherwise he could not have withstood the hardships of his western travels. His complexion was dark and his hair black. Friends and acquaintances all liked Say because of his amiable disposition, his modesty, his sincerity, his conciliatory manner, his readiness to trust others, his willingness to help everybody whenever possible, his honesty and his love of truth. Some, however, thought that his modesty was so excessive as to result in an absence of self-confidence which reacted against his own interests. Nevertheless his refusal to take advantage of certain offers which might have increased his worldly possessions may have been due to his dislike or lack of interest, and he was too honest to feign interest where it did not exist. Certainly Say's work does not exhibit any lack of confidence in his ability in his chosen field, and his standards of usefulness or advancement may have differed from those of his friends.

Say had many friends and numerous corrospondents, both in this country and abroad.

Thomas Say was easily the leader in descriptive studies during the early part of the century. His article in Nicholson's *Cyclopaedia* was the foundation of conchology in America. A contemporary said,

> "This work ought to be in the possession of every American lover of natural science. It has been quoted by M. Lamarck and adopted by M. Ferrusac, and has thus taken its place in the scientific world."

Parts one to five of Say's *American Conchology* printed at New Harmony were translated into French by J. C. Chenu and published in Paris in 1845. Some of Say's entomological writings too were translated into French and published by M. A. Gory in 1837. It was Gory's intention to collect, translate and publish all of Say's insect writings, but the work never went beyond three thin livraisons. When Say began to describe shells there were no other conchologists in the country, but from about 1820 on they increased in number. Among his contemporaries were Rafinesque, Barnes, Hildreth and later Isaac Lea. Dr. Henry A. Pilsbry has said that Say's "descriptions of shells are excellently worded, very few of them being in any way ambiguous," and that "all his species have been identified and very few of them fall into synonymy."

The first papar published in America on fossil invertebrates was from the pen of Say and appeared in volume 1 of *Silliman's Journal*. He was the first in America to call attention to the chronogenetic value of fossils. Therein he said that the progress of geology "must be in part founded on a knowledge of the different genera and species of reliquiae, which the various accessible strata of the earth present," and he was aware too of the difficulties of studying fossils because of their fragmentary character and realized that their interpretation necessitated a knowledge of similar living animals. Dr. G. D. Harris collected Say's paleontological writings and reprinted them in the *Bulletin of American Paleontology*, 8 No. 5 (Dec. 7, 1896), under the title "A Reprint of the Paleontological Writings of Thomas Say." Doctor Harris considers Thomas Say one of America's greatest naturalists, and in his introduction he said that more than once European co-workers have overlooked Say's original descriptton of *Exogyra* and credited the genus to Sowerby, and that too often has Say's work on Crinoidea been forgotten.

Say's abilities were recognized abroad. According to the titlepage of his *American Entomology*, he was in 1824 a correspondent of the Philomathique Society of Paris. On May 5, 1829, he was elected a Foreign Member of the Linnaean Society of London, his certificate being signed by Dr. Francis Boott, Edward Adolphus Duke of Somerset, F.R.S., A. B. Lambert, Edward J. Bennett, Walter Buchanan, Edward Forster, Robert Brown, Thomas Bell, Rev. F. A. Hope, John Morgan, Richard Taylor and William Yarrell. Say was not, as stated in some accounts, a member of the Zoological Society of London.

LeConte, writing of Say's coleopterological descriptions, said, "His descriptions are so clear as to leave scarcely a doubt as to the objects designated," an opinion still shared by most present-day entomologists.

Say belonged to the descriptive period of American natural history. Specimens had to be named and described before further studies on habits and life histories could be advanced. He was not vitally interested in relationships and classification. His acute perception, his powers of observation and his industry were devoted to a single purpose, the description of new species, and

in this he was eminently successful. His ability to express the salient characters of a species in a few words was remarkable.

The bulk of the work that he accomplished was done before his removal to New Harmony, where he went, no doubt, because of his friendship for Maclure but also because he believed in Owen's plans for the betterment of humanity. Say's friendship for Maclure was unusually close, and this being so, Say was undoubtedly influenced by it to the extent that he disregarded the advice and suggestions of lesser friends who were concerned with his poor health and lack of finances. However, Say did what he wanted to do — describe new species — at a time when pioneers in such work were not even rewarded as poorly as they are now. As Coates has said, Say opened the shafts and galleries and pointed out the veins. And the success of his activities is attested by his numerous successors.

TIMOTHY DWIGHT (1752-1817)

Timothy Dwight, educator, pioneer of higher education for women, and president of Yale College from 1795 until his death in 1817, whose published works fill thirteen volumes, incorporated some entomology in his *Travels in New England and New York*, which was published in New Haven in 1821, and in London in 1823. In the first volume of this work (p. 56) he states,

> "I know not, that the Insects of New England, are remarkable either for their variety, numbers, or malignity. The *Hornet*, *Wasp* and *Humble Bee*, are natives of many countries. They exist, but do not abound here. The *Honey Bee* I consider as a native of this country; since it was found in the forests too early, and at too great distances from European settlements, to have been derived from importation."

On page 57, he talks about the mosquito, saying in part that such insects were not numerous in most parts of New England:

> "Such maritime towns, as have salt marshes in their neighborhood, are not unfrequently troubled with them in hot and moist seasons; particularly when the wind blows directly from the marshes."

He speaks of living in New Haven for more than thirty years and during that time they gave the inhabitants no trouble, except in three or four instances. Of the "locust," he states that it appears regularly every seventeenth year and sometimes does a little mischief to the forest trees.

In volume II (p. 403) we read,

> "Bennington [N.H.], and its neighbourhood, have for some time past been infested by grasshoppers of a kind, with which I had before been wholly unacquainted. At least their history, as given by respectable persons, is in a great measure novel."

They appeared at different periods in different years, and in the year 1798 they came four weeks earlier than in 1797 and disappeared four weeks sooner. He could not describe their form nor size — not having seen them. Their favorite food was clover and corn, and they fed upon the silk of corn. But they also ate almost all vegetables, and fed on the garments of laborers hung up in the field. And in addition, they ate pine sawdust. At times, particularly a little before their disappearance, they collected in clouds, rose high in air and took extensive flights, the cause and direction of which had never been discovered. They customarily returned and perished on the very grounds which they had ravaged.

In volume III (pp. 300-302) he has considerable to say about the Hessian fly being discovered near Brooklyn in 1784, near the Hessian encampment. From here it spread at the rate of about twenty miles each year, through most parts of the northern and middle states, "faster with, and slower against, the South-West wind."

He then briefly describes larva, pupa, eggs, work of the larva in the stalk, and the injury to wheat, its favorite food. When sown late, wheat generally escapes. While on this subject, he wrote,

> "Nothing can more strongly exhibit the dependence, or the littleness, of man, than the destruction of his valuable interests by such minute, helpless beings: nor can anything more forcibly display the ease, with which his Maker punishes his transgressions."

Of canker-worms, he said,

> "The Canker-worm has never made any considerable depredations at the distance of more than forty or fifty miles from the shore; although it has existed in this country more than one hundred and fifty years."

MISCELLANEOUS EARLY PAPERS

J. P. Brace in 1818 wrote on the cutworm *Phalaena devastator* (*Amer. Jour. Sci. & Arts*, vol. 1, pp. 154-155); Joseph Tufts in 1819 wrote on the codling moth (*Mass. Agric. Repos. & Jour.* July 1819); and John Prince, the same year, described the habits and ravages of *Chrysobothris femorata* (*Mass. Agric. Repos. & Jour.*, July, 1819, vol 5, pp. 360-361).

"A memoir on the honey-bees of America . . . " was read before the New York Lyceum of Natural History on September 25, 1820, by Mr. J. C. Vanden Heuvel and printed later in the *American Journal of Science*, (vol. 3, No. 1, pp. 79-85, Feb. 1821). Vanden Heuvel presented a group of twenty bees to the collection of the Lyceum, which he had obtained from Dr. George Schmidt, an entomologist who collected in Guiana and whom Vanden Heuvel had met while there on a recent visit. He regretted that he did not have the names of the bees, but he did have the common names current among the natives. Doctor Schmidt had assured him of the honey producing qualities of all. Several pages of the paper are devoted to the native origin of the bee in America and various accounts of travelers are quoted.

Dr. Gerard Troost, first president of the Academy of Natural Sciences of Philadelphia, whose entire life was devoted to geology and related sciences, who came to this country from Holland and who was professor of chemistry, geology and mineralogy in the University of Nashville for twenty-two years and state geologist of Tennessee for nine years, and whose published writings established his reputation at home and abroad, wrote, so far as could be determined, only one paper of entomological interest. This was entitled "Description of a variety of amber and of a fossil substance supposed to be the nest of an insect discovered at Cape Sable, Magothy River, Ann-Arundel County, Md." (*Amer. Jour. Sci. & Arts*, vol. 3, No. 1, February [8] + p. [1]-199, art. 3, p. 8-15, 1821) and was written from Baltimore.

In a stratum of lignite, Troost found a substance which appeared to be "a kind of comb or nidus made by some insects around the twigs and extremeties of the succulent branches of a tree." The sizes of the nests varied from one to three inches long and the diameter was about one inch. The shape was irregular and the surface rough, resembling the unripe fruit of the bitter orange. The surface was also marked with pin holes and these led to interior oval cells. It appeared that the holes were made by insects for egg-laying purposes. These nests were of a resinous nature and possessed the same chemical properties as amber.

NICHOLAS MARCELLUS HENTZ (1797-1856)

In 1821, an educator and scientist who later became an authority on American spiders, published his first spider paper in the *Journal of the Academy of Natural Sciences of Philadelphia*

(vol. 2, pt. 1, pp. 53-55). The title was "A notice concerning the spider, whose web, is used in medicine" and the author was Nicholas Marcellus Hentz. In this paper Hentz gave the spider the manuscript name, *Tegeneria medicinalis*, and mentioned briefly its color and markings. He gave more space to a description of the genus *Tegeneria* of Walckenaer. The spider in question was an inhabitant of cellers in this country and its web was supposed to possess narcotic powers and had been used apparently with success in certain cases of fevers. A plate accompanies the paper, figuring the spider and some details.

Hentz published a few papers on insects, but most of his work dealt with spiders. One of his insect papers was "Descriptions of some new species of North American insects," published in 1826 (*Jour. Acad. Nat. Sci. Phila.*, vol. 5, pt. 2, pp. 373-75, 1 pl.). In this Hentz described several beetles from Massachusetts and also included a description of *Elater vernalis* from Pennsylvania, by Say. The following year, 1827, saw the publication of another insect paper by Hentz, this time involving the descriptions of eleven beetles, three species of *Cicindela*, received from T. W. Harris, three species of *Lebia*, two species of *Melolontha*, two species of *Pyrochroa* and one species of *Nemognatha*. Most of the specimens were from Massachusetts. The descriptions are brief and sometimes there is a note or two about their habits or food plants.

Another insect paper written by Hentz, in 1828, was entitled "Remarks on the use of the maxillae in coleopterous insects, with an account of two species of the family Telemorphidae, and of three of the family Mordellidae, which ought to be the type of two distinct genera" (*Trans. Amer. Philos. Soc.*, n.s., vol. 3, No. 14, pp. 458-463, 1 pl.). Hentz believed that the maxillae, in many insects, were appendages to the tongue, that their use was to assist in the deglutition of food, and that they seldom served to grind food except in the Melolonthidae, Rutelidae and a few other families. He mentioned Latreille, Degeer and their observations. Hentz's article was designed to bring out the idea that the maxillae, in most beetles, may not have as much use in masticating food as was commonly supposed and his observations on *Cantharis marginata* Fab., and *Cantharis bimaculata* Fab., corroborated his opinion. In this paper he also erected the genera *Chauliognathus* and *Macrosiagon*.

With one exception, Hentz's remaining eleven papers are all devoted to spiders, mainly the descriptions of new species. The exception is his article entitled "The Locust" published in 1834 in *The Western Journal of the Medical and Physical Sciences*, Cincinnati (vol. 8 [2d hexede, vol. 2], No. 1, June, pp. 160-163). This is on the cicada and about half is given over to the uses of the words "locust" and "cicada," the writings of the Greeks, Pliny, etc., habits of the cicada, the various species, and the 17-year cicada. After seeing the pupae of the periodical cicada near the surface of the ground and after hearing various accounts, he wrote,

> "but the writer is not yet convinced by any printed account of their appearance, that seventeen, or eight, or seven are the number of years which are necessary to complete the subterranean existence."

Hentz's remaining spider papers appeared in the *American Journal of Science*, and the *Journal of the Boston Society of Natural History*, mainly in the latter. In 1841, he claimed in twenty years to have described 147 species and his estimate of the number throughout the world was 2,000. Nearly all his papers were illustrated by his own drawings.

Hentz was born in Versailles, July 25, 1797. His father fled there from Paris, because of his unwelcome political activities, and assumed the name of Arnold. Nicholas, while youug, became quite skilled in miniature painting. In 1813 he entered the Hospital Val de Grace as a medical student and remained there until the fall of Napoleon, when his father was proscribed and was obliged to flee to America. The family, after arriving in America, spent a few weeks in New York City and "Elizabeth Town," New Jersey, and then moved to "Wilkesburg," Pennsylvania, in April, 1816. Hentz, for some years, taught Friends, and gave lessons in miniature drawing in Philadelphia and Boston. While teaching at Round Hill, Northampton, Massachusetts, in a school for boys, he met and married Miss Caroline Lee Whiting, who later became known as a novelist and poet. Shortly after marrying, he moved to Chapel Hill, North Carolina, where he taught modern languages in the State University there, until 1830. Then he moved to Covington, Kentucky, to take charge of a female seminary, then to Florence, Alabama, where for eight years he ran a flourishing school called Locust Hill Female Academy. In 1842 he went to Tuscaloosa and in 1846 to Tuskegee, both in Alabama, and in the following year to Columbus, Georgia, all the time engaged in teaching. All his leisure was given to the study of spiders, their habits, etc., and to collecting and describing them. He corresponded with and was one of Say's friends, and he was a great friend of T. W. Harris. In fact, one of Hentz's sons was named T. W. Hentz. While in Philadelphia he became acquainted with Lesueur, who was accustomed to etch his own plates, and having the use of Lesueur's equipment, Hentz made etchings of some of his own spider plates. In the winter of 1820-21 he attended a course of medical lectures at Harvard, but finally abandoned them for teaching.

While living in Columbus, Georgia, his health began to fail in 1849 and his nervous condition was such that he became a regular user of morphine. He gradually became more infirm and finally moved to Mariana, Florida, to the home of his son, where he died November 4, 1856.

In Boston, 1875, his collected writings were published under the title, *The Spiders of the United States. A Collection of the Arachnological Writings of N. M. Hentz*, edited by Edward Burgess with notes and descriptions by James H. Emerton. In this book, it is stated that Hentz was physically small and spare, about five and a half feet high and weighing only about one hundred and ten or one hundred and fifteen pounds. His disposition was genial, affectionate and generous, although at times his nervousness made him morbidly sensitive and suspicious and a prey to imaginary fears. He was very religious and all his life he had the habit of suddenly resorting to prayer. Regardless of circumstances, he would either drop to his knees or remove his hat, and pray. For amusement he took pleasure in fishing and gunning and in walks in the woods with his sons.

JOSEPH DORFEUILLE (1790-1840)

The Western Quarterly Reporter of Medical, Surgical and Natural Science, of Cincinnati, printed in 1822 (vol. 1, No. 3, Aug. p. 342) a folding plate containing a circular chart by J. Dorfeuille. This chart or table, as it is called, had originally been prepared to accompany an essay on American Entomology, but the essay was missing. A note accompanying the table reads as follows:

> "it contains the genera established by the most celebrated entomologists in Europe. Their relations to the Linnean system in nearly the same as that published in the *Encyclopaedia Brittanica* and in the *Edinburgh Encyclopaedia* by Brewster with the exception of foreign genera."

The chart is harder to read than it would have been had it been made oblong. As it stands, it consists of concentric circles. At the

circumference of the last circle, are the genera. As the center of the chart is approached, the groups become larger, such as family, order, legion, subclass, with "class" at the center.

In the same journal (vol. 1, No. 4,, [Nov.] pp. 398-400) the editor prints a notice from Dorfeuille relating to what is called "an insect plant" found at Nachitoches, Louisiana. Dorfeuille, in part, describes this "insect plants" as being composed of two parts, animal and vegetable. The animal part is three lines in length and four in breadth. The vegetable part is ten lines in length and is divided into branches, etc. In 1803 he examined an insect from which grew a kind of fungus. It seemed to him that the animal was about to be changed into a plant. The fungus came from the head of the insect and filled the cavities of the larval or pupal skin left in the soil. Dorfeuille thought that the skin had belonged to a species of cicada peculiar to Natchitoches.

JAMES WORTH (17??-18??)

James Worth, on July 29, 1822, in a paper read before the Agricultural Society of Bucks County, Pennsylvania, called attention to several wheat-infesting insects, and confused *Isosoma hordei*, the joint worm (and possibly *tritici*) and *Meromyza americana* and possibly a species of *Oscinis*. He also described the injury due to *Meromyza* and this antedated "the discovery and description of the species by Fitch about 34 years." Mr. Worth's observations were printed in the *American Farmer*, (vol. 4, p. 394).

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Dr. James E. DeKay, one of the leading zoologists of his day and author of works dealing with the reptiles, amphibia, mollusca and crustacea of New York, etc., official zoologist of the New York State Survey upon the Geology and Natural History of the State, presented at the January 24, 1823, meeting of the New York Lyceum of Natural History a paper on two worms inhabiting the body of the common cricket. According to the abstract, published in the *American Journal of Science* (vol. 7, No. 1, p. 172, Nov. 1823), Doctor DeKay "offered drawings and descriptions of two of them supposed to be new species of intestinal worms" and they were described as *Ascaris grylli*, and *Fissula grylli*.

Doctor DeKay joined the Lyceum of Natural History in 1819 and in 1837 he was elected a corresponding member of the Boston Society of Natural History. He died in Oyster Bay, Long Island, in 1851.

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Jacob Cist was born in Philadelphia, Pa., March 13, 1782. At the age of fifteen, he entered his father's printing establishment, after attending the public schools of Philadelphia and Nazareth Hall, at Nazareth, Pennsylvania. At the age of eighteen or nineteen, he became manager of his father's business, newly established at Washington, D. C. However, a few months later the plant was closed and Cist entered the United States Post Office Department, in which he served as a clerk for eight years, when he resigned to move to Wilkes-Barre, Pennsylvania, where he was appointed to the postmastership. This position he held for the remainder of his life.

He became interested in the natural sciences, particularly geology, and he was clever at sketching and writing. As a result, his essays on various subjects, poetry, etc., appeared in various magazines and newspapers. Between 1813 and 1815, he undertook, with friends, the mining and marketing of anthracite coal, but his company like that of his predecessor was not successful in convincing the public of the value of this fuel.

Between 1815 and 1821, he collected and distributed in this country and in France specimens of plants, fossil plants, and corresponded with various scientists. Most of his observations appeared in the *American Journal of Science and Arts*. He had many interests, such as agriculture and the organization of glass and iron works, and he spent many years in the preparation of a work on American entomology, making hundreds of drawings and numerous notes. At his death, December 30, 1825, this remained uncompleted. In addition, he invented an artist's paint mixing mill, a printer's ink from anthracite coal, and a stove in which to burn anthracite coal. He was the first cashier of the first bank in Wilkes-Barre in 1817, treasurer of Luzerne County in 1816, and a founder and treasurer of the Wilkes-Barre Bridge Company, 1816-1818.

Mr. Gilbert S. McClintock, of Wilkes-Barre, Pennsylvania, is the fortunate possessor of a large collection of beautifully executed drawings of insects and books of field notes made by Jacob Cist, who was his great grandfather. Mr. McClintock states that according to letters in his possession, Jacob Cist corresponded with Thomas Say and with scientists in England, France, Germany, etc. It is apparent that he was an interesting and versatile individual of whom more should be made available.

ABRAHAM HALSEY (17??-18??)

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circumference of the last circle, are the genera. As the center of the chart is approached, the groups become larger, such as family, order, legion, subclass, with "class" at the center.

In the same journal (vol. 1, No. 4,, [Nov.] pp. 398-400) the editor prints a notice from Dorfeuille relating to what is called "an insect plant" found at Nachitoches, Louisiana. Dorfeuille, in part, describes this "insect plants" as being composed of two parts, animal and vegetable. The animal part is three lines in length and four in breadth. The vegetable part is ten lines in length and is divided into branches, etc. In 1803 he examined an insect from which grew a kind of fungus. It seemed to him that the animal was about to be changed into a plant. The fungus came from the head of the insect and filled the cavities of the larval or pupal skin left in the soil. Dorfeuille thought that the skin had belonged to a species of cicada peculiar to Natchitoches.

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of the Lichens of the vicinity of New York" (*Annals of the Lyceum*, 1823), cashier and accountant for the foundry of James P. Allaire at Corlear's Hook, later cashier of a Brooklyn or New York bank, published in 1824 "Remarks on certain entozoical fulgi" (*Annals Lyc. Nat. Hist. N. Y.*, vol. 1, pt. 1, pp. 125-6). In this paper he stated that,

> "in the warm climate of South America, a fungus is frequently met with, growing from dead insects of the *Vespae* and *Grylli* tribes."

Dickson, who first detected this fungus, in England, described it as *Sphaeria entomorhiza*. Then follows a general account of the fungus and a related species and also an account of another genus, *Isaria*. Halsey's short paper of two pages was called forth because specimens of *Sphaeria entomorhiza* attached to insects had recently been presented to the Lyceum by Doctor Madianna, from Guadeloupe.

THADDEUS WILLIAM HARRIS (1795-1856)

An outstanding figure in entomological and natural history circles in this country during the first half of the 19th century was Thaddeus William Harris, M.D., who was second only to Say as a pioneer in entomology. Shortly after Say had begun in Philadelphia, Harris became active in Massachusetts, and continued until the middle of the century. His first published article, on entomology, appears to be the one entitled "The natural history of the salt-marsh caterpillar" which was printed in 1823 in the *Massachusetts Agricultural Repository and Journal* (vol. 7, pp. 322-31, 1 pl. 9 figs.). In this he gives the life history of the salt marsh caterpillar as he observed it on the salt marshes bordering the Charles River near Cambridge. At that time, salt hay was important to the farmers in that vicinity. He describes the larva in some detail, its feeding periods, its habit of rolling itself up into a ball and floating on the surface when the hay is covered by the tide, its food, the cocoon, and the adults of both sexes. He also described the male and the female moth and its varieties. Peck said the moth was undescribed and so Harris describes it in Latin, giving it the name *Arctia pseuderminea*, a name suggested by Peck. Harris succeeded in getting eggs from females in confinement, but could not locate them in the field. For control, he recommended cutting the grass early in July and burning over the marshes in March. Harris's observations and his interest in seemingly unimportant details, show that he was a good entomologist and a good student of insect economy.

In 1824 Harris wrote a "Description of four native species of the genus *Cantharis*" for the *Boston Journal of Philosophy and the Arts* (vol. 1, No. 5, Jan. art. 58, pp. 494-502). The same paper was republished in the *New England Journal of Medicine and Surgery* in 1824 (vol. 13, pp. 243-5, July, 1824). The first part deals with the general history of the beetles, but nothing is said of the habits of the larvae. There are short descriptions of *Cantharis vittata, cinerea, marginata* and *strata*, all of which had been described previously by others. Accompanying those descriptions are notes on the medicinal properties of the beetles, their food, common names, synonymy, etc.

In 1825, Harris described, in the *Boston Journal of Philosophy and the Arts* (vol. 2, No, 6, May, art. 63, pp. 580-83), *Condylura prasinata* from Maine, an animal related to the mole or shrew-mouse. In 1827, he published "Descriptions of three species of the genus *Cremastocheilus*" in the *Journal of the Academy of Natural Sciences of Philadelphia* (vol. 5, pt. 2, pp. 381-89), all of which were from Massachusetts.

Harris's paper, "Minutes towards a history of some American species of *Melolonthus* particularly injurious to vegetation," which was printed in the *Massachusetts Agricultural Repository and Journal* in 1827 (vol. 10, pp. 1-12, July), was written with a view to the premium offered by the Massachusetts Society for Promoting Agriculture for the best essay on the natural history of the rose bug. His professional duties prevented him from getting it in on time, and he resolved not to submit it. This information, however, came to the ears of the president of the society, who urged Harris to submit it. This he did and the trustees awarded him the premium. The paper begins with the Linnean definition of the genus *Scarabaeus*, its characters and general habits and injury of the species in Europe. Harris consulted the works of Latreille, Olivier, and Kirby and Spence. He also mentions the natural enemies. All of which leads up to the American species which he discusses, finally coming to *Melolontha subspinosa* described by Fabricius. Then he gives its life history and his observations and experience, all based upon field observations, in which of course there are some gaps. He states that if young chickens suffer from eating them alive, sweet oil should be poured down their throats. Harris was not impressed by most of the remedies proposed by French authors, and for his own part he recommended "a general pursuit" of them. Applications of air-slaked lime to grape vines were found to be useful as deterrents. Fires by night did not attract them. Severe winters and coldness and moisture did not always decrease their numbers by killing the larvae in the soil. He cites French authors who recommended hand collecting and killing for several years in succession. He believed that a warm, fertile and rather dry soil, which was not disturbed by the plow or spade, was favorable toward an increase in numbers. The entire paper is good. The entomological observations are sound and Harris thought straight and did not jump to conclusions.

In 1835 Harris wrote "Upon the economy of some American species of *Hispa*" (*Jour. Bost. Soc. Nat. Hist.* vol. 1, No. 2, art. 9, pp. 141-151) and also upon "Characteristics of some previously described North American coleopterous insects and descriptions of others which appear to be new, in the collection of Mr. Abraham Halsey" (*Trans. Nat. Hist. Soc. of Hartford* [Conn.] pp. 65-91, 1 pl.). Twenty-seven species are mentioned in this paper and the plate is a colored one. Halsey, at this time, was corresponding secretary of the Natural History Society of Hartford.

Descriptive papers by Harris are not numerous. In 1838 he published "Remarks upon the North American insects belonging to the genus *Cychrus* of Fabricius; with descriptions of some newly detected species" (*Jour. Bost. Soc. Nat. Hist.*, vol. 2, No. 3, art. 8, pp. 189-204) which was abstracted in the *American Journal of Science and Arts* (vol. 36, pp. 391-92, July 1839). His paper "Descriptive catalogue of the North American insects belonging to the Linnaean genus *Sphinx*," based upon his own collection, appeared in the *American Journal of Science and Arts* (vol. 36, No. 2, July, art. 3, pp. 282-320) in 1839. Not until 1853 did another technical paper appear, when he described *Rhinosia pometella* in the *Proceedings of the Boston Society of Natural History* (vol. 4, pp. 349-351). And in 1859, three years after his death, the Boston Society published in their *Proceedings* his remarks "On *Cicindela Hentzii*; On the synonymy of three North American butterflies" (vol. 7, pp. 185-88; 189-90). In the same volume is another posthumous paper entitled "Observations on the transformations of the Cecidomyiidae" (vol. 7, pp. 179-83), in which he says that although, in most insects, a new membrane or skin is formed beneath the outer skin, whether the latter is cast off or retained, this is not true for the larvae of *Cecidomyia salicia* and *Cecidomyia tritici*. These species overwinter as full-grown larvae. Then they change color; the body swells and

rudimentary legs, wings, and antennae bud forth and grow to pupal dimensions; thus they transform to pupae, without shedding their larval skins.

In 1839, the *Journal of the Essex County Natural History Society* (Salem, Mass., vol. 1, No. 2, pp. 101-7) printed Harris's paper entitled "Remarks upon *Scarabaeus goliatus* and other African beetles allied to it," in which he traces the earliest accounts and reviews previously written papers. At the end he says,

> "it is much to be regretted that Dr. Lamarck's numerous and unwarrantable innovations in nomenclature should still be retained. Specific names are the property of the first describer who makes use of them, and should not be altered or removed."

Doctor Harris published some descriptions of new species in the *New England Farmer*. In 1837 Harris had been appointed, by the legislature of Massachusetts, as one of a commission for a scientific survey of the state, and in this connection he wrote his *Report on the Insects of Massachusetts Injurious to Vegetation*, "published agreeably to an order of the legislature by the Commissioner on the Zoological and Botanical Survey of the states" (Cambridge, Mass., Folsom, Wells, Thurston, 8 + 459 pp.), which was published in 1841. In 1842, a small impression, with slight alteration, was printed. In 1852 a revised edition was published. And in 1862 an enlarged and illustrated edition was published under the editorship of Charles L. Flint, then secretary of the State Board of Agrlculture, Other editions appeared in Philadelphia, 1869, and New York, 1880.

Harris's *Report* was well received and favorably reviewed. As a popular treatise on injurious insects, it was without a rival for many years and it was of value to every student of entomology. Today most of the remedies, involving as they do, hand picking, or the use of uncertain chemical combinations, seem quite old-fashioned, but the book will always remain one of the classics of economic entomology. In its pages are recorded the names of many of Harris's correspondents, and of authors of papers, long since forgotten.

It is impossible to present here a detailed list of Harris's writings. In 1843, he described an African beetle "allied to *Scarabaeus polyphemus*." In 1847, his account of the seventeen-year locust, which had appeared in his *Report on the Insects of Massachusetts* (1841) was reprinted in the *American Journal of Science and Arts* (vol. 53). In 1851 he wrote on the currant stem borer, *Aegeria tipuliformis*, as it was then called, for the *Magazine of Horticulture and Botany* (vol. 17 [2nd ser. vol. 7] No. 6, June, pp. 241-44) and in the same magazine in 1855 (vol. 21, No. 9, Sept., pp. 418-23) was printed an article entitled "The measure-worm," which Harris identified as the snow-white silky geometer, *Geometra niveosericeana*. At that time the larvae were troublesome in New York City upon elm, willow, linden, maple, poplar and horse-chestnut trees. The species is now known as *Ennomos subsignaria* Hubn., the snow-white linden moth.

Doctor Harris was born in Dorchester, Massachusetts, November 12, 1795, being the eldest child of Thaddeus Mason Harris, to whom reference has been made [see Chap. II]. In 1811, in his sixteenth year, he entered Harvard College and graduated in 1815. Following this, he studied medicine at the same institution, received his medical degree in 1820 and began his medical practice with Dr. Amos Holbrook in Milton. In 1824 he married Catherine, the youngest daughter of Doctor Holbrook. Apparently the practice of medicine was distasteful to him or his success for one reason or another was not assured, for in 1831 he accepted the position of librarian in Harvard University, which he retained until his death.

All his leisure time was given to the study of natural history and to illustration for his articles. In 1831 he prepared the Catalogue of Insects included in Hitchcock's *Report on the Geology, Mineralogy, Botany and Zoology of Massachusetts*. This was the first attempt in this country to enumerate and classify American insects on a large scale, and it included some 2,300 species. From 1837 until 1842 he was professor of natural history in the university, and in 1840 he published a list of the native plants found around Boston. All his life he was interested in botany, and correspondents sent to him seeds from all parts of the world. Doctor Harris had antiquarian interests also, and looked into and made notes upon historical subjects, but many were never written up and published. In 1847 there was published in the Boston *Courier* of July 29, an article on Stephen Daye, the Cambridge printer, which Harris wrote, and a few of his genealogical writings appeared in the *New England Historical and Genealogical Register*.

Dr. Samuel H. Scudder edited the *Entomological Correspondence of Thaddeus William Harris, M.D.*, which was published by the Boston Society of Natural History in 1869. This contains the correspondence of Harris with Hentz, F. E. Melsheimer, Doubleday, Herrick, J. L. LeConte, Miss M. H. Morris, Say, Zimmermann, Darling, Le Baron and Colonel Higginson, also descriptions of larvae, and life history notes from manuscripts previously unpublished. Nearly every important paper or fragment, previously inacessible, was reproduced.

When Doctor Harris's *Insects Injurious to Vegetation* appeared, there were quite a few persons interested more or less in insects despite the general belief now that only a handful of people paid any attention to entomology at that time. True, the professional entomologists were scarce, but a careful reading of Doctor Harris's book will reveal the names of many persons who were genuinely interested in insects. Leaving out the names of the few professionals, we find that Doctor Greene, of Mansfield, investigated the rose chafer; the Rev. L. W. Leonard, of Dublin, New Hampshire, sent beetles to Harris, as did Mr. Nuttall; Mr. M. S. Deane, in the *Boston Cultivator* (July 1, 1848) wrote about the pea weevil; Wilson, the ornithologist, described insect injury; Dr. James Tilton, of Wilmington, Delaware, wrote the account of the plum weevil in Dr. James Mease's edition of Millich's *Domestic Encyclopaedia* (Phila. 1830); Dr. Joel Burnett wrote two articles on the plum weevil, one for the *New England Farmer* (Mar. 11, 1840) and the other for Hovey's *Magazine of Horticulture* (Aug. 1843); and Mr. M. H. Simpson wrote on the same subject for Hovey's in the June, 1850, issue. The Hon. John Lowell, of Roxbury, Mr. Henry Wheeler and Dr. Oliver Fiske, of Worcester, corresponded with Harris about insects. Dr. Paul Swift wrote to Harris in May, 1844, and told him of the trees in Washington and Independence squares, Philadelphia, Pennsylvania, being infested by a "*Saperda*." Theophilus Parsons likewise wrote to Harris in 1847 about the insects on the trees of Boston Commons. Mr. Phanuel Flanders, of Lowell, Massachusetts, showed to Harris potato leaves riddled by flea beetles. Mr. F. C. Hill, of Philadelphia, sent him eggs of the katydid, and the Rev. Thomas Hill, of Waltham, Massachusetts, sent him eggs of another Orthopterous insect. Mr. Robert Treat Paine sent him specimens of locusts, and Dr. D. S. C. H. Smith supplied grasshoppers. Mrs. N. G. S. Gage, of Concord, wrote to Harris about insects. Mr. Enoch Perley, of Bridgeton, Maine, published his writings on apple bark lice in the early papers of the Massachusetts Agricultural Society (1796, p. 32). Harris received specimens of Lepidoptera from Dr. D. S. C. H. Smith, of Sutton, and from the Rev. L. W. Leonard, and T. G. Fessenden. From E. C. Herrick, of New Haven, Connecticut,

Harris received wheat eaten by grain moths. In addition, there were numerous persons who wrote for the agricultural journals and each professional entomologist always had correspondents and collectors with whom he kept in touch.

JOHN EATTON LECONTE (1784-1862)

In 1824, John Eatton LeConte, the father of John Lawrence LeConte, wrote,

> "Owing to the difficulty of determining in this country, what insects are known to naturalists in Europe, the science of entomology has as yet made but small progress amongst us: even if all the books which have been published on this subject were commonly available, we still should not be in a much better situation."

This statement appeared in a paper entitled "Description of some new species of North American insects," that was published in the *Annals of the New York Lyceum of Natural History* (vol. 1, pt. 1, pp. 169-173, 1 col. plate). The author, in offering his new descriptions, stated that he acted with due caution and hesitation after being advised by Baron Dejean, "profoundest entomologist and most accomplished soldier of his age." Twenty species are described, in *Anthrenus, Bruchus, Hister, Pissodes*, and other genera, many of them from Georgia. The descriptions are very short and one rather poor colored plate accompanies them. This was drawn by J. E. LeConte and engraved by Emily Maverick, who came of a well-knoun family of engravers. The beetles are rather stiff looking and the colors are incorrect.

John Eatton LeConte was born in Shrewsbury, New Jersey, February 22, 1784. He married Mary Anne H. Lawrence in July, 1821, and had three sons, two Edwards who died in infancy, and John Lawrence, who was born May 13, 1825, and later became the distinguished entomologist. John Eatton LcConte lived most of his life in New York. When thirty-four, he entered the corps of topographical engineers of the United States Army with the rank of captain and remained until 1831, attaining in 1828 the rank of brevet-major after ten years of service.

Previous to his army service, he published a catalogue of the plants of New York City, edited by Doctor Hosack. Later he published special studies on various genera of plants as well as on our native grapes, tobacco and pecans. He was also the author of papers on mammals, reptiles, batrachians and crustacea, mainly systematic, and he collected much material for the natural history of our insects. In cooperation with Boisduval, a single handsomely illustrated volume upon North American butterflies was published in Paris in 1833, under the title *Historie Generale et Iconographie des Lepidopteres et des Chenilles de l'Amerique Septentrionale*, "par le Docteur Boisduval, et M. John LeConte de Hew York." Although published jointly, LeConte did most of the work. He was particularly interested in the Coleoptera, although he published but a few papers upon them and those mainly upon the family Histeridae. His monograph on the North American Histeroides was printed in the *Journal of the Boston Society of Natural History* in 1845 (vol. 5, No. 1, pp. 32-86), and his paper, "Remarks on two American *Cimex*", was printed in the *Proceedings of the Academy of Natural Sciences of Philadelphia* in 1855. For the former paper, in which the seventy-five descriptions are in Latin, his son, John Lawrence LeConte, drew with much care the figures on six plates.

According to Henshaw, J. E. LeConte described eighty-six species of Coleoptera. Of this number, sixty-one retained LeConte's names; two were varieties; and twenty-three were synonyms. He left behind many water-color illustrations of our native insects and plants which he himself had made. These are said to be the property of the Missouri Botanic Garden. He died at Philadelphia, November 21, 1862.

JOHN T. SHARPLESS (17??-18???)

The possibilities in silk culture continued to interest many people. John T. Sharpless, M.D., read before the Maclurian Lyceum of Science of Philadelphia, on June 11, 1826, "An essay on the *Bombyx mori*, or silk worm" that was printed in the *Franklin Institute Journal* in 1826 (vol. 2, pp. 22-9; 94-100; 139-144). In this he traced tile history of the silk worm in China, India, Persia, Greece, Rome, etc., its introduction in the British colonies, the formation of the society known as "The Filature of Philadelphia," developed and encouraged by Benjamin Franklin, the silk shipments sent to England for manufacture, the premiums offered for the greatest number of cocoons and similar matters.

Doctor Sharpless claimed that the revival of interest, at the time he wrote, was due in great part to Mr. Samuel Alexander of Philadelphia, who had brought eggs from Gibraltar to observe the habits of the larvae. He was so impressed with the possibilities of the insect in this country that, by great perseverance and industry, he produced about five millions of eggs. These he distributed, and most of the larvae in and near Philadelphia at that time were from his Gibraltar eggs. Italian eggs interested him also. Doctor Mease also imported a quantity of eggs from Genoa, and his worms were thriving at the "Hospital." Sharpless stated that there were about 500,000 larvae in Philadelphia and vicinity. Of this number, 25,000 were at the "Hospital," and Mr. Alexander, Mr. Dusar, and Mrs. Kempton each had 10,000. Sharpless then described the life-history of the silk worm, and other matters of importance to silk culturists, including the cultivation of mulberry trees. Even the internal anatomy as described by Malpighi and Blumenback came in for attention. In fact the entire paper is good.

AMOS EATON (1776-1842)

In 1826, Amos Eaton's text book on zoology was published at Albany, New York. The title is *Zoological Text Book, comprising Cuvier's Four Grand Divisions of Animals: also, Shaw's Improved Linnean Genera, arranged according to Classes and Orders of Cuvier and Latreille*. Of its 282 pages, 13 are devoted to insects. Eaton said,

> "By studying insects and becoming acquainted with their beautiful structure, all those artificial horrors, excited by their presence, are changed into feelings of adoration for Him, who drew out their microscopic tubes, and set their respective fluids to flow into them."

Brief diagnostic characters are given for the following orders, which are then subdivided into families: 1, Myriapodia; 2, Thysanoura [sic]; 3, Parasita; 4, Suctoria; 5, Coleoptera; 6, Orthoptera; 7, Hemiptera; 8, Neuroptera; 9, Hymenoptera; 10, Lepidoptera; 11, Rhiptera; 12, Diptera.

Amos Eaton was an educator and scientist who was born May 17, 1776. He graduated from Williams College in 1799, was admitted to the bar in 1802, and lived in Catskill, as a lawyer and land agent. However, he became interested in botany and other natural sciences through Dr. Samuel L. Mitchill and Dr. David Hosack, and by 1810 he was giving popular lectures on botany. Later he lectured on other nature subjects. In 1820 he was appointed professor of natural history in the Medical School at Castleton, Vermont, and in 1824 he was made senior professor in the Rensselaer School at Troy, New York. This latter position he held until his death in Troy on May 10, 1842. He wrote five works on botany, two on chemistry and six on geology, in addition to various papers on educational and other subjects.

JACOB PORTER (17??-18??)

Dr. Jacob Porter, of Plainfield, Massachusetts, presented "a collection of minerals, reptiles and insects" to the New York Lyceum of Natural History in June, 1827. Apparently Doctor Porter was a collector who was interested in everything pertaining to the "art" of capturing insects, for in 1831 the *American Journal of Science and Arts* published "Instructions for the benefit of those who are engaged in collecting insects for cabinets of natural history" by Theodore Roger (vol. 19, No. 2, Jan., art. 2, pp. 213-20) which Porter had translated from the French. Roger's paper originally had appeared in the first volume of the *Bulletin d' Histoire Naturelle de la Societe Linneene de Bordeaux.*

The paper starts off with a few general statements concerning the places where insects may be found, the desirability of not injuring them or breaking them, and so on. Then the collecting utensils are listed as follows:

1. A net of gauze.
2. Rackets in gauze.
3. Umbrella.
4. Trowel.
5. A bownet of horse hair or canvas — for water collecting.
6. Tin box.
7. Wooden box lined with cork.
8. Paper triangles.
9. Pins — several sizes.
10. Bottles with large necks.

"The rackets may be compared to the pinchers used by surgeons, or to scissors, each half of which should be terminated by a rhomb covered with gauze, drawn tight over it, so that on shutting the pinchers, the two rhombs may perfectly fit each other.

"Butterflies captured in the rackets will never be injured because they can not struggle in the rackets."

General directions are given concerning the uses of the different collecting utensils, which the author calls "Instruments of Pursuit." Several pages of directions are given, as for example, on how to handle beetles, orthopterous insects, Neuroptera, Hymenoptera, Lepidoptera, etc.

Jacob Porter was interested in local history as well as in insects. He wrote an "Account of Plainfield" that was published in the *Massachusetts Historical Collections* (vol. 8, 2nd ser. Boston, 1826) and also a *Topographical Description and Historical Sketch of Plainfield* that was published in Greenfield in 1834.

JOHN BIGLAND (17??-18??)

The first edition of John Bigland's *A Natural History of Birds, Fishes, Reptiles, and Insects* was published in Philadelphia in 1828. In 1831 another edition followed. Pages 139 to 174 of Part 4 are devoted to entomology. Chapter I covers insects generally, their characteristics, and general remarks on such insects as the "scorpion," silk-worm, bees, locust. Chapter II has the following heading, which is sufficiently indicative of its contents: "Concluding Reflections on the conformation of Animal bodies. Structure of heart, eye, Convincing proofs of an all wise Design in the formation of the Universe, and consequently, of the Existence of a Supreme Intelligence." These reflections, however, applied to all animals, including insects. An appendix includes insect accounts from Goldsmith's *Animated Nature* and these of course are quite readable. Bigland has nothing in particular upon American insects.

JEREMIAH VAN RENSSELAER (1793-1871)

A trace of what is now known as medical entomology made its appearance in 1828 in the pages of the *American Journal of Science and Arts* (vol. 13, No. 2, art. 4, pp. 229-34), in the shape of a contribution from Jeremiah Van Rensselaer, entitled "On a larva in the human body . . . ." Doctor Van Rensselaer presented this paper at a meeting of the New York Lyceum of Natural History. At a previous meeting he had donated to the Lyceum a larva from a human body. In the paper referred to, he recounts various instances of larvae occurring in the human body, and tells of thirty larvae having been vomited by a girl of seventeen, who suffered severely for eighteen months from spasmodic and nervous affections. Numerous other records of insect larvae in the human body are cited, both in this country and abroad, but nothing is said about the identity of the species.

Doctor Van Rensselaer was born in Greenbush, New York, in 1793. He studied at Yale College, completing his work there in 1813. Then he went to New York where he worked under his uncle, Dr. Archibald Bruce, and where he acquired his liking for natural science. In 1823 he received his M.D. from the Vermont Academy of Medicine. Following this he spent three years abroad studying at hospitals in London, Paris, and Edinburgh. After returning, he practiced extensively in New York. For many years he was corresponding secretary of the New York Lyceum of Natural History. At one time he delivered a course of lectures before the New York Athenaeum. In 1852 he retired to take care of his estates at Greenbush. After another trip abroad, he returned to New York in poor health and died in 1871.

EARLY SOCIETIES AND ENTOMOLOGY PAPERS

The Franklin Society of Providence, Rhode Island, organized for the "Purpose of Promoting Investigation in Natural Science," published at Providence, Rhode Island, in 1829, an eight page pamphlet entitled, *General directions for collecting and preserving articles in the various departments of natural history; respectfully submitted by the Franklin Society of Providence, Rhode Island, to the attention of travellers, sea-faring men, and all lovers of nature and of nature's handy works, who are willing to lend their aid in promoting the cause of science, and advancing the progress of the arts.*

The first recipe is for the purpose of protecting the skins of animals from insect attacks, decay and for preventing decomposition. It is called "arsenical soap," the formula being camphor 2 1/2 oz.; arsenic in powder, 1 lb.; white or castile soap, 1 lb.; pearlash, 6 oz.; and lime in powder, 2 oz. Other recipes are mentioned, such as corrosive sublimate, chloride of lime, salt, cement, etc. In making the arsenical soap, the soap was to be cut fine, and heated with a little water, over a slow fire. The pearlash and lime were to be mixed in and stirred with a wooden spoon. After removal from the fire, the arsenic was added and "rubbed" in. Then camphor was added and the whole kept in jars.

Under the heading, "Insects," it is said that in catching them caution must be used not to injure them by breaking legs, wings, feelers, or by destroying their colors. Beetles may be killed by immersion in spirits of wine, or hot water and also by touching their heads with spirits of turpentine or by putting them under an inverted tumbler and filling it with sulphur fumes, by means of lighted matches held under one edge.

"All insects save butterflies and those consisting of a soft substance — may be packed in boxes, by making alternate layers of sand and insects. Butterflies must be pinned into boxes; and spiders, ants and other soft animals put into spirits. Procure if possible the caterpillar of the butterfly. If only caterpillar is found — it should be put in a box having a small air hole and be furnished with such leaves as it feeds upon. The eggs and various productions should be obtained; also a male and female and a specimen of the plants they feed upon, &c. Those used in medi-

cine, in dyeing and other processes, are more especially to be procured, and all information relating to them collected."

Daniel Prouty in 1831 supplied the *Massachusetts Agricultural Repository and Journal* with remarks on means against *Saperda candida*, under the title "Extirpating borer." In July, 1820, the same journal had printed an article on the same subject by Jesse Buel.

At this time the Boston Society of Natural History was concerning itself with entomology. At the June 13, 1831, meeting of the Council,

> "upon the representation of Dr. Gould, that several gentlemen had expressed a readiness to collect insects for this Society if a proper case should be provided to preserve them, it was voted — that Dr. Gould have the power to expend 50 dollars to procure a suitable cabinet for this purpose."

On December 7, 1831,

> "Mr. Fowle gratified the Society with a paper upon the history of the Animals he had presented, all of which were from the Island of Cuba . . . . The luminous insect is the *Elater Noctilucus*, called by the Spaniards, Cucullo . . . "

and more concerning the source of the light and of a young lady of Cuba, reading under the bed clothes, by the light of a few Cucullos in a thin glass bottle, when forbidden to read after a certain hour.

On January 4, 1832, "Dr. Gould exhibited about thirty species of Diurnal Lepidoptera, which he had captured in this vicinity. Of nearly twenty of these species, he gave a minute description pointing out the larvae and pupae — their habitats, seasons of appearing and various peculiarities.

"Thaddeus William Harris, M.D." — by Dr. Gould — was proposed as "a candidate for membership," and on February 1, 1832, he was "unanimously chosen a member of the Society."

At a meeting of the Council on February 8, 1831, the publication of a journal was proposed:

> "Upon the representation of the President, that Dr. Harris was desirous to publish descriptions of some of our Insects in a scientific Journal, and would be pleased to publish them in the pages of a journal appearing under the auspices of this Society — and of Mr. Green, that Mr. Nuttall would also aid in supporting such a publication — A Committee, consisting of Mr. Binney and Dr. Flint, were chosen to ascertain to what extent we may depend upon original communications, if such a journal should be commenced, and also, what amount of funds would be required to carry it on."

And according to the report of the curators, on May 2, 1832, a cabinet had been provided for the department of entomology. It contained thirty drawers each fourteen by twenty-one inches and at the time it housed about 1,200 specimens. About 200 were from South America and the remainder were from New England. The specimens were all classified and most of them were labeled.

SAMUEL PRESCOTT HILDRETH (1783-1863)

Dr. Samuel Prescott Hildreth, one of the early pioneer physicians of Ohio and for nearly forty years a contributor to the *American Journal of Science and Arts*, on meteorology, geology and paleontology, wrote also a few things on insects. His paper on "Notices and observations on the American Cicada or locust" which appeared in the *American Journal of Science and Arts* in 1830 (vol. 18, No. 1, April, art. 5, pp. 47-50), is an account of the periodical cicada. It is illustrated by one plate, rather poorly drawn, of five figures showing adults of both sexes. Hildreth notes their appearance at Marietta, Ohio, in 1795, 1812, and 1829, and gives general notes on their noise, feeding habits, egg laying, etc. He believed that the eggs derived some sustenance from the sap of the twig, because the eggs invariably perished in those branches that withered and died soon after the egg punctures had been made. He also stated that the pupae were so full of oily juices that they were used in the manufacture of soap. In 1847, Hildreth had additional notes on the periodical cicada at Marietta, Ohio, in 1846. These appeared in the *American Journal of Science and Arts* (vol. 3, ser. 2, pp. 215-218), to which he was a constant contributor.

Hildreth, who was born in Methuen, Massachusetts, September 30, 1783, studied medicine under Dr. Thomas Kittredge, of Andover. In 1805 he was practicing in Hampstead, New Hampshire. In 1806 he moved to Marietta, Ohio, and except for about a year and a half he remained there all his life. He explored the coal regions of Ohio and was deeply interested in natural history. In 1837 he was one of the assistant geologists of the Geological Survey of Ohio. In addition to his papers on natural history, he wrote for the medical journals and on historical subjects connected with the early history of Ohio and West Virginia. He also found time to serve in the Ohio legislature (1810 and 1811), as a tax collector, and as Clerk of the Ministerial Lands for many years. He helped to draft legislation regulating the practice of medicine and for the organization of medical societies in Ohio. He died at Marietta, July 24, 1863, and his collection of about 4,000 natural history specimens, together with his library, went to Marietta College.

POPULAR ENTOMOLOGY

In the early days, scraps of entomology appeared in various places. In the first volume of *The Cabinet of Natural History and American Rural Sports*, published by I. and T. Doughty in Philadelphia in 1830, there is on page 15 a paragraph on "Hunting Spiders," culled from the Family Library. And of course, the "redeeming trait in the history of these cruel creatures is their affection for their young." Furthermore, we learn that one of these spiders jumped two feet, on a humble bee. On pages 173-176 of the same volume, there is another article on spiders entitled "How Spiders Effect Their Aerial Excursions" by John Blackwell, Esq., F.L.S., and this paper was reprinted not from any "Family Library" but from the *Transactions of the Linnean Society*. Another and the final entomological article in volume 1 is found on pages 179-160, "*Oestrus Equi*, or the Horse Gad Fly." The article outlines the life-history and habits of the horse bot, and is signed "Nicholson." Most of the article is in quotation marks and its entomology appears to be good.

A serial magazine devoted in part to natural history made its appearance in Boston in 1831. It was entitled *The Naturalist containing treatises on natural history, chemistry, domestic and rural economy, manufactures and arts with twelve illustrations* and it was edited by D. J. Browne. The first number appeared in December, 1830, and the last in December, 1832. The editor selected articles from various journals and the first volume is the only one containing entomological articles. In this there are papers on termites, ants, bees and silk-worms. The bee article is from Bevan's *Treatise on Bees*. Others are from Eaton's *Zoology* and from Huber's works on bees and ants.

JOHN LEONARD KNAPP (1767-18??)

An English book that circulated in this country was *The Journal of a Naturalist*, by John L. Knapp, published by Carey and Lea of Philadelphia in 1851. It is devoted to meditations, observations of nature, etc., a large part being botanical. Of its 286 pages, thirty or forty are on insects — moths, the glow-worm, hornets, etc.— and also on the killing of insects. The

author believed prussic acid "to be neither painful or injurious, yet decisive, and communicative with pleasure." His method was to dip a pointed crow-quill into prussic acid and immediately insert it into the insect at a point "between the shoulders and beneath the head." And, to quote Mr. Knapp, "Extinction of animation ensues."

Knapp, in the preface of his book, states that many years have elapsed since the publication of White's *Natural History of Selborne*, and that no publication resembling it has since appeared. The reader is left to infer that *The Journal of a Naturalist* supplies the need. Knapp's book is really rhetoric on natural history and the whole thing is somewhat artificial and not at all to be put in the same class as White's *Selborne*.

John Leonard Knapp was a botanist who was born at Shenley, Buckinghamshire, on May 9, 1767. He made long summer botanical excursions, one of which was to Scotland, where he collected several of the rarest of British grasses. His *Journal of a Naturalist* was successful. It was published, first anonymously, in 1829, and went through three editions during his lifetime.

JONATHAN HOLMES COBB (1799-1882)

A few words should be said here about Cobb's "Silk Manual" which was a popular book for several years. The title is *A manual containing information respecting the growth of the mulberry tree, with suitable directions for the culture of silk* by Jonathan Holmes Cobb, Boston, 1831. Other editions appeared in 1832, 1833 and 1839. Cobb was a manufacturer of Dedham, Massachusetts, who founded the silk industry in the United States and who lived from 1799 to 1882. His book is divided into three parts, the first being devoted to the culture of the mulberry tree, sowing the seed, planting, grafting, pruning, types of trees, soil, etc. The second part relates to the rearing of the silk-worm, eggs, hatching, food, moulting, cocoons, curing, diseases of silk-worms, etc., and the third to reeling, various processes of manufacture, machinery, etc. In addition, there is an appendix covering the history of silk culture in the United States, dyeing of silk, values, imports, etc., etc. Part of the appendix is quoted here from the 1839 edition because it presents a picture of the large amount of public interest in silk-culture at that time and partly because it illustrates the danger of making prophecies:

> "In America the culture of the silk worm was introduced into Virginia in 1623, by James I, who himself composed a book of instructions on the subject, and caused mulberry trees and silk worms eggs to be sent to the colony. He made great efforts to have it take the place of tobacco in agricultural pursuits. Thirty years afterwards it was enacted that every planter who should not have raised at least ten mulberry trees for every hundred acres of land in his possession, should be fined ten pounds of tobacco. Five thousand pounds of tobacco were promised to any one who should produce one thousand pounds of wound silk in one year. In 1664, Mr. Walker, a member of the legislature, stated that he had seventy thousand mulberry trees on his estate. In 1666, all statutory provisions were repealed, because the business was in so thriving a condition as no longer to require protection. The decline of silk business in that state was probably owing to want of perseverance. The new emigrants brought with them new views and habits; and as they brought their slaves, it became necessary that an immediate annual profit should be realized. Hence the culture of rice and indigo was introduced, and on account of the immediate profit derived from their culture, that of silk languished, which would have required a steady perseverance for a course of years.
>
> "The culture of silk was introduced into Georgia at the earliest period of its settlement. The trustees of the colony transmitted mulberry trees as well as seeds and silk worms' eggs. The public seal of the colony represented silk worms in their various stages. In the year 1736 a quantity of raw silk was raised in that colony, and was manufactured at Derby, by Sir Thomas Combe, into a piece of stuff and presented to the queen. A few years before our Revolution considerable quantities of raw silk began to be exported to England, which was found equal to the best silk of Piedmont, and to be worked with less waste than the China silk. In 1776 more than twenty thousand pounds of raw silk were imported into England from Georgia.
>
> "No result of any consequence seems to have followed the exertions of Dr. Franklin to establish a filature at Philadelphia in 1769. The Revolution came on and put an end to the undertaking. There is little doubt that if the United States had continued to remain British Colonies, the culture of silk would have made an immense progress in this country, because its promotion was a matter of vital interest to the mother country, whose manufacturers would have been furnished from hence with the raw material, which they are obliged to purchase at a great expense, drawing very little from their dominions in Bengal, where it seems it is imperfectly prepared.
>
> "In Connecticut this culture has been attended to for seventy years, and it is probable that about four tons are now raised annually in the county of Windham. I was told by an intelligent citizen of that county during my visit there in 1828, that the culture was found profitable and was the best business they could pursue. I found many families, in some towns nearly all engaged in raising silk. A family makes ten, twenty, fifty, or a hundred pounds in a season, according to their supply of leaves. It is evident that they will derive much advantage from introducing European skill into their manufacture of the article. I am told that during the present season they have erected a factory and employ several European artists. There is every reason to believe that a rapid increase of production will soon take place in many of the states of the Union. In New Hampshire, Vermont, and Maine, silk has been cultivated in small quantities with success. Individuals in Massachusetts have cultivated it with success for thirty years, and there is not, probably, a farm in the state on which it may not be raised. The beautiful specimens of the article produced at the agricultural exhibitions in different parts of the Union show the degree of interest excited at the present time on the subject, and indicate that at no distant day great national wealth will be derived from the exertions that are now undertaken in this department."

JOSEPH ENNALLS MUSE (17??-18??)

Dr. Joseph Ennalls Muse, who died at Cambridge, Maryland, and who at one time was stationed at the United States Marine Hospital in New Orleans, Louisiana, contributed to the *American Journal of Science and Arts* (vol. 22, No. 1, April, art. 2, pp. 71-74; 155-158) in 1832 an article "On the Hessian Fly" that he had written on December 27, 1831, and February 26, 1832.

Dr. Joseph E. Muse was living at Cambridge, eastern shore of Maryland, when he wrote this article, and in it he complains about the lack of attention to insects injurious to crops. He discusses the "Hessian Fly," which exists only in the wheat-producing sections of the United States and Canada, and not in Europe or South America, having appeared fifty years previously. The insect and its habits are then described. To get rid of it, he advises that stack yards and other places be kept clean and free from "vegetating scattered wheat." Another practice to be avoided is fallowing, for a second successive crop of wheat — upon wheat stubble. The scattered wheat thus prematurely vegetated, gives sustenance and security to the insects. He says the peculiar and exclusive prey of this insect is the green leaf and stalk of wheat. If casual vegetation of this plant were avoided between the harvesting of the old crop and the seeding of the new, and the latter operation deferred until the beginning of frost, the parent swarms would most probably perish.

REFERENCES FOR CHAPTER IV

Anon.

1829. *General Directions for Collecting and preserving articles in the various departments of natural history; respectfully submitted by the Franklin Society of Providence, Rhode Island, to the attention of travellers, sea-faring men, and all lovers of nature and of nature's handy works, who are willing to lend their aid in promoting the cause of science, and advancing the progress of the arts.* Providence: Franklin Soc. 8 pp.

1830. *The Cabinet of Natural History and American Rural Sports.* Philadelphia: I. & T. Doughty. 3 v.

Barton, B. S. (1766-1815)

1803. *Elements of Botany.* Philadelphia: R. Desilver. 325pp. [Reprinted 1836]

Barton, B. S., and T. Nuttall [see Nuttall, 1818]

Bevan, E. (1769-1860)

1827 *The Honey Bee, its natural history, physiology and management.* London: Baldwin. 404pp. [2nd ed., 1838]

Bewick, T. (1753-1828)

1792. *A General History of Quadrupeds: the figures engraved on wood.* (3rd ed.). Newcastle: S. Hogson. 483pp. [Reprinted 1804, New York: G. R. Waite. 531pp; 1885, London: B. Quaritch. 526pp.]

Bigland, J.

1828. *Natural History of Birds.* Philadelphia. [2nd ed., 1831]

Blackwell, J.

1830. How spiders effect their aerial excursions. *Trans. Linn. Soc. London,*

Boisduval, J. B. A. D. de (1799-1879), **and J. E. LeConte** (1784-1860)

1829-34. *Histoire Generale et Iconographie des Lepidopteres et des Chenilles de l'Amerique Septentrionale.* Paris: Roret. 228pp, 78 pl.

Brace, J. P. (1798-18??)

1818. Description of the *Phalaena devastator* (the insect that produces the cut worm). *Amer. J. Sci. Arts* (New Haven), 1:154-155.

Brewster, D.

1815. *Edinburgh Encyclopaedia.* Edinburgh: Blackwood. 9 v.

Burgess, E., and J. H. Emerton (ed.)

1875. *The Spiders of the United States. A Collection of the Arachnological Writings of N. M. Hentz.* Boston.

Cist, J. (1782-1825)

1824. Notice of the *Melolontha*, or may bug. *Amer. J. Sci. Arts* (New Haven), 8:269-271.

Cobb, J. H. (1799-1882)

1831. *A Manual Containing Information Respecting the Growth of the Mulberry Tree, with Suitable Directions for the Culture of Silk.* Boston. [Reprinted 1832, 1833, 1839]

Degeer, C. (1720-1778)

1752-78. *Mémoires pour servir à l'histoire des Insectes.* Stockholm: Hosselberg. 7 v. [German ed., see Goeze 1776-83]

DeKay, J. E. (17??-1851)

1823. *Amer. J. Sci. Arts* (New Haven), 7:172.

Dorfeuille, J. (1790-1840)

1822a. *Western Qtr. Rep. Med. Surg. Nat. Hist.* (Cincinnati), 1:342.

1822b. *Western Qtr. Rep. Med. Surg. Nat. Hist.* (Cincinnati), 1:398-400.

Dwight, T. (1752-1817)

1821. *Travels in New England and New York.* New Haven. 3 v. [Reprinted 1823, London]

Eaton, A. (1776-1842)

1826. *Zoological Text Book, comprising Cuvierts Four Grand Divisions of Animals: also, Shaw's Improved Linnean Genera, arranged according to Classes and Orders of Cuvier and Latreille.* Albany. 282pp.

Eaton, F. B.

1855. Insects injurious to vegetation. *Trans. New Hampshire St. Agric. Soc.* (Concord), 3:199-207. (1854)

Fabricius, J. C. (1745-1808)

1775. *Systema entomologicae, sistens insectorum classes, ordines, genera, species, adiectis synonymis, locis, descriptionibus, observationibus.* Flensburg. 832pp.

1776. *Genera insectorum eorumque characteres naturales secundum numeroum, figuram, situm et proportionem omnium partim oris adiecta mantissa specierum nuper detectrum.* Cologne. 310pp.

1777. *Genera insectorum eorumque characteres naturales secundum numeroum, figuram, situm et proportionem omnium partim oris adiecta mantissa specierum nuper detectarum.* Cologne: Bartsch. 324pp.

1781-[82]. *Species insectorum eorumque exhibentes eorum differentias specificas, synonyma auctorum, loca natalia, metamorphosin adiectis, observationibus, descriptionibus.* Hamburg: Bohn. 2 v. (494pp; 495-514 [1782])

Goeze, J. A. E. (1731-1793)

1776-83. *Abhandlungen zur Geschichte des Insekten aus den französischen übersetzt und mit Anmerkungen.* Leipzig: J. C. Müller. 7 v.

Halsey, A.

1823. Synopsis of the lichens of the vicinity of New York. *Ann. Lyc. Nat Hist. New York,*

1824. Remarks on certain entozoical fulgi. *Ann. Lyc. Nat. Hist. New York,* 1:125-126.

Harris, G. D.

1896. *Bull. Amer. Paleon.* (Ithaca), 8(5):

Harris, T. W. (1795-1856)

1823. The natural history of the salt-marsh caterpillar. *Mass. Agri. Repos. J.* (Boston), 7:322-331, 1 pl.

1824. Description of four native species of the genus *Cantharis. Boston J. Philos. Arts,* 1:494-502. [Reprinted, 1824. *New England J. Med. Surg.* (Boston), 13:243-245]

1825. *Boston J. Philos. Arts,* 2:580-583.

1827a. Descriptions of three species of the genus *Cremastocheilus. J. Acad. Nat. Sci. Philadelphia,* 5:381-389.

1827b. Minutes towards a history of some American species of *Melolonthus* particularly injurious to vegetation. *Mass. Agri. Repos. J.* (Boston), 10:1-12.

1831. A Catalogue of the Animals and Plants in Massachusetts. *In* E. Hitchcock, *Report on the Geology, Mineralogy, Botany and Zoology of Massachusetts.* Amherst.

1835a. Upon the economy of some American species of *Hispa. J. Boston Soc. Nat. Hist.,* 1:141-151.

1835b. Characteristics of some previously described North American coleopterous insects and descriptions of others which appear to be new, in the collection of Mr. Abraham Halsey. *Trans. Nat. Hist. Soc. Hartford,* 1835:65-91, 1 pl.

1838. Remarks upon the North American insects belonging to the genus *Cychrus* of Fabricius; with descriptions of some newly detected species. *J. Boston Soc. Nat. Hist.,* 2:189-204. [abstract in *Amer. J. Sci. Arts* (New Haven), 36:391-392]

1839a. Remarks upon *Scarabaeus goliatus* and other African beetles allied to it. *J. Essex Co. Nat. Hist. Soc.* (Salem, Ma), 1:101-107.

1839b. Descriptive catalogue of the North American insects belonging to the Linnaean genus *Sphinx. Amer. J. Sci. Arts* (New Haven), 36:282-320.

1841. *Report on the Insects of Massachusetts Injurious to Vegetation.* Cambridge, Ma: Comm. Zool. 459pp. [Reprinted, 1842] (Revised by C. L. Flint, 1862)

1843. Peach tree worms. *Mass. Ploughman* (Boston), 2:36.

1847. On the seventeen-year locust. *Amer. J. Sci. Arts* (New Haven), 53:218-222.

1851. The currant-tree borer. *Mag. Hort. Bot.* (Boston), 17:241-244.

1852. *Report on the Insects Injurious to Vegetation* (rev. ed.). Cambridge, Ma: Comm. Zool.

1853. *Proc. Boston Soc. Nat. Hist.,* 4:349-351.

1855. The measure-worm. *Mag. Hort. Bot.* (Boston), 21:418-423.

1859a. Observations on the transformations of the Cecidomyiidae. *Proc. Boston Soc. Nat. Hist.,* 7:179-183.

1859b. On *Cicindela hentzii*; on the synonymy of three North American butterflies. *Proc. Boston Soc. Nat. Hist.,* 7:185-190.

1862. *A Treatise on Some of the Insects Injurious to Vegetation* (Revised by C. L. Flint). Boston: Crosby & Nichols. 640pp, 8 pl. [Reprinted, 1869, 1880]

Hentz, N. M. (1797-1856)

1821. A notice concerning the spider, whose web, is used in medicine. *J. Acad. Nat. Sci. Philadelphia,* 2:53-55.

1826. Descriptions of some new species of North American insects. *J. Acad. Nat. Sci. Philadelphia,* 5:373-375, 1 pl.

1828. Remarks on the use of the maxillae in coleopterous insects, with an account of two species of the family Telemorphidae, and of three of the family Mordellidae, which ought to be the type of two distinct genera. *Trans. Amer. Philos. Soc.* (Philadelphia), (n.s.) 3:458-463, 1 pl.

1834. The locust. *Western J. Med. Phys. Sci.* (Cincinnati), 8:160-163.

Hildreth, S. P. (1783-1863)

1830. Notices and observations on the American cicada or locust. *Amer. J. Sci. Arts* (New Haven), 18:47-50.

1847. *Amer. J. Sci. Arts* (New Haven, (2) 3:215-218.

Huber,

18?? Bees/ants?

Keating, W. H. (1799-1840)

1824. *Narrative of an Expedition to the Sources of St. Peter's River, Lake Winnepeek, Lake of the Woods, &c. Performed in the year 1823 by*

order of the Hon. J. C. Calhoun, Secretary of War, under the command of Stephen H. Long, U.S.T.E. Philadelphia: Carey & Lea. 2 v, 15 pl. [Reprinted 1825, London: Cox & Baylis. Facs. reprint 1959, Minneapolis: Ross & Haines]

Kirby, W. (1759-1850), **and W. Spence** (1753-1860)

1815-29. *An Introduction to Entomology; or elements of the natural history of insects: comprising an account of noxious and useful insects, of their metamorphosis, fodd, strategies, habitations, societies, motions, noises, hybernation, instinct, etc. etc.* London: Longman. 4 v. [Reprinted in later editions]

1846. *An Introduction to Entomology; or elements of the natural history of insects: comprising an account of noxious and useful insects, of their metamorphosis, fodd, strategies, habitations, societies, motions, noises, hybernation, instinct, etc. etc.* (6th ed.). Philadelphia: Lea & Blanchard. 600pp.

Knapp, J. L. (1767-18??)

? 1829. *The Journal of a Naturalist*. London. [Reprinted 1851. Philadelphia: Carey & Lea. 286pp.]

Lamarck, J. B. P. A. de M. de (1744-1829)

1815-22. *Histoire Naturelle des Animaux sans Vertebres: presentant les caractères géneraux et particuliers de ces animaux, leur distribution, leurs genres, et la citation des principales espéces qui c'y rapportent; precedée d'une introduction offrant la determination des caractères essentials de l'animal, as distinction du vegetal et des autres corps naturels: enfin, l'exposition des principles fondamentaux de la zoologie*. Paris: Verdiere. 7 v.

Latreille, P. A. (1762-1833)

1802-05. *Histoire Naturelle, Générale et Particulière des Crustacés et des Insectes, ouvrage faisant suite aux oeuvres de Leclerc de Buffon et partie du cours complet d'histoire naturelle rédigé p. C. S. Sonnini*. Paris: Dufart. 14 v.

LeConte, J. E. (1784-1862)

1824. Description of some new species of North American insects. *Ann. New York Lyc. Nat. Hist.*, 1:169-173, 1 pl.

1845. A monography of the North American Histeroides. *J. Boston Soc. Nat. Hist.*, 5:32-86.

1855. Remarks on two American *Cimex*. *Proc. Acad. Nat. Sci. Philadelphia*, 7:404.

LeConte, J. L. (1825-1883)

1859. *The Complete Writings of Thomas Say on the Entomology of North America*. New York: Bailliere Broth. 2 v. [Reprinted 1869, 1885, 1891]

Maclure, W. (1763-1840)

1809. *Observations on the Geology of the United States of America: with some remarks on the effect produced on the nature and fertility of soils, by the decomposition of the different classes of rocks: and an application to the fertility of every state in the union in reference to the accompanying geological map*. Philadelphia. 127pp. [rev. ed., 1817]

Marshall, H. (1722-1801)

1785. *Arbustum Americanum: the American grove and alphabetical catalogue of the trees and bushes*. Philadelphia. 2 v.

Michaux, A.

1801. *Histoire des Chênes de l'Amérique Septentrionale*. Paris. [Engl. trans., *Oaks of North America*]

Muhlenburg, H. (1753-1815)

1813. *Catalogus Plantarum America Septentrionalis, huc usque cognitarum indigenarum et cicurum; or, A catalogue of the hitherto known native and naturalized plants of North America, arranged according to the sexual system of Linnaeus*. Lancaster, Pa: W. Hamilton. 112pp.

Muse, J. E.

1832. On the Hessian fly. *Amer. J. Sci. Arts* (New Haven), 22:71-74, 155-158.

Nuttall, T. (1786-1859)

1818. *The Genera of North American Plants, and catalogue of the species, to the year 1817*. Philadelphia. 2 v.

Ord, G.

1815. In Guthrie, *Geography*.

Porter, J.

1826. Account of Plainfield. *Coll. Mass. Hist. Soc.* (Boston), (2) 8:

1831. Instructions for the benefit of those who are engaged in collecting insects for cabinets of natural history. *Amer. J. Sci. Arts*, 19:213-220) [Engl. transl. of T. Roger's 1823 French paper]

1834. *Topographical Description and Historical Sketch of Plainfield*. Greenfield.

Prince, J.

1819. On a worm which attacks the apple tree. *Mass. Agric. Repos. J.* (Boston), 5:360-361.

Pursh, F. (1774-1820)

1814. *Flora Americae Septrionalis, or, A systematic arrangement and description of the plants of North America: containing, besides what have been described by preceeding authors, many new and rare species, collected during twelve years travels and residence in that country*. London: White, Cochrane & Co. 2 v.

Roger, T.

1823. *Instructions à l'usage des personnes qui voudraient s'occuper à recueillir des insectes pour les cabinets d'histoire naturelle*. Bordeaux. 24pp, 2 pl. [Reprinted, 1826. *Bull. Hist. Nat. Soc. Linn. Bordeaux*, 1:162-172. (Engl. transl. by J. Porter, 1831. Instructions for the benefit of those who are engaged in collecting insects for cabinets of natural history. *Amer. J. Sci. Arts*, 19:213-220)]

Say, T. (1787-1834)

1817a. *American Entomology or Descriptions of the Insects of North America, Illustrated by Coloured Figures from Drawings Executed from Nature*. Philadelphia: J. Mitchell & Ames. 10pp, 6 pl.

1817b. Descriptions of several new species of North American insects. *J. Acad. Nat. Sci. Philadelphia*, 1:19-23.

1817c. Some account of the insect known by the name of the Hessian Fly, and of a parasitic insect that feeds on it. *J. Acad. Nat. Sci. Philadelphia*, 1:45-48, 1 pl.

1824-28. *American Entomology or Descriptions of the Insects of North America, Illustrated by Coloured Figures from Drawings Executed from Nature*. Philadelphia: J. Mitchell. 3 v.

1830-[38]. *American Conchology, or descriptions of the shells of North America, illustrated by coloured figures*. New Harmony. 129pp, 68 pl. [French ed., 1845, Paris]

Scudder, S. H. (1837-1911) (ed.)

1869. *Entomological Correspondence of Thaddeus William Harris, M.D.* Boston: Boston Soc. Nat. Hist. 375pp.

Sharpless, J. T.

1826. An essay on the *Bombyx mori*, or silk worm. *Franklin Inst. J.* (Philadelphia), 2:22-29, 94-100, 139-144.

Troost, G.

1821. Description of a variety of amber and of a fossil substance supposed to be the nest of an insect discovered at Cape Sable, Magothy River, Ann-Arundel County, Md. *Amer. J. Sci. Arts* (New Haven), 3:1-199.

Tufts, J.

1819. On the insect found in apples and pears. *Mass. Agric. Repos. J.* (Boston), 5:364-367.

Van den Huevel, J. C.

1821. A memoir on the honey-bees of America . . . . *Amer. J. Sci. Arts* (New Haven), 3:79-85.

Van Rensselaer, J. (1793-1871)

1828. On a larva in the human body. *Amer. J. Sci. Arts* (New Haven), 13:229-234.

White, G. (1720-1793)

1789. *Natural History and Antiquities of Selborne*. London.

Worth, J.

1822. *Amer. Farmer* (Baltimore), 4:394.

1823. An account of the insect so destructive to the peach tree. *J. Acad. Nat. Sci. Philadelphia*, 3:216-221.

ADDITIONS AND CORRECTIONS TO THE *BIBLIOGRAPHY OF BUTTERFLIES*, IN THE *ATLAS OF NEOTROPICAL LEPIDOPTERA*. No. II. COMPRISING MOSTLY WORKS PUBLISHED DURING 1996 AND 1997

Gerardo Lamas

Museo Nacional de Historia Natural, Aptdo. 14-0434, Lima, Peru

The first set of *Additions and Corrections* to the annotated *Bibliography of Butterflies* (Lamas, Robbins, and Field, 1995), in the series *Atlas of Neotropical Lepidoptera, Vol. 124*, appeared a year ago (Lamas, 1997, *Lepidoptera News* 1997(1):4-18). The 496 additional references included herein comprise mostly works published in 1996 and 1997, such as were recorded until June 30th, 1998.

In the *Corrections* section, rather than repeating whole bibliographic entries, I have used **bold** typeface to indicate corrections made, which I hope will be self explanatory. Changes in the dates of publication of some XIX century works have been made in accordance with new information provided by N. L. Evenhuis in his recent *Litteratura Taxonomica Dipterorum (1758-1930)* (1997. Leiden, Backhuys Publ.).

Walter Neukirchen, Julián Salazar and Angel Viloria were particularly helpful in providing data on publications omitted previously, and I am most grateful for their kind interest and assistance.

ADDITIONS

Acevedo, Efrén

1992. Reconocimiento de plagas y benéficos en el cultivo de tomate de árbol (*Cyphomandra betacea* (Cav)Sendt) en la zona cafetera de Colombia. *Agronomía* (Manizales) 5(1): 33-37, 1 fig., 4 tabs. (October) [*Thyridia aedesia* Doubleday, *Pteronymia veia* Hewitson, *Mechanitis mazaeus* Hewitson; host plant; parasitoids]

Ackery, Phillip Ronald

1996. See Jong, R. de et al., 1996.

1997. The Butterflies of Venezuela. Nymphalidae 1. Limenitidinae, Apaturinae, Charaxinae. Andrew F. E. Neild. 1966 [sic]. *Antenna* 21(2): 80-81 (April) [book review]

Aiello, Annette

1996. See Otero, L. D. & A. Aiello, 1996.

1997. See Davies N. et al., 1997.

Alonso, Alfonso

1995. See Brower, L. P. et al., 1995.

Altizer, Sonia

1995. See Brower, L. P. et al., 1995.

Alvarez, Adelino, Filho

1979. See Link, D. & A. Alvarez, Filho, 1979.

Amarillo, Angela Rocío

1997. See Johnson, K. & A. R. Amarillo, 1997.

Amarillo, Angela Rocío, and Miguel Gonzalo Andrade

1996. *Clave sinóptica para las familias y subfamilias de mariposas y polillas colombianas,* pp. 117-147, figs. *In:* Andrade, M.G., G. Amat & F. Fernández (Eds.), *Insectos de Colombia. Estudios escogidos.* Bogotá, Academia Colombiana de Ciencias Exactas, Físicas y Naturales (Colección Jorge Alvarez Lleras, N° 10) (September) [general]

Amat, Germán

1996. See Andrade, M. G. & G. Amat, 1996.

Anderson, James B., and Lincoln Pierson Brower

1996. Freeze-protection of overwintering monarch butterflies in Mexico: critical role of the forest as a blanket and an umbrella. *Ecological Entomology* 21(2): 107-116, 4 figs., 3 tabs. (May) [*Danaus plexippus* (Linnaeus)]

Andrade, Isabel, and Woodruff W. Benson

1997. *Eurema dina leuce* (Pieridae) feeds on a lactiferous hostplant in eastern Brazil. *Journal of the Lepidopterists' Society* 51(4): 358-359 (29 December)

Andrade, Miguel Gonzalo

1995. *Actinote* (Nymphalidae I: Acraeinae). *Monografías de Fauna de Colombia* 1: 33-117, 2 pls., 35 figs. [general; taxonomy; distribution]

1996a. *Apuntes para una Historia de la Entomología en Colombia,* pp. 17-35. *In:* Andrade, M.G., G. Amat & F. Fernández (Eds.), *Insectos de Colombia. Estudios escogidos.* Bogotá, Academia Colombiana de Ciencias Exactas, Físicas y Naturales (Colección Jorge Alvarez Lleras, N° 10) (September) [general]

1996b. See Amarillo, A. R. & M. G. Andrade, 1996.

Andrade, Miguel Gonzalo, and Germán Amat

1996. *Un estudio regional de las mariposas altoandinas en la Cordillera Oriental de Colombia,* pp. 149-180, 5 figs., 1 tab. *In:* Andrade, M.G., G. Amat & F. Fernández (Eds.), *Insectos de Colombia. Estudios escogidos.* Bogotá, Academia Colombiana de Ciencias Exactas, Físicas y Naturales (Colección Jorge Alvarez Lleras, N° 10) (September) [general; distribution]

Anjos, Norivaldo dos, Germi Porto Santos and José Cola Zanuncio

1986. Pragas do eucalipto e seu controle. *Informe agropecuário* (Belo Horizonte) 12(141): 50-58, 14 figs. (September) [*Euselasia apisaon* (Dalman), *Phocides palemon* (Cramer); host plants; Brazil]

Anken, Ralf H.

1995. Zur Kenntnis eines neuen Taxon des Genus *Enantia* Hübner aus Südwest-Brasilien (Lepidoptera: Pieridae). *Entomologische Zeitschrift* 105(24): 481-484, 2 figs. (15 December) [*E. licinia punctaclara*]

1996. On the taxonomic value of the morphology of wing scales in some Heliconiinae (Lepidoptera, Nymphalidae). *Iheringia (Zoologia)* 81: 139-144, 13 figs. (4 October) [*Heliconius erato phyllis* (Fabricius), *H. besckei* Ménétriès; Brazil]

Anken, Ralf H., and M. Helena Pinto Bivar de Matos e Silva

1996. Beschreibung einer neuen Unterart von *Aphrissa statira* (Cramer, 1777) aus Südost-Brasilien nebst Bemerkungen zur Taxonomie der Art im Gesamtverbreitungsgebiet (Lepidoptera, Pieridae). *Facetta* 12: 5-12, 2 figs. [*A. s. inesa*]

Anonymous

1818. *Insects. A catalogue of the very superb and celebrated collection of foreign insects of the late John Francillon, Esq.* London, Richard and Arthur Taylor. [general; auction catalogue]

1828. *Verzeichniss der zur Verlassenschaft des Herrn Senator Schneider gehörigen Insectensammlung.* Stralsund, Königliche Regierungs Buchdruckerei. iv + 94 pp. [general]

1993. English names for butterflies found in the southeastern U.S. and eastern Canada. *American Butterflies* 1(2): 27-32 (May) [general; Neotropics]

1996. Errata. *Lambillionea* 96(1)(1): 108 (April) [*Argyrogrammana*; French Guiana]

1997. Lives of butterflies. Andrew Brower, new Harold E. and Leona M. Rice Professor. *Oregon State University Science Record*

25(1): 8-9, 3 figs. [*Heliconius*]

Arai, Hisayasu

1997. See Inoue, T. & H. Arai, 1997.

Araújo, Marcelo Antunes

1997. See Dutra, R. R. C. & M. A. Araújo, 1997.

Attal, Stéphane, and Alain Crosson

1996. *The genus* Perisama. *Lepidoptera Nymphalidae.* Venette, Sciences Nat. 149 pp., 12 pls., figs., maps ["Texte Français", comprising title-page and pp. F7-F149, was published [16] July; English version appeared afterwards] [new taxa: *P. moronina leslia, P. oppelii bleuzeni, P. o. cristal, P. xanthica argentina, P. ambatensis phenix, P. clisithera beaufouri, P. aldasi, P. patara gallardi, P. tryphena cauca, P. t. pastaza, P. t. pallida, P. t. asormani, P. cloelia flavidior, P. antioquia, P. satanas, P. tringa cellularis, P. humboldtii occidentalis, P. h. bolivar, P. h. ismaeli, P. vitringa huallaga, P. nevada;* taxonomy; distribution; life history; host plant; morphology; evolution; behavior; biogeography; South America]

Austin, George T.

1996. Hesperiidae of Central Rondônia Brazil: Three new species of *Narcosius* (Pyrginae). *Journal of the Lepidopterists' Society* 50(1): 54-60, 8 figs. (26 April) [*N. steinhauseri, N. pseudomura, N. odysseus*]

1997a. See Johnson, K. et al., 1997.

1997b. Two new *Entheus* from Ecuador and Peru (Lepidoptera: Hesperiidae: Pyrginae). *Tropical Lepidoptera* 8(1): 18-21, 3 figs. (5 September) [*E. latebrosus, E. curvus*]

1997c. Hesperiidae of Rondônia Brazil: *Eracon* and a new related genus, with descriptions of two new species (Lepidoptera: Hesperiidae: Pyrginae). *Tropical Lepidoptera* 8(1): 22-28, 12 figs. (5 September) [*E. asymmetrica, Cornuphallus, C. albafascia*]

1997d. See Hall, J. P. W. & G. T. Austin, 1997.

1997e. Notes on Hesperiidae in northern Guatemala, with descriptions of new taxa. *Journal of the Lepidopterists' Society* 51(4): 316-332, 25 figs. (29 December) [*Vinpeius, Inglorius* (new genus) *mediocris, Niconiades incomptus*]

Austin, George T., and Thomas Chadbourne Emmel

1996. Nymphalidae of central Rondônia, Brazil: Melitaeinae, with descriptions of two new species. *Tropical Lepidoptera* 7(2): 133-142, 22 figs. (30 December) [*Eresia fraterna, Castilia longala*]

Austin, George T., Nick M. Haddad, Claudio Méndez, Thomas D. Sisk, Dennis D. Murphy, Alan E. Launer and Paul Ralph Ehrlich

1996. Annotated checklist of the butterflies of the Tikal National Park area of Guatemala. *Tropical Lepidoptera* 7(1)(1): 21-37, 20 figs., 3 tabs. (25 June) [general]

Austin, George T., and Kurt Johnson

1996. Theclinae of Rondônia, Brazil: *Iaspis* Kaye, taxonomic comments and descriptions of new species (Lepidoptera: Lycaenidae). *Tropical Lepidoptera* 7(1)(1): 45-59, 28 figs. (25 June) [*I. rufa, I. grandis, I. rubicunda, I. flava, I. purpurata, I. ornata, I. minuta, I. ambiguanota, I. fumosa, I. sinenota*]

1997a. Theclinae of Rondônia, Brazil: *Strymon* Hübner, with descriptions of new species (Lepidoptera: Lycaenidae). *Insecta Mundi* 11(3/4): 201-235, 67 figs. (September-December) [*S. spinatus, S. latamaculus, S. pallidulus, S. tholus, S. rotundum, S. germana, S. novasignum, S. clavus, S. implexus, S. inmirum, S. incanus, S. halos, S. conspergus, S. diagonalis*]

1997b. Theclinae of Rondônia, Brazil: *Gigantorubra* and *Angulopis*, with descriptions of new species (Lepidoptera: Lycaenidae). *Insecta Mundi* 11(3/4): 255-272, 34 figs. (September-December) [*G. microserrata, G. divergens, G. quadramacula, G. ampla, G. fuscofascia, G. silva, G. rondonia, G. obscura, G. perplexa, G. purpura, A. tenuis*]

Austin, George T., Olaf Hermann Hendrik Mielke and Stephen Rogers Steinhauser

1997. Hesperiidae of Rondônia, Brazil: *Entheus* Hübner, with descriptions of new species (Lepidoptera: Hesperiidae: Pyrginae). *Tropical Lepidoptera* 8(1): 5-18, 18 figs. (5 September) [*E. eunyas, E. aureanota, E. bombus, E. aureolus*]

Austin, George T., and Stephen Rogers Steinhauser

1996. Hesperiidae of central Rondônia, Brazil: *Celaenorrhinus* Hübner (Lepidoptera: Pyrginae), with descriptions of three new species and taxonomic comments. *Insecta Mundi* 10(1/4): 25-44, 58 figs. (December) [*C. orneates, C. par, C. autochton*]

Avalos, Delia Susana

1989. Moscas Tachinidae de la Provincia de Córdoba (Argentina). *Revista peruana de Entomología* 31: 48-50 (30 June) [*Colias lesbia* (Fabricius); parasitoid]

1997. See Molinari, A. M. & D. S. Avalos, 1997.

Ayres, Geoff

1995. Banana butterfly. *Bulletin of the amateur Entomologists' Society* 54(401): 161 (20 August) [*Hamadryas guatemalena* (Bates); Central America]

Báez, Ignacio

1995. Equipo para colectar y montar mariposas diurnas. *Dugesiana* 2(2): 5-10, 3 figs. (December)

Bailowitz, Richard A., and James P. Brock

1991. *Butterflies of southeastern Arizona.* Tucson, Sonoran Arthropod Studies, Inc. ix + 342 pp., 4 pls., figs. [general; Mexico, Costa Rica]

Balcázar, Manuel

1997. Mexican butterfly diversity. *American Butterflies* 5(4): 28-31, 7 figs. [general]

Bálint, Zsolt

1996a. Oh High Andes - You were my Ardis Park. *News of the Lepidopterists' Society* 38(1): 27-29, 15 figs. (January) [general; Peru]

1996b. An overview of Neotropical *Polyommatus* (sensu Eliot, 1973) lycaenid butterflies. *Esperiana* 4: 159-166, pls. J-K (18 December) [general]

1996c. See Johnson, K. et al., 1996.

1997. A report of an entomological expedition in Peru with special reference to lycaenid butterflies (Lepidoptera: Lycaenidae). *Folia entomologica hungarica* 58: 9-17, 6 figs. [general]

Bálint, Zsolt, and Kurt Johnson

1997a. Reformation of the *Polyommatus* section with a taxonomic and biogeographic overview (Lepidoptera, Lycaenidae, Polyommatini). *Neue entomologische Nachrichten* 40: 1-68, 4 pls., 23 figs. (November) [general; new species: *Madeleinea gradoslamasi*]

1997b. New species of *Cyanophrys* sensu lato from the Andean region of Argentina (Lepidoptera: Lycaenidae). *Annales historico-naturales Musei nationalis hungarici* 89: 141-150, 18 figs. [*C. mykros, C. nescus, C. octonarius, Plesiocyanophrys runa*]

Bálint, Zsolt, and Gerardo Lamas

[1997]. On the taxonomy of the Neotropical polyommatine lycaenids (Lepidoptera: Lycaenidae, Polyommatini). *Annales historico-naturales Musei nationalis hungarici* 88: 127-144, 47 figs., 4 tabs. ("1996" [January 1997]) [new species: *Madeleinea ardisensis, M. colca, M. bella, Nabokovia cuzquenha*; morphology; distribution; Peru]

Barata, Lauro Euclides Soares

1994. See Trigo, J. R. et al., 1994.

1996a. See Trigo, J. R. et al., 1996.

1996b. See Trigo, J. R. et al., 1996.

1996c. See Freitas, A. V. L. et al., 1996.

Bastos, Cristina Schetino, Marcelo Picanço, Ailton Pinheiro Lôbo, Edimar Antônio da Silva and Ludmila Lafetá de Melo Neves

1997. Oviposição de *Ascia monuste orseis* (Godart) (Lepidoptera, Pieridae) em couve comum. *Revista brasileira de Zoologia* 14(1): 187-193, 4 figs., 1 tab. (16 July) [Brazil]

Bastos, José Alberto Magalhães

1975. Caracterização de algumas lagartas-pragas do Estado do Ceará, Brasil. *Fitossanidade* (Fortaleza) 1(2): 35-37 (July) [*Anartia*

jatrophae (Linnaeus), *Opsiphanes invirae* (Hübner); host plants]

1977a. Controle da lagarta do coqueiro, *Brassolis sophorae* L., com alguns inseticidas orgânicos sintéticos. *Fitossanidade* (Fortaleza) 2(2): 43-45, 1 fig., 3 tabs. (December) [Brazil]

1977b. Ensaio de controle à lagarta do coqueiro, *Brassolis sophorae* L., com inseticidas orgânicos sintéticos, em laboratório. *Fitossanidade* (Fortaleza) 2(2): 51-52, 2 tabs. (December) [Brazil]

Bastos, José Alberto Magalhães, Alessandra Perazzo Barbosa Mota and Josefa Corina Dantas Faustino

1979. Novo ensaio de controle à lagarta do coqueiro, *Brassolis sophorae* L., com inseticidas orgânicos sintéticos. *Fitossanidade* (Fortaleza) 3(1/2): 42-43, 1 tab. (December) [Brazil]

Bastos, José Alberto Magalhães, and Maria Ester Santiago de Oliveira

1979. Ensaio de controle da lagarta do coqueiro, *Brassolis sophorae* L., com os inseticidas Profenofos, Endrin e Metil-Parathion em diversas concentrações. *Fitossanidade* (Fortaleza) 3(1/2): 51-53, 1 tab. (December) [Brazil]

Bauer, Claudia

1995. See Pacheco, J. F. & C. Bauer, 1995.

Beccaloni, George W.

1997a. Vertical stratification of ithomiine butterfly (Nymphalidae: Ithomiinae) mimicry complexes: the relationship between adult flight height and larval host-plant height. *Biological Journal of the Linnean Society* 62(3): 313-341, 4 figs., 6 tabs. (November) [general; Ecuador]

1997b. Ecology, natural history and behaviour of ithomiine butterflies and their mimics in Ecuador (Lepidoptera: Nymphalidae: Ithomiinae). *Tropical Lepidoptera* 8(2): 103-124, 162 figs., 3 tabs. (23 December) [general]

Beer, Sergio

1942. Ricerche sulla morfologia dei desegni nelle ali dei papilionidi. *Commentationes* (Vatican) 6(2): 27-181, 2 pls., 18 figs., 13 tabs. [general]

Bennett, Frederick D.

1994. See Medina, S. et al., 1994.

Benrey, Betty

1997. See Denno, R. F. & B. Benrey, 1997.

Benson, Woodruff W.

1997a. See Andrade, I. & W. W. Benson, 1997.

1997b. See Freitas, A. V. L. et al., 1997.

Benyamini, Dubi

1996. Pupal summer diapause in Chilean *Pieris brassicae* (Linnaeus, 1758) (Lepidoptera, Pieridae). *Nota lepidopterologica* 18(3/4): 184-192, 2 figs., 2 tabs. (13 May)

Benyamini, Dubi, and Kurt Johnson

1996. Review of Austral *Heoda*, with a new species from Chile (Lepidoptera: Lycaenidae: Eumaeini). *Tropical Lepidoptera* 7(1)(1): 13-20, 11 figs., 1 tab. (25 June) [*H. erani*; distribution; ecology]

Beutelspacher, Carlos Rommel

1993. See Brailovsky, H. U. et al., 1993.

1994. *A guide to Mexico's butterflies and moths.* Mexico, Minutiae Mexicana. 95 pp., figs. [general]

Bingham, I.

1995. See Bingham, L. et al., 1995.

Bingham, L., I. Bingham, S. Geary, J. Tanner, C. Driscoll, B. Cluff and J. S. Gardner

1995. SEM comparison of *Morpho* butterfly dorsal and ventral scales. *Microscopy Research and Technique* 31(1): 93-94, 5 figs. [*M. rhetenor* (Cramer)]

Bobadilla, Dante, Héctor Vargas and Mauricio Jiménez

1993. Enemigos naturales de los principales lepidópteros plagas del tamarugo *Prosopis tamarugo* Philippi. *Idesia* 12: 5-11, 4 figs. [*Leptotes trigemmatus* (Butler); host plant; parasitoids; predators; Chile]

Bolay, Eberhard

1997. *The Dominican Republic. A country between rain forest and desert. Contributions to the ecology of a Caribbean island.* Weikersheim, Margraf Verlag. 452 pp., figs. [general]

Boomsma, Tineke

1997. See Meerman, J. C. & T. Boomsma, 1997.

Boucard, Adolphe [1839-1905]

1894. *Travels of a naturalist. A record of adventures, discoveries, history ans customs of Americans and Indians, habits and descriptions of animals, chiefly made in North America, California, Mexico, Central America, Columbia, Chili, etc; during the last forty-two years.* London, Pardy & Sons. viii + 204 pp. [general; Nicaragua]

Bowers, M. Deane

1996. Biology and conservation of the Monarch Butterfly, by Stephen B. Malcolm and Myron P. Zalucki (editors). 1993. *Journal of the Lepidopterists' Society* 50(2): 166-168 (5 August) [book review]

Brabant, Ronald

1996. See Maes, J.-M. & R. Brabant, 1996.

Brabant, Ronald, and Jean-Michel Maes

1997. Nouvelle sous-espèce de *Napeogenes tolosa*, Hew. 1855 du Nicaragua (Lepidoptera, Ithomiidae). *Lambillionea* 97(2)(1): 187-198, 2 figs., 1 tab. (June) [*N. t. mombachoensis*]

Brailovsky, Harry Urad, Carlos Rommel Beutelspacher and Santiago Zaragoza

1993. *La colección entomológica del Instituto de Biología,* pp. 67-100, figs. *In:* Brailovsky, H.U. & B. Gómez (Eds.), *Colecciones zoológicas. Colecciones Biológicas Nacionales del Instituto de Biología.* México, Universidad Nacional Autónoma de México (October) [general]

Brévignon, Christian

1996a. Description et figuration de nouveaux *Pyrrhogyra* de Guyane Française (Lepidoptera Nymphalidae Limenitidinae). *Lambillionea* 96(centenaire): 46-48, 8 figs. (February) [*P. edocla perscita, P. otolais placita*]

1996b. Description d'une nouvelle sous-espèce de *Eurema daira* (Godart, 1819) de Guyane Française (Lepidoptera Pieridae). *Lambillionea* 96(centenaire): 47-48, 4 figs. (February) [*E. d. macheti*]

1996c. See Gallard, J.-Y. & C. Brévignon, 1996.

1996d. Description d'un nouvel *Heliconius* provenant de Guyane Française (Lepidoptera, Nymphalidae). *Lambillionea* 96(3)(1): 467-470, 15 figs. (September) [*H. lalitae*]

1996e. Notes sur les Nemeobiinae de Guyane Française. I - Etude de sept groupes d'espèces jumelles du genre *Euselasia* Kirby, 1871 (Lepidoptera Riodinidae). *Lambillionea* 96(4)(2): 722-732, 87 figs. (December) [new taxa: *E. manoa, E. inini, E. eustola wacapu, E. saulina*]

1997. Notes sur les Nemeobiinae de Guyane Française. II - Le groupe de *Euselasia euryone* (Hewitson, 1856) (Lepidoptera Riodinidae). *Lambillionea* 97(1)(2): 116-120, 18 figs. (March) [life history; host plants]

Brévignon, Christian, and Jean-Yves Gallard

1997a. Inventaire des Riodinidae de Guyane Française. I Euselasiinae (= Nemeobiinae). Description de nouvelles sous-espèces. (Lepidoptera Riodinidae). *Lambillionea* 97(2)(2): 264-276, 22 figs. (June) [*Euselasia artos maripasoula, E. euboea reducta, E. zena hermieri*]

1997b. Inventaire des Riodinidae de Guyane Française. II - Riodininae: Mesosemiini, Eurybiini, Incertae Sedis. Description de nouveaux taxa. (Lepidoptera). *Lambillionea* 97(3)(1): 322-342, 55 figs. (September) [new taxa: *Semomesia cecilae, Mesosemia cyanira ackeryi, M. orbona caballina, M. menoetes pulverulenta, M. meyi, Eurybia cyclopia montsineryensis, E. caerulescens palikourea, Napaea nepos gemina*]

Brock, James P.

1991. See Bailowitz, R. A. & J. P. Brock, 1991.

Bros, Emmanuel de

1996. Erinnerungen an ein Trekking in Patagonien und Feuerland mit

Sammeln von Lepidopteren. *Mitteilungen der entomologischen Gesellschaft Basel* (N.F.) 46(2/3): 52-67, 17 figs. (11 June) [general; Chile, Argentina]

Brower, Andrew Van Zandt

1995. See Brower, L. P. et al., 1995.

1996a. The Butterflies of the West Indies and South Florida.- David Spencer Smith, Lee D. Miller and Jacqueline Y. Miller. 1994. *Journal of the New York entomological Society* 103(1): 126-128 (12 January) [book review]

1996b. Parallel race formation and the evolution of mimicry in *Heliconius* butterflies: A phylogenetic hypothesis from mitochondrial DNA sequences. *Evolution* 50(1): 195-221, 13 figs., 3 tabs. [general]

1996c. A new mimetic species of *Heliconius* (Lepidoptera: Nymphalidae), from southeastern Colombia, revealed by cladistic analysis of mitochondrial DNA sequences. *Zoological Journal of the Linnean Society* 116(3): 317-332, 8 figs., 1 tab. ("March" [2 May]) [new taxa: *H. tristero, H. melpomene mocoa*]

1997. The evolution of ecologically important characters in *Heliconius* butterflies (Lepidoptera: Nymphalidae): a cladistic review. *Zoological Journal of the Linnean Society* 119(4): 457-472, 2 figs., 2 tabs. ("April" [7 May]) [general]

Brower, Andrew Van Zandt, and Mary G. Egan

1997. Cladistic analysis of *Heliconius* butterflies and relatives (Nymphalidae: Heliconiiti): a revised phylogenetic position for *Eueides* based on sequences from mtDNA and a molecular gene. *Proceedings of the Royal Society of London* (B) 264: 969-977, 3 figs., 4 tabs. [general]

Brower, Lincoln Pierson

1977. Misleading butterfly fiction. *BioScience* 27(3): 212 [*Danaus plexippus* (Linnaeus); Mexico; book review]

1987. A royal voyage to an enchanted forest. *Orion Nature Quarterly* 6: 26-35, figs. [*Danaus plexippus* (Linnaeus); migration; Mexico]

1988a. Avian predation on the Monarch Butterfly and its implications for mimicry theory. *American Naturalist* 131(supplement): 4-6, 2 pls., 1 fig. (June) [*Danaus plexippus* (Linnaeus); Mexico]

1988b. A place in the sun. *Animal Kingdom* 91: 42-51, figs. (July-August) [*Danaus plexippus* (Linnaeus); migration; Mexico]

1990. See Glendinning, J. I. et al., 1990.

1993. Deciphering the spring migration of the Monarch Butterfly. *Lore* (Milwaukee) 1993: 6-11, 4 figs. (June) [*Danaus plexippus* (Linnaeus); migration; Mexico]

1996a. Monarch Butterfly orientation: Missing pieces of a magnificent puzzle. *Journal of experimental Biology* 199(1): 93-103, 4 figs. (January) [*Danaus plexippus* (Linnaeus); migration; Mexico]

1996b. See Anderson, J. B. & L. P. Brower, 1996.

1996c. Forest thinning increases monarch butterfly mortality by altering the microclimate of the overwintering sites in Mexico. *Decline and Conservation of Butterflies in Japan* 3: 33-44, 5 figs. (30 June) [*Danaus plexippus* (Linnaeus)]

Brower, Lincoln Pierson, Linda Susan Fink, Andrew Van Zandt Brower, Kingston Leong, Karen S. Oberhauser, Sonia Altizer, Orley R. Taylor, Jr., Danel Vickerman, William H. Calvert, Tonya Van Hook, Alfonso Alonso, Stephen Baillie Malcolm, Denis Frank Owen and Myron P. Zalucki

1995. On the dangers of interpopulational transfers of monarch butterflies. *BioScience* 45(8): 540-544, 2 figs., 1 tab. (September) [*Danaus plexippus* (Linnaeus); migration; Mexico]

Brown, Keith Spalding, Jr.

1994. See Trigo, J. R. et al., 1994.

1996a. See Trigo, J. R. et al., 1996.

1996b. See Trigo, J. R. et al., 1996.

1996c. Conservation of threatened species of Brazilian butterflies. *Decline and Conservation of Butterflies in Japan* 3: 45-62, 6 figs., 3 tabs. (30 June) [general]

1996d. The use of insects in the study, inventory, conservation and monitoring of biological diversity in Neotropical habitats, in relation to traditional land use systems. *Decline and Conservation of Butterflies in Japan* 3: 128-149, 5 figs., 2 tabs. (30 June) [general]

1996e. *Diversity of Brazilian Lepidoptera: history of study, methods for measurement, and use as indicator for genetic, specific and system richness,* pp. 221-253, 4 figs., 4 tabs. *In:* Bicudo, C.E. de M. & N.A. Menezes (Eds.), *Biodiversity in Brazil. A first approach.* São Paulo, Instituto de Botânica/CNPq. [general]

1996f. See Freitas, A. V. L. et al., 1996.

1997a. See Freitas, A. V. L. et al., 1997.

1997b. Diversity, disturbance, and sustainable use of Neotropical forests: insects as indicators for conservation monitoring. *Journal of Insect Conservation* 1(1): 25-42, 4 figs., 3 tabs. [general]

Brown, Keith Spalding, Jr., and Roger W. Hutchings

1997. *Disturbance, fragmentation, and the dynamics of diversity in Amazonian forest butterflies,* pp. 91-110, 6 figs., 4 tabs. *In:* Laurance, W. F. & R. O. Bierregaard, Jr. (Eds.), *Tropical Forest Remnants. Ecology, management and conservation of fragmented communities.* Chicago, The University of Chicago Press. [general]

Brown, Keith Spalding, Jr., and José Roberto Trigo

1995a. Multi-level complexity in the use of plant allelochemicals by aposematic insects. *Chemoecology* 5/6(3/4): 119-126, 2 figs. [general; host plants]

1995b. *The ecological activity of alkaloids,* pp. 227-354, 26 figs., 12 tabs. *In:* Cordell, G.A. (Ed.), *The Alkaloids.* Vol. 47. New York, Academic Press, Inc. [general; host plants]

Büttiker, William

1997. Field observations on ophthalmotropic Lepidoptera in southwestern Brazil (Paraná). *Revue suisse de Zoologie* 104(4): 853-868, 9 figs., 4 tabs. (December) [*Dryas iulia* (Fabricius); Peru]

Burke, Horace R., and Robert R. Murray

1974. *Type-material in the Insect Collection of the Department of Entomology Texas A&M University.* College Station, Texas Agricultural Experiment Station. 14 pp. (September) [*Heliconius charitonius tuckeri* Comstock & Brown, *H. c. vazquezae* Comstock & Brown]

Burns, John McLauren

1996. Genitalia and the proper genus: *Codatractus* gets *mysie* and *uvydixa* - in a compact *cyda* group - as well as a *hyster*ectomy, while *Cephise* gets part of *Polythrix* (Hesperiidae: Pyrginae). *Journal of the Lepidopterists' Society* 50(3): 173-216, 96 figs., 4 tabs. (11 October) [general; new species: *Cephise nuspesez*; Mexico, Central and South America; host plants]

1997. Presidential address 1996: On the beauties, uses, variation, and handling of genitalia. *Journal of the Lepidopterists' Society* 51(1): 1-8, 33 figs., 1 tab. (4 April) [general; Hesperiidae]

Bury, Priscilla Susan [née Falkner] [fl. 1831-1858]

1831-34. *A selection of hexandrian plants, belonging to the natural order Amaryllidae and Liliaceae, from drawings.* London, Robert Havell. 5 + 51 ll., 51 pls. [in 10 fascicles, published between 1831 and December 1834] [*Papilio menelaus* Linnaeus, *P. nestor* Linnaeus]

Bustillo, Alex Enrique

1996. See Posada, F. J. et al., 1996.

Butler, Arthur Gardiner

1888. On two small collections of African Lepidoptera recently received from Mr. H. H. Johnston. *Proceedings of the zoological Society of London* 1887(4): 567-574 (April) [new genus: *Tatura*]

Calatayud, María de los Angeles

1984. *Catálogo de las expediciones y viajes científicos españoles a América y Filipinas (siglos XVIII y XIX). Fondos del Archivo del Museo Nacional de Ciencias Naturales.* Madrid, Consejo Superior de Investigaciones Científicas. 433 pp., 23 pls. [general; history of collections]

1987. *Catálogo de documentos del Real Gabinete de Historia Natural (1752-1786). Fondos del Archivo del Museo Nacional*

de Ciencias Naturales. Madrid, Consejo Superior de Investigaciones Científicas. xxii + 417 + [7] pp., 28 pls., figs. [general]

Caldas, Astrid

1996a. Fifth instar parasitoids of *Anaea ryphea* (Nymphalidae): The missing data. *Journal of the Lepidopterists' Society* 50(1): 89-90 (26 April) [host plant; Brazil]

1996b. Intraspecific variation in *Anaea ryphea* Cramer and *Anaea eurypyle* C. and R. Felder (Nymphalidae). *Journal of Research on the Lepidoptera* 32: 37-44, 3 figs., 1 tab. (1 May) [general]

1996c. Intraseasonal variation in a population of *Fountainea ryphea* (Cramer) (Lepidoptera, Nymphalidae). *Revista brasileira de Zoologia* 13(2): 399-404, 3 tabs. [host plant; Brazil]

1997. Notes on the male genitalia of the *Anaea ryphea - Anaea eurypyle* complex (Nymphalidae). *Journal of the Lepidopterists' Society* 51(1): 83-90, 6 figs. (4 April) [morphology; taxonomy]

Caldas, Astrid, and Fernando de C. Passos

1996. Comments on plant-herbivore-parasitoid interactions in the Cerrado area of southern Brazil. *Revista brasileira de Zoologia* 13(2): 405-410, 4 tabs. [general; host plants]

Calhoun, John V.

1996. Conquering soldiers: The successful invasion of Florida by *Danaus eresimus* (Lepidoptera: Nymphalidae). *Holarctic Lepidoptera* 3(1): 7-18, 13 figs. (15 June) [ecology; life history; host plants; behavior; Mexico, West Indies]

1997a. Notes on the taxonomic status of *Ascia monuste crameri* (Lepidoptera: Pieridae). *Holarctic Lepidoptera* 4(1): 25-26, 1 fig. (25 June) [Surinam]

1997b. Updated list of the butterflies and skippers of Florida (Lepidoptera: Papilionoidea and Hesperioidea). *Holarctic Lepidoptera* 4(2): 39-50, 1 fig. (20 December) [general; Neotropics]

Callaghan, Curtis John

1997a. A revision of the *Euselasia orfita* complex (Riodinidae). *Journal of the Lepidopterists' Society* 51(1): 62-74, 40 figs. (4 April) [general; new species: *E. cyanira*; taxonomy; distribution; South America]

1997b. A review of the genus *Panara* Doubleday, 1857 (Riodinidae) in southeast Brazil, with a description of two new subspecies. *Journal of Research on the Lepidoptera* 34(1/4): 21-38, 38 figs. (15 December) [*P. soana bacana, P. s. ruschii*]

Callaghan, Curtis John, and Julián Adolfo Salazar

1997. A new species of Riodinidae from Colombia. *Journal of the Lepidopterists' Society* 51(1): 57-61, 8 figs. (4 April) [*Calydna volcanicus*]

Callegari, Iván

1996. See Inoue, T. & I. Callegari, 1996.

1997. See Inoue, T. & I. Callegari, 1997.

Calvert, William H.

1995. See Brower, L. P. et al., 1995.

Calvo, Renán

1995. Lista preliminar de mariposas diurnas (Rhopalocera) de la zona de el Llano, Río Macho, Costa Rica. *Brenesia* 38: 163-166 ("1992", June 1995) [general]

Campos-Farinha, Ana E. C., and Nozor P. O. Pinto

1996. Natural enemies of *Chlosyne lacinia saundersii* Doubl. & Hew. (Lepidoptera: Nymphalidae) in the State of São Paulo. *Anais da Sociedade entomológica do Brasil* 25(1): 165-168, 2 figs., 1 tab. (April) [parasitoids; predators; Brazil]

Cárdenas, Reinaldo

1996a. See Posada, F. J. et al., 1996.

1996b. See Posada, F. J. & R. Cárdenas, 1996.

Carvalho, José Cândido de Melo

1951. Relações entre os indios do Alto Xingu e a fauna regional. *Publicações avulsas do Museu nacional* (Rio de Janeiro) 7: 1-32, 10 figs., 1 tab. [*Aphrissa statira* (Cramer); Brazil]

1955. Notas de viagem ao rio Paru de Leste. *Publicações avulsas do Museu nacional* (Rio de Janeiro) 14: 1-82, frontisp., 18 figs. [general; Brazil]

Carvalho, Roberta M. de

1997. See Freitas, A. V. L. et al., 1997.

Casagrande, Mirna Martins

1996a. Notas sistemáticas sobre Brassolinae. I. Tribos (Lepidoptera, Nymphalidae). *Revista brasileira de Zoologia* 12(3): 671-699, 37 figs. ("1995", 1996)

1996b. See Robbins, R. K. et al., 1996.

Castellani, Tania Tarabini, Karla Zanenga Scherer, Lucir Maria Locatelli and Benedito Cortês Lopes

1996. The occurrence of *Junonia evarete* (Lepidoptera: Nymphalidae) and *Acromyrmex striatus* (Hymenoptera: Formicidae) on *Paepalanthus polyanthus* (Eriocaulaceae). *Journal of the New York entomological Society* 103(3): 329-334, 1 fig., 1 tab. (5 November) [host plant; Brazil]

Cesari, Carlos

1995. Las mariposas: Caleidoscopio de la Naturaleza. *Carta ecológica* (Caracas) 5(74): 11-12, 2 figs. (July-September) [general; Venezuela]

Cestari, Antonio N.

1997. See Kubrusly, F. S. et al., 1997.

Chacón, Isidro A.

1988. *Lista de mariposas diurnas (Rhopalocera) del Refugio Nacional de Fauna Silvestre 'Tapantí'*, pp. 71-73. *In:* Meza, T.A. (Ed.), *Areas silvestres de Costa Rica*. San José, Editorial Alma Mater. [general; Costa Rica]

Chai, Peng

1996. Butterfly visual characteristics and ontogeny of responses to butterflies by a specialized tropical bird. *Biological Journal of the Linnean Society* 59(1): 37-67, 14 figs., 2 tabs. ([18] September) [general; predator; Costa Rica]

Charudattan, R.

1996. See Medal, J. C. et al., 1996.

Chaverri, Lucía

1997. See Corrales, J. F. & L. Chaverri, 1997.

Chumpitasi, Miguel E.

1997. Life history of *Heliconius charitonius* (L.) at San Jose, Costa Rica. *News of the Lepidopterists' Society* 39(5): 98 [host plant]

Cluff, B.

1995. See Bingham, L. et al., 1995.

Cohen, Edgar, Jr.

1995. See Cohen, J. & E. Cohen, Jr., 1995.

Cohen, Joy, and Edgar Cohen, Jr.

1995. A lepidopterist's expedition to Rondonia, Brazil. *Maryland Entomologist* 4: 43-45 (December) [general]

Collins, Graham

1996. See Waring, P. et al., 1996.

Constantino, Luis Miguel

1996. See Prieto, A. V. & L. M. Constantino, 1996.

1997a. See Johnson, K. & L. M. Constantino, 1997.

1997b. See Salazar, J. A. et al., 1997.

1997c. Natural history, immature stages and hostplants of *Morpho amathonte* from western Colombia (Lepidoptera: Nymphalidae: Morphinae). *Tropical Lepidoptera* 8(2): 75-80, 6 figs., 1 tab. (23 December) [general]

Constantino, Luis Miguel, and Kurt Johnson

1997. A new species of the *Eumaeus toxana/E. toxea* clade from Tepui's [sic] in the Amazon basin of Colombia. *Revista de Theclinae colombianos* 1(8): [ii] + 1-10, 2 figs. (15 August) [*E. sara*]

Cordero, Carlos R.

1996. The courtship behavior of *Callophrys xami* (Lycaenidae). *Journal of Research on the Lepidoptera* 32: 99-106, 1 fig. (1 May) [Mexico]

1997. Why do some male *Callophrys xami* (Lycaenidae) shift their territories? *Journal of the Lepidopterists' Society* 51(4): 295-303, 1 fig., 2 tabs. (29 December) [behavior; Mexico]

Corrales, Jorge F.

1996. *Las mariposas* Heliconius *de Costa Rica*. Heredia, Instituto Nacional de Biodiversidad. 34 pp., figs., 14 maps [general;

host plants; distribution]

Corrales, Jorge F., and Lucía Chaverri

1997. *Mariposas.* Heredia, Instituto Nacional de Biodiversidad. [5] + 21 pp., figs. [general; Costa Rica]

Correa, Claudine A.

1996. See Moreira, G. R. P. et al., 1996.

Couturier, Guy

[1997]. See Vásquez, J. et al., 1997.

Couturier, Guy, Herminio Inga and Elva Tanchiva

[1997]. Insectos plaga del arroz en Loreto, Amazonía peruana. *Revista peruana de Entomología* 39: 131-134, 4 figs. ("December 1996", [18 February 1997]) [*Enosis angularis* Möschler, *Panoquina ocola* Edwards]

Couturier, Guy, Elva Tanchiva. Herminio Inga, Joel Vásquez and Rita Riva

[1997]. Notas sobre los artrópodos que viven en el pijuayo (*Bactris gasipaes* H.B.K.: Palmae) en la Amazonía peruana. *Revista peruana de Entomología* 39: 135-142, 10 figs. ("December 1996", [18 February 1997]) [*Brassolis sophorae* (Linnaeus)]

Cowan, Charles Francis

1980. Morphidae (Insecta, Lepidoptera), a further correction. Z.N. (S)2201. *Bulletin of zoological Nomenclature* 37(3): 134-135 (25 September)

Crosson, Alain

1996. See Attal, S. & A. Crosson, 1996.

Cruz, Valentina

1997. See Roque, L. et al., 1997.

Daily, Gretchen C., and Paul Ralph Ehrlich

1996. Nocturnality and species survival. *Proceedings of the national Academy of Sciences of the USA* 93(21): 11709-11712, 5 tabs. (15 October) [general; Costa Rica]

Dalrymple, Marcus, and Carlos F. Gottfried

1995. Migration of the masses. *Geographical Magazine* (London) 67(3): 36-38, figs. (March) [*Danaus plexippus* (Linnaeus); Mexico]

Davies, Neal, Annette Aiello, James Louis Borlase Mallet, Andrew Pomiankowski and Robert Elliot Silberglied

1997. Speciation in two neotropical butterflies: extending Haldane's rule. *Proceedings of the Royal Society of London* (B) 264(1383): 845-851, 4 figs., 1 tab. (22 June) [*Anartia fatima* (Fabricius), *A. amathea* (Linnaeus); Panama]

Deinert, E. I., John Thomas Longino and Lawrence Edmund Gilbert

1994. Mate competition in butterflies. *Nature* 370(6484): 23-24, 1 fig., 1 tab. (7 July) [*Heliconius hewitsoni* Hewitson; host plant; Costa Rica]

De Marmels, Jürg

1996. La colección Feige. *Boletín de Entomología venezolana* (N.S.) 11(1): 69 ("July", September) [general; Neotropics]

Denno, Robert F., and Betty Benrey

1997. Aggregation facilitates larval growth in the Neotropical nymphalid butterfly *Chlosyne janais*. *Ecological Entomology* 22(2): 133-141, 6 figs. (May) [host plant; Mexico]

DeVries, Philip James

1996. See Hawkins, B. A. & P. J. DeVries, 1996.

1997a. Breathing new life into the study of butterflies. *American Scientist* 85(5): 477-478, 1 fig. (September-October) [general; Venezuela; book review]

1997b. *The butterflies of Costa Rica and their natural history. Volume II. Riodinidae.* Princeton University Press. xxvii + 288 pp., 25 pls., 59 figs., 11 tabs. [general; taxonomy; behavior; ecology; life history; egg, larva, pupa, imago; host plants; pathogens; parasites; parasitoids; predators; mimicry; diversity; distribution]

1997c. See Swinethrottle, R. B., 1997.

DeVries, Philip James, and Jason Piers Wilton Hall

1996. Two new species of Costa Rican butterflies (Lepidoptera: Riodinidae). *Tropical Lepidoptera* 7(1)(1): 87-90, 5 figs. (25 June) [*Mesosemia harveyi, Theope guillaumei cecropia*; Panama]

DeVries, Philip James, Debra Murray and Russell Lande

1997. Species diversity in vertical, horizontal, and temporal dimensions of a fruit-feeding butterfly community in an Ecuadorian rainforest. *Biological Journal of the Linnean Society* 62: 343-364, 8 figs., 5 tabs. [general]

DeVries, Philip James, and George O. Poinar

1997. Ancient butterfly-ant symbiosis: direct evidence from Dominican amber. *Proceedings of the Royal Society of London* (B) 264(1385): 1137-1140, 1 fig. (22 August) [*Theope*]

Dias, Manoel Martins

1997. See Ebert, H. & M. M. Dias, 1997.

Díaz, Norma B., and Andrés Eugenio Varga

1997. Conozcamos a las mariposas. *Mariposas del Mundo* (Buenos Aires) 3: 14-20, 7 figs. (September) [general]

Diniz, Ivone R., and Helena C. Morais

1997. Lepidopteran caterpillar fauna of cerrado host plants. *Biodiversity and Conservation* 6(6): 817-836, 2 figs., 4 tabs. (June) [general; Brazil]

Driscoll, C.

1995. See Bingham, L. et al., 1995.

Dudley, Robert

1991. Biomechanics of flight in Neotropical butterflies: aerodynamics and mechanical power requirements. *Journal of experimental Biology* 159: 335-357, 5 figs., 3 tabs. [general]

1996a. See Grodnitsky, D. L. & R. Dudley, 1996.

1996b. See Srygley, R. B. et al., 1996.

Dutra, João Clovis Stanzani

1995. See Vitali, M. de J. et al., 1995.

Dutra, Renato Rouxo Coutinho, and Marcelo Antunes Araújo

1997. Informatização de coleções utilizando um Sistema de Informações Geográficas (SIG): Um protótipo desenvolvido para a coleção de Lepidoptera do Departamento de Zoologia da Universidade Federal do Paraná. *Revista brasileira de Zoologia* 14(2): 407-416, 6 figs. (20 August) [general; Brazil]

Dyer, Lee A.

1995. Tasty generalists and nasty specialists? Antipredator mechanisms in tropical lepidopteran larvae. *Ecology* 76(5): 1483-1490, 8 figs., 4 tabs. (July) [general; host plants; Costa Rica]

1997. Effectiveness of caterpillar defense against three species of invertebrate predators. *Journal of Research on the Lepidoptera* 34(1/4): 48-68, 6 figs., 3 tabs. (15 December) [general; Costa Rica]

Ebert, Heinz, and Manoel Martins Dias

1997. Novos gênero e espécie de Satyrinae (Lepidoptera, Nymphalidae) do sudeste brasileiro. *Revista brasileira de Zoologia* 14(2): 283-298, 42 figs. (20 August) [*Carminda, C. umuarama*; Paraguay, Argentina]

Egan, Mary G.

1997. See Brower, A. V. Z. & M. G. Egan, 1997.

Ehrlich, Paul Ralph

1996a. See Austin, G. T. et al., 1996.

1996b. See Daily, G. C. & P. R. Ehrlich, 1996.

Eid, Alain, and Michel Viard

1997. *Butterflies and moths of the World.* Edison, New Jersey, Chartwell Book. 192 pp., figs. [French ed., 1996] [general]

Elia, Frank C.

1994. *Feeding butterflies in a butterfly display,* pp. 139-146, 1 tab. *In: Invertebrates in Captivity 1994.* Tucson, Sonoran Arthropod Studies Institute. [general]

Ellison, Aaron M., and Elizabeth J. Farsnworth

1996. Spatial and temporal variability in growth of *Rhizophora mangle* saplings on coral cays: links with variation in insolation, herbivory, and local sedimentation rate. *Journal of Ecology* 84(5): 717-731, 6 figs., 5 tabs. (October) [*Phocides pigmalion* (Cramer); host plant; Belize]

Emmel, John F.

1997. See Mattoni, R. H. T. et al., 1997.

Emmel, Thomas Chadbourne

1996a. See Austin, G. T. & T. C. Emmel, 1996.

[general]

Gallard, Jean-Yves

1996. Trois nouveaux Riodinidae de Guyane Française (Lepidoptera). *Lambillionea* 96(centenaire): 43-46, 14 figs. (February) [*Theope guillaumei, Mesosemia minutula, Parnes brevignoni*]

1997a. See Brévignon, C. & J.-Y. Gallard, 1997a.

1997b. See Brévignon, C. & J.-Y. Gallard, 1997b.

Gallard, Jean-Yves, and Christian Brévignon

1996. *Mesosemia bari* D'Abrera synonyme de *Mesosemia esmeralda* Gallard & Brévignon. *Lambillionea* 96(1)(1): 107 (April) [French Guiana]

Gallo, Pedro

1989. See Jiménez, M. et al., 1989.

Garcia, Juliana Ferreira

1990. See Zanuncio, J. C. et al., 1990.

Gardner, J.S.

1995. See Bingham, L. et al., 1995.

Garrison, Rosser W.

1996. See Louton, J. A. et al., 1996.

Geary, S.

1995. See Bingham, L. et al., 1995.

George, Jeremiah N.

1997. See Mattoni, R. H. T. et al., 1997.

Gerstäcker, Carl Eduard Adolph

1863. *Scepastus* und *Phylloscirtus*, zwei käferähnliche Grylloden-Gattungen, nebst Bemerkungen über Form-Analogieen unter den Insecten. *Stettiner entomologische Zeitung* 24(10/12): 408-436 (October-December) [general; mimicry]

Ghiradella, Helen

1994. Structure of butterfly scales: Patterning in an insect cuticle. *Microscopy Research and Technique* 27: 429-438, 16 figs. [general]

Gibbons, Bob

1997. *The fascinating world of butterflies & moths.* London, Grange Books. 112 pp., figs. [general]

Gilbert, Lawrence Edmund

1994. See Deinert, E. I. et al., 1994.

Gilbert, Pamela

1996. See Harvey, J. M. V. et al., 1996.

Gillett, John

1995. See Harley, K. et al., 1995.

Glassberg, Jeffrey

1997a. Go get set on your marks: White skippers! *American Butterflies* 5(4): 32-35, 15 figs. [*Heliopetes*; Mexico]

1997b. Book reviews. *American Butterflies* 5(4): 38-39, 41, 2 figs. [Costa Rica, Venezuela, Mexico]

Glendinning, John I.

1990. Responses of three mouse species to deterrent chemicals in the monarch butterfly. II. Taste tests using intact monarchs. *Chemoecology* 1(3/4): 124-130, 4 figs., 2 tabs. (December) [*Danaus plexippus* (Linnaeus); Mexico]

Glendinning, John I., Lincoln Pierson Brower and Charles A. Montgomery

1990. Responses of three mouse species to deterrent chemicals in the monarch butterfly. I. Taste and toxicity tests using artificial diets laced with digitoxin or monocrotaline. *Chemoecology* 1(3/4): 114-123, 6 figs., 6 tabs. (December) [*Danaus plexippus* (Linnaeus); Mexico]

Gloster, Oliver

1996. See Raguso, R. A. & O. Gloster, 1996.

Goncalves, Maria de Fátima Barros

1979. See Sales, F. M. et al., 1979.

González, Jorge M., and Francisco Romero

1996. Fauna del Parque Nacional "Henri Pittier", Aragua, Venezuela: Lista de Papilioninae (Papilionidae: Lepidoptera). Diagnosis y comentarios. *Memoria de la Sociedad de Ciencias naturales La Salle* (Caracas) 56(145): 35-44 (January-June) [general; behavior; host plants]

González, Luis Lamberto

1996. See Warren, A. D. & L. L. González, 1996.

González, Roberto H.

1995. See Grez, A. A. & R. H. González, 1995.

Gorman, James

1980. Mysteries of the monarch. *Discover* 1(3): 44-46, 3 figs. (December) [*Danaus plexippus* (Linnaeus); migration; Mexico]

Gottfried, Carlos F.

1995. See Dalrymple, M. & C. F. Gottfried, 1995.

Grace, Eric S.

1997. *The World of the Monarch Butterfly.* San Francisco, Sierra Club Books. [xii] + 114 pp., figs. [*Danaus plexippus* (Linnaeus); Mexico]

Grados, Juan [1969-]

[1997]. See Lamas, G. & J. Grados, 1997.

Greig, Nancy

1994. *Hindsight is 20/20: Opening a live butterfly exhibit in a hurry,* pp. 156-162. *In: Invertebrates in Captivity 1994.* Tucson, Sonoran Arthropod Studies Institute. [general]

1996. Cockrell Butterfly Center. *News of the Lepidopterists' Society* 38(1): 8-10, 5 figs. (January) [general]

Grez, A. A., and Roberto H. González

1995. Resource concentration hypothesis: effect of host plant patch size on density of herbivorous insects. *Oecologia* 103(4): 471-474, 3 figs., 2 tabs. (September) [*Pieris brassicae* (Linnaeus); Chile]

Gries, Gerhard

1996. See Rhainds, M. et al., 1996.

Grimaldi, David A.

1996. *Amber. Window to the past.* New York, American Museum of Natural History. 216 pp., figs. [fossil butterfly; República Dominicana]

Grodnitsky, Dmitry L., and Robert Dudley

1996. Vortex visualization during free flight of heliconiine butterflies (Lepidoptera: Nymphalidae). *Journal of the Kansas entomological Society* 69(2): 199-203, 2 figs. (23 August) [*Heliconius erato* (Linnaeus)]

Gunder, Jeane Daniel [1888-1948]

1930a. North American institutions featuring Lepidoptera. XVIII. The museums of Cuba. *Entomological News* 41(9): 290-295, pls. 26-28 ([7] November) [general]

1930b. North American institutions featuring Lepidoptera. XIX. Entomological institutions in Mexico. *Entomological News* 41(10): 313-318, pls. 29-33 ([26] December) [general]

Haddad, Nick M.

1996. See Austin, G. T. et al., 1996.

Hale, Jeremy

1995. See Van den Berghe, E. P. et al., 1995.

Hall, Jason Piers Wilton

1996a. See Torres, R. et al., 1996.

1996b. See DeVries, P. J. & J. P. W. Hall, 1996.

1997. See Willmott, K. R. & J. P. W. Hall, 1997.

Hall, Jason Piers Wilton, and George T. Austin

1997. Riodinidae of Rondônia, Brazil: A new species of *Theope* (Lepidoptera: Riodinidae). *Tropical Lepidoptera* 8(2): 101-102, 2 figs. (23 December) [*T. turneri*]

Hall, Jason Piers Wilton, and Keith Richard Willmott

1996a. The genus *Theope*: Four new species and a new subspecies (Lepidoptera: Riodinidae). *Tropical Lepidoptera* 7(1)(1): 63-67, 14 figs. (25 June) [*T. kingi, T. devriesi, T. sisemina tabacona, T. dabrerae*; Colombia, Costa Rica, Ecuador, Guyana, Panama, Peru]

1996b. Notes on the genus *Argyrogrammana*, Part 2, with one new species (Lepidoptera: Riodinidae). *Tropical Lepidoptera* 7(1)(1): 71-80, 26 figs. (25 June) [*A. pastaza*; taxonomy; Costa Rica, South America]

1996c. Systematics of the riodinid tribe Symmachiini, with the description of a new genus and five new species from Ecuador, Venezuela and Brazil (Lepidoptera: Riodinidae). *Lambillionea* 96(4)(1): 637-660, 31 figs., 3 tabs. (December) [*Pirascca, P.*

polemistes, Comphotis apachita, Phaenochitonia gallardi, P. pseudodebilis, Symmachia hazelana; Panama, Colombia]

Hall, Stephen K.

1996. Behaviour and natural history of *Greta oto* in captivity (Lepidoptera: Nymphalidae: Ithomiinae). *Tropical Lepidoptera* 7(2): 161-165, 19 figs. (30 December) [egg, larva, pupa, imago; host plant]

Hammond, Paul C., and David V. McCorkle

1996. Swallowtail Butterflies - Their ecology and evolutionary biology. J. M. Scriber, Y. Tsukaki, and R. C. Lederhouse [eds.]. 1995. *Annals of the entomological Society of America* 89(1): 154-155 (January) [book review]

Hancock, E. Geoffrey

1995. Handkerchiefs in Trinidad and Tobago (Lepidoptera: Nymphalidae). *Bulletin of the amateur Entomologists' Society* 54(399): 36-37 (10 April) [*Phyciodes leucodesma* (C. & R. Felder), *Dynamine arene* (Hübner)]

Harley, Ken, John Gillett, John Winder, Wendy Forno, Ricardo Segura, Hugo Miranda and Richard Kassulke

1995. Natural enemies of *Mimosa pigra* and *M. berlandieri* (Mimosaceae) and prsopects for biological control of *M. pigra*. *Environmental Entomology* 24(6): 1664-1678, 1 fig., 2 tabs. (December) [*Cogia calchas* (Herrich-Schäffer), *Hemiargus ceraunus* (Fabricius), *Ministrymon azia* (Hewitson), *M. una* (Hewitson); host plants; Mexico, Venezuela]

Hartmann, Thomas

1996a. See Trigo, J. R. et al., 1996.

1996b. See Freitas, A. V. L. et al., 1996.

Harvey, Donald James

1996. See Robbins, R. K. et al., 1996.

[1997]. See Lamas, G. et al., 1997.

Harvey, Julie M. V., Pamela Gilbert and Kathy Martin

1996. *A catalogue of manuscripts in the Entomology Library of The Natural History Museum, London.* London, Mansell Publishing Limited. xvi + 251 pp., 4 pls., [general; Neotropics]

Hasegawa, Toshinori

1996a. See Kumazawa, K. et al., 1996.

1996b. See Tabata, H. et al., 1996.

Hawkins, Bradford A., and Philip James DeVries

1996. Altitudinal gradients in the body sizes of Costa Rican butterflies. *Acta oecologica* 17(3): 185-194, 4 figs. (October) [general]

Hayward, Carolyn

1997. *Queremos quedarnos*. Lima, Ediciones Libro Amigo. 70 pp., figs. ([June]) [general; conservation; Peru]

Henning, Graham A.

1992. Phylogenetic notes on the African species of the subfamily Acraeinae - Part 1 (Lepidoptera: Nymphalidae). *Metamorphosis* 3(3): 100-114, 2 figs. (September) [*Actinote*]

Henriques, Silvana Aparecida

1996. See Trigo, J. R. et al., 1996.

Heppner, John Bernhard

1996a. Chile 1995. *Tropical Lepidoptera News* 1996(1): 1, 3, 5 figs. (March) [general]

1996b. Key to families of Lepidoptera. *Tropical Lepidoptera* 4(suppl. 3): 1-28, 9 figs. (10 December) [general]

1997. Las mariposas de Chile - The butterflies of Chile by L. E. Peña-G. and A. J. Ugarte-P. 1997. *Tropical Lepidoptera* 8(2): 125 (23 December) [general; book review]

Hölldobler, Bert

1996. See Fiedler, K. et al., 1996.

Hoffman, Don

1989. *Wanderer. The Monarch Butterfly.* Morro Bay, California, Natural History Association of San Luis Obispo Coast, Inc. 30 pp., figs. [*Danaus plexippus* (Linnaeus); migration; Mexico]

Hoth, Jürgen

1995. Mariposas monarca, mitos y otras realidades aladas. *Ciencias* (México) 37: 19-28, 11 figs., 1 tab. (January-June) [*Danaus plexippus* (Linnaeus); conservation; Mexico]

Howe, William H.

1996. Zone 12 Northern Neotropics Mexico, Central America, Caribbean Islands, pp. 61-62. *In:* Season Summary 1995. *News of the Lepidopterists' Society* [38(3)]: 64 pp. [Papilionidae, Pieridae]

Huheey, James Edward

1988. Mathematical models of mimicry. *American Naturalist* 131(supplement): 22-41, 2 figs., 2 tabs. (June) [general]

Hutchings, Roger W.

1997. See Brown, K. S., Jr. & R. G. Hutchings, 1997.

Iede, Edson Tadeu, and Débora C. Machado

1989. Pragas da erva-mate (*Ilex paraguariensis* St. Hill.) e seu controle. *Boletim de Pesquisa florestal* (Curitiba) 18/19: 51-60 (June-December) [*Adelpha serpa hyas* (Boisduval); host plant; Brazil]

Igarzábal, Daniel, Patricia Fichetti and Marcelo Tognelli

1994. Claves prácticas para la identificación de larvas de Lepidoptera en cultivos de importancia agrícola en Córdoba (Argentina). *Gayana (Zoología)* 58(2): 99-142, 100 figs. (December) [*Colias lesbia* (Fabricius); host plants]

Inga, Herminio

[1997]a. See Couturier, G. et al., 1997.

[1997]b. See Couturier, G. et al., 1997.

Inoue, Takeo

1996. *Agrias* hunting in Jeberos and Satipo, Peru. *Yadoriga* 167: 2-12, 16 figs., 2 maps [In Japanese] [*Callithea*]

1997. A female *Agrias beata beata* f. *beatifica* (Lepidoptera: Nymphalidae) with hindwing blue patch from Nauta, Peru. *Transactions of the lepidopterological Society of Japan* 48(2): 63-64, 3 figs. (15 June)

Inoue, Takeo, and Hisayasu Arai

1997. Yellow or red coloring along forewing costal veins in eight *Agrias beata* (Lepidoptera, Nymphalidae) from Peru. *Transactions of the lepidopterological Society of Japan* 48(4): 207-213, 24 figs. (30 November) [new form: *A. b.* form *pseudoviola*]

Inoue, Takeo, and Iván Callegari

1996. Two female *Agrias sardanapalus lugens* (Lepidoptera, Nymphalidae) with hindwing red veins from Satipo, Peru. *Transactions of the lepidopterological Society of Japan* 47(4): 266-268, 6 figs. (1 December)

1997. A male *Agrias beata* (Lepidoptera: Nymphalidae) with unusual hindwing black pattern from Atalaya, Peru. *Transactions of the lepidopterological Society of Japan* 48(4): 205-206, 2 figs. (30 November)

International Commission on Zoological Nomenclature

1956. Direction 54. Addition to the Official List of Family-Group Names in Zoology, or, as the case may be, to the Official Index of Rejected and Invalid Family-Group Names in Zoology of the family-group names involved in the cases dealt with in Volume 12 of the Opinions and Declarations rendered by the International Commission on Zoological Nomenclature, other than family-group names already dealt with in those Opinions. *Opinions and Declarations rendered by the international Commission on zoological Nomenclature* 12(26): 457-470 (17 September) [Heliconiidae]

1958. Direction 99. Addition to the Official List of Family-Group Names in Zoology of the names of certain family-group taxa belonging to the Order Lepidoptera (Class Insecta), the names of the type genera of which have already been placed on the Official List of Generic Names in Zoology. *Opinions and Declarations rendered by the international Commission on zoological Nomenclature* 1(F.10): 161-174 (16 May) [general]

1982. Direction 113. Morphidae (Insecta, Lepidoptera): Further correction to Official List entry. *Bulletin of zoological Nomenclature* 39(3): 196-199 (30 September)

Jasinski, Artur

1996. Description of three new subspecies of *Perisama* Doubleday from Ecuador and Northern Peru (Lepidoptera: Nymphalidae:

Eurytelinae: Catagrammini). *Genus* (Wroclaw) 7(3): 503-514, 8 figs. (30 November) [*P. hilara sabanillana, P. lebasii lathyi, P. ouma huacamayana*]

Jiggins, Chris D.

1996. See Mallet, J. L. B. et al., 1996.

Jiggins, Chris D., and W. Owen McMillan

1997. The genetic basis of an adaptive radiation: warning colour in two *Heliconius* species. *Proceedings of the Royal Society of London* (B) 264(1385): 1167-1175, 2 figs., 3 tabs. (22 August) [*H. erato cyrbia* Godart, *H. himera* Hewitson; Ecuador]

Jiggins, Chris D., W. Owen McMillan, Walter Michael Neukirchen and James Louis Borlase Mallet

1996. What can hybrid zones tell us about speciation? The case of *Heliconius erato* and *H. himera* (Lepidoptera: Nymphalidae). *Biological Journal of the Linnean Society* 59(2): 221-242, 4 figs., 4 tabs. (October) [genetics; evolution; Ecuador, Peru]

Jiménez, Mauricio

1993. See Bobadilla, D. et al., 1993.

Jiménez, Mauricio, Pedro Gallo and Eliett Silva

1989. Susceptibilidad de varias especies de larvas de lepidópteros al nemátodo entomopatógeno *Steinernema carpocapsae* (Steinernematidae). *Idesia* 11: 49-51 [*Leptotes trigemmatus* (Butler); Chile]

Johnson, Kurt

1996a. See Benyamini, D. & K. Johnson, 1996.
1996b. See Austin, G. T. & K. Johnson, 1996.
1996c. See Torres, R. et al., 1996.
1997a. See Le Crom, J. F. & K. Johnson, 1997a.
1997b. See Salazar, J. A. & K. Johnson, 1997.
1997c. See Constantino, L. M. & K. Johnson, 1997.
1997d. See Le Crom, J. F. & K. Johnson, 1997b.
1997e. See Salazar, J. A. et al., 1997.
1997f. See Le Crom, J. F. & K. Johnson, 1997c.
1997g. See Bálint, Z. & K. Johnson, 1997a.
1997h. See Bálint, Z. & K. Johnson, 1997b.
1997i. See Austin, G. T. & K. Johnson, 1997a.
1997j. See Austin, G. T. & K. Kohnson, 1997b.

Johnson, Kurt, and Angela R. Amarillo

1997. Review of *Antephrys* with description of a new Colombian species. *Revista de Theclinae colombianos* 1(4): [ii] + 1-16, 3 figs. (15 August) [*A. santander*; Mexico, Central America, Venezuela]

Johnson, Kurt, George T. Austin, Jean François Le Crom and Julián Adolfo Salazar

1997. The Strephonina, a new infratribe of the Eumaeini with description of fourteen new genera (Lycaenidae). *Revista de Theclinae colombianos* 1(1): [ii] + 1-61, pls. 1-2, 16 figs. (15 August) [new taxa: *Strephonota, Zigirina, Treboniana, Serratonotes, Letizia, Robustana, R. prima, Diminutina, Dindyminotes, Exorbaetta, Syedranota, Cyclotrichia, Falerinota, Ostrinotes, O. amarillonotes, Decussata, D. colombiana*]

Johnson, Kurt, and Luis Miguel Constantino

1997. *Paraspiculatus*, a new genus of the Eumaeini. *Revista de Theclinae colombianos* 2(10): [ii] + 1-8, 1 fig. (15 August) [new species: *P. colombiensis*; Colombia, Brazil, Peru]

Johnson, Kurt, and Karl Ritter Kroenlein

1997. A new species of *Argentostriatus* from Colombia (Lycaenidae: Eumaeini). *Revista de Theclinae colombianos* 2(11): [ii] + 1-7, pls. 9-11 (15 August) [*A. namohai*]

Johnson, Kurt, and James J. Kruse

1997. Colombian species of tailless *"Cyanophrys" sensu lato* and their sister taxa: Priorities for biological study. *Revista de Theclinae colombianos* 1(5): [ii] + 1-35, pl. 4, 3 figs., 3 maps (15 August) [new species: *Plesiocyanophrys lamellatus, P. silverado, P. salazari, P. angela, P. ricardo, P. brazilensis, P. paranensis, Cyanophrys sullivani, C. velezi, C. eupatorium*; Neotropics]

Johnson, Kurt, James J. Kruse and Karl Ritter Kroenlein

1997. Tha Macusiina, a new infratribe of the Eumaeini with description of ten new genera (Lycaenidae). *Revista de Theclinae colombianos* 2(13): [iv] + 1-39, pls. 12-13, 12 figs. (15 August) [new taxa: *Egides, Bussa, Owda, Brevianta, Enos, Laothus, Timaeta, Thaeides, T. annandon, Timokla, T. laura*; Neotropics]

Johnson, Kurt, and Jean François Le Crom

1997a. The "brown-frons" complex of *Cyanophrys sensu lato* and new sister species from Colombia and Brazil. *Revista de Theclinae colombianos* 1(2): [ii] + 1-21, pl. 3a, 6 figs. (15 August) [new taxa: *Cyanophrys remuborealis, C. rindgei, C. saphirus, C. (Mesocyanophrys), C. (Apophrys)*; Neotropics]

1997b. Clench's *Cyanophrys "amyntor* group" in Colombia with descriptions of several outlying endemics from elsewhere in South America. *Revista de Theclinae colombianos* 1(3): [ii] + 1-28, 14 figs. (15 August) [*C. amyntoides, C. descimoni, C. distractus howei, C. immaculus, C. pseudocallophria, C. innocuus, C. rachelae, C. gigantus, C. pantobias*; Neotropics]

1997c. *Asymbiopsis*, a new genus of the tribe Eumaeini (Lycaenidae) with descriptions of new species of *Asymbiopsis* and *Symbiopsis* Nicolay. *Revista de Theclinae colombianos* 2(9): [ii] + 1-25, pls. 7-8, 9 figs. (15 August) [*A. designarus, A. remolinensis, A. bulbis, A. castinotus, A. velezi, S. salazari, S. pencilatus*]

Johnson, Kurt, and Carmen Rita Lugo

1997. Three new species of elfin-like lycaenid butterflies from the high Andes of Colombia (Thecloxurina; Strymonina). *Revista de Theclinae colombianos* 1(6): [ii] + 1-12, pls. 5-6, 2 figs. (15 August) [*Rhamma lecromi, Abloxurina lecromi, Heoda lecromi*]

Johnson, Kurt, Julián Adolfo Salazar and Jesús Hernán Vélez

1997. New species of *Micandra* Staudinger [sic] from Colombia with distinction of *Trochusinus*, a new genus of the Eumaeini. *Revista de Theclinae colombianos* 2(15): [ii] + 1-15, 4 figs. (15 August) [*M. neblina, M. sylvia, T. werneri, T. elizabetha*; Venezuela, Ecuador]

Johnson, Kurt, Julián Adolfo Salazar, Jesús Hernán Vélez and Rodrigo Torres

1997. New species of the *adunca* elfin group of the high Andean genus *Rhamma* (Eumaeini; Thecloxurina). *Revista de Theclinae colombianos* 2(12): [ii] + 1-9, 2 figs. (15 August) [*R. livida, R. emeraldina*; Colombia, Ecuador, Peru, Bolivia]

Johnson, Kurt, G. Warren Whitaker and Zsolt Bálint

1996. Nabokov as lepidopterist: An informed appraisal. *Nabokov Studies* 3: 123-144, 2 figs. [Lycaenidae; Neotropics]

Joicey, James John, and William James Kaye

1919. Species of *Heliconius* from French Guiana. *Proceedings of the entomological Society of London* 1918(3/4): clii-cliii (29 March) [*H. erato* (Linnaeus), *H. melpomene* (Linnaeus)]

Jolivet, Pierre, and Jean-Michel Maes

1995. A biological accident or a strange case of phoresy? (Coleoptera; Galerucinae: Lepidoptera; Danainae). *Chrysomela Newsletter* 30: 4 (October) [*Lycorea cleobaea atergatis* Doubleday; Nicaragua]

Jong, Rienk de, Richard Irwin Vane-Wright and Phillip Ronald Ackery

1996. The higher classification of butterflies (Lepidoptera): problems and prospects. *Entomologica scandinavica* 27(1): 65-101, 18 figs., 10 tabs. (April) [general]

Karlsson, Bengt

1995. Resource allocation and mating systems in butterflies. *Evolution* 49(5): 955-961, 4 figs., 3 tabs. [*Heliconius*]

Kassulke, Richard

1995. See Harley, K. et al., 1995.

Katz, Richard

1946. *Auf dem Amazonas.* Erlenbach, Eugen Rentsch Verlag. 290 pp., 10 figs. [general; Brazil]

Kaye, William James

1915. [A note]. *Proceedings of the South London entomological and*

natural History Society 1914/15: 79 [*Heliconius amaryllis* f. *euryades* Riffarth, *H. euryades* Hewitson]

1919a. [A note]. *Entomologist's monthly Magazine* 55(657): 39 (February) [*Heliconius erato* new form *extrema*; Colombia]

1919b. See Joicey, J. J. & W. J. Kaye, 1919.

Keber, Astrid

1997a. See Lödl, M. et al., 1997.

1997b. See Gaal, S. et al., 1997.

Kesselring, Jorge

1996a. Beobachtungen an *Callicore sorana* Godart (Lep., Nymphalidae). *Galathea* 12(2): 47-52, 5 figs. [life history; Brazil]

1996b. Ein Schmetterlingsgarten mitten in der Stadt (Lep.). João Pessoa, (Paraiba), Brasilien. *Galathea* 12(3): 89-92, 4 figs. [general]

Knowles, Dennis O'Keeffe, and David Spencer Smith

1996. Two new butterfly sightings. *Bahamas Journal of Science* 3(2): 30-32, 2 figs. (June) [reprinted from *Journal of the Lepidopterists' Society* 49(1): 91-94; 1995] [*Parachoranthus magdalia* (Herrich-Schäffer), *Battus devilliers* (Godart)]

Koshio, Chiharu

1997. Insects and researchers in the neotropical rainforest of Panama - wonderful life at the Smithsonian Tropical Research Institute. *Yadoriga* 173: 4-12, 6 figs. (15 December) [In Japanese] [general]

Kricher, John

1997. *A Neotropical Companion. An introduction to the animals, plants, and ecosystems of the New World Tropics.* Princeton, Princeton University Press. xviii + 451 pp., figs. (Ed. 2) [general]

Kroenlein, Karl Ritter

1997a. See Johnson, K. & K. R. Kroenlein, 1997.

1997b. See Johnson et al., 1997.

Kruse, James J.

1997a. See Johnson, K. & J. J. Kruse, 1997.

1997b. See Johnson, K. et al., 1997.

Kubrusly, Flávia S., Cosue Miyaki, Antonio N. Cestari and Luíz Carlos G. Simões

1997. An attempt to establish cell lines from *Dione juno* (Cramer, 1779) and *Methona themisto* (Hubner [sic], 1818). *Ciência e Cultura* 49(1/2): 140-143, 1 fig., 1 tab. (January-April) [host plants; Brazil]

Kumazawa, Kinya, Keishi Negita, Toshinori Hasegawa and Hiroshi Tabata

1996. Fluorescence from cover and basal scales of *Morpho sulkowskyi* and *Papilio xuthus* butterflies. *Journal of experimental Zoology* 275(1): 15-19, 7 figs. (1 May)

Kumazawa, Kinya, and Hiroshi Tabata

1996. Time-resolved fluorescence studies of the wings of *Morpho sulkowskyi* and *Papilio xuthus* butterflies. *Zoological Science* (Tokyo) 13(6): 843-847, 4 figs., 1 tab. (15 December)

Kumazawa, Kinya, Shingo Tanaka, Keishi Negita and Hiroshi Tabata

1994. Fluoresence [sic] from wing of *Morpho sulkowskyi* butterfly. *Japanese Journal of applied Physics* 3(1)(4A): 2119-2122, 6 figs.

Kuratomi, Saulo

1981a. See Patiño, H. et al., 1981.

1981b. See Patiño, H. et al., 1981.

Lamas, Gerardo

1996a. Mariposas batesianas: El surgimiento de la lepidopterología evolucionista. *Alma Máter* (Lima) 11: 78-91, figs. (March) [general; history]

1996b. See Medina, M. C. et al., 1996.

1996c. See Robbins, R. K. et al., 1996.

1997a. Lepidoptera of the Cordillera del Cóndor, pp. 90-98, 212-230. *In:* Schulenberg, T.S. & K. Awbrey (Eds.), The Cordillera del Cóndor Region of Ecuador and Peru: A biological assessment. *RAP Working Papers* 7: 1-231 (January) [general]

1997b. See Bálint, Z. & G. Lamas, 1997.

[1997]c. Nota rectificativa sobre *Cethosia judith* Guérin, [1844] (Lepidoptera: Nymphalidae, Heliconiinae). *Revista peruana de Entomología* 39: 19-20 ("December 1996" [18 February 1997]) [Colombia]

[1997]d. Lista comentada de los nombres propuestos para los Acraeini neotropicales, y su material-tipo (Lepidoptera: Nymphalidae, Heliconiinae). *Revista peruana de Entomología* 39: 29-48 ("December 1996" [18 February 1997]) [general]

[1997]e. Diez notas sinonímicas sobre Satyrinae neotropicales, con la descripción de dos subespecies nuevas de Perú y Ecuador (Lepidoptera: Nymphalidae). *Revista peruana de Entomología* 39: 49-54 ("December 1996" [18 February 1997]) [general; *Corades ulema mirianae, C. pannonia condorita*]

1997f. Additions and corrections to the Bibliography of Butterflies, Atlas of Neotropical Lepidoptera. *Lepidoptera News* (Gainesville) 1997(1): 4-18 (March)

1997g. See Roque, L. et al., 1997.

1997h. *Comparing the butterfly faunas of Pakitza and Tambopata, Madre de Dios, Peru, or why is Peru such a mega-diverse country?*, pp. 165-168, 2 tabs. *In:* Ulrich, H. (Ed.), *Tropical Biodiversity and Systematics.* Bonn, Zoologisches Forschungsinstitut und Museum Alexander Koenig. [general]

Lamas, Gerardo, and Juan Grados

[1997]. Mariposas de la Cordillera del Sira, Perú (Lepidoptera: Papilionoidea y Hesperioidea). *Revista peruana de Entomología* 39: 55-61, 1 tab. ("December 1996" [18 Feruary 1997]) [general]

Lamas, Gerardo, Robert Kanner Robbins and Donald James Harvey

[1997]. Mariposas del alto Río Napo, Loreto, Perú (Lepidoptera: Papilionoidea y Hesperioidea). *Revista peruana de Entomología* 39: 63-74, 1 fig., 4 tabs. ("December 1996" [18 February 1997]) [general]

Lande, Russell

1997. See DeVries, P. J. et al., 1997.

Larsen, Torben B.

1993. Butterfly mass transit. *Natural History* (New York) 102(6): 30-39, figs. (June) [*Danaus plexippus* (Linnaeus); migration; Mexico]

Launer, Alan E.

1996. See Austin, G. T. et al., 1996.

Le Crom, Jean François

1997a. See Johnson, K. et al., 1997.

1997b. See Johnson, K. & J. F. Le Crom, 1997a.

1997c. See Johnson, K. & J. F. Le Crom, 1997b.

1997d. See Johnson, K. & J. F. Le Crom, 1997c.

1997e. See Torres, R. & J. F. Le Crom, 1997.

Le Crom, Jean François, and Kurt Johnson

1997a. Additional new species and records of elfin butterflies from Colombia (Lycaenidae). *Revista de Theclinae colombianos* 1(7): [ii] + 1-8, 2 figs. (15 August) [*Pons regala, Candora swarthea, Pontirama andradei*]

1997b. Additions to the *Strymon* fauna of Colombia (Eumaeini; Strymonina). *Revista de Theclinae colombianos* 2(16): [ii] + 1-47, pls. 13-14, 19 figs. (15 August) [new species: *S. anthracaetus, S. henaoi, S. alicia, S. vividus, S. dondiego, S. profusorubrus, S. lecromi, S. baricharensis, S. hurtadoi, S. necjebus, S. angulus, S. additionalis*]

1997c. A new species group of South American *Strymon* and its possible affinity to elements of the Antillean *Strymon* fauna (Eumaeini, Strymonina). *Revista de Theclinae colombianos* 2(18): [ii] + 1-17, pls. 17-18, 6 figs. (15 August) [new species: *S. carmencitae, S. rosari, S. originatus, S. specialus*; Colombia, Venezuela, Surinam, Trinidad, Argentina]

Lederhouse, Robert C.

1996. See Scriber, J. M. & R. C. Lederhouse, 1996.

Lenko, Karol, and Nelson Papavero

1996. *Insetos no Folclore. 2a. edição (revista e ampliada).* São Paulo, Editora Plêiade. 468 pp., 104 figs. [general; ethnoentomology]

Leong, Kingston

1995. See Brower, L. P. et al., 1995.

Linares, Mauricio

1991. *El fantasma mimético del pasado: Reconstrucción en el laboratorio de una forma mimética extinta,* pp. 223-236, 3 figs., 1 tab. *In: Memorias. Primer Simposio Nacional de Fauna del Valle del Cauca.* Cali, Instituto Vallecaucano de Investigaciones Científicas. [*Heliconius cydno weymeri* Staudinger, *H. erato chestertonii* Hewitson, *Elzunia humboldt regalis* (Stichel); mimicry; genetics; evolution; Colombia]

1996. The genetics of the mimetic coloration in the butterfly *Heliconius cydno weymeri. Journal of Heredity* 87(2): 142-149, 4 figs., 2 tabs. (March-April) [Colombia]

1997a. The ghost of mimicry past: laboratory reconstitution of an extinct butterfly 'race'. *Heredity* 78(6): 628-635, 5 figs., 2 tabs. (June) [*Heliconius cydno weymeri* Staudinger, *H. erato chestertonii* Hewitson, *Elzunia humboldt regalis* (Stichel); mimicry; genetics; evolution; Colombia]

1997b. *Origin of Neotropical mimetic biodiversity from a three-way hybrid zone of* Heliconius cydno *butterflies*, pp. 93-108, 3 figs., 1 tab. *In:* Ulrich, H. (Ed.), *Tropical Biodiversity and Systematics.* Bonn, Zoologisches Forschungsinstitut und Museum Alexander Koenig. [Colombia]

Link, Dionísio, and Adelino Alvarez, Filho

1979. Palmeiras atacadas por lagartas de Brassolidae (Lepidoptera) em Santa Maria, RS. *Revista do Centro de Ciências rurais* (Santa Maria) 9(2): 221-225, 1 tab. [*Brassolis astyra* (Godart), *Opsiphanes invirae amplificatus* Stichel; host plants; Brazil]

Llorente, Jorge Enrique

1996a. See Luis, M. A. et al., 1996.
1996b. See Warren, A. D. et al., 1996.
1996c. See Vargas, I. et al., 1996.
1996d. See Luis, M. A. et al., 1996.
1996e. See Vargas, I. et al., 1996.
1997. See Raguso, R. A. & J. E. Llorente, 1997.

Llorente, Jorge Enrique, Moisés Armando Luis, Isabel Vargas and Jorge Soberón

1996. *Papilionoidea (Lepidoptera),* pp. 531-548, 1 fig., 6 tabs., 1 map. *In:* Llorente, J.E., A.N. García & E. González (Eds.), *Biodiversidad, taxonomía y biogeografía de artrópodos de México: Hacia una síntesis de su conocimiento.* México, Universidad Nacional Autónoma de México. [general; Mexico]

Llorente, Jorge Enrique, Moisés Armando Luis, Isabel Vargas and Andrew D. Warren

1996. Lista de las mariposas del Estado de Jalisco, México. *Revista de la Sociedad mexicana de Historia natural* 46: 35-48, 1 tab. ("1995", 1996) [general]

Llorente, Jorge Enrique, Leonor Oñate, Moisés Armando Luis and Isabel Vargas

1997. *Papilionidae y Pieridae de México: Distribución geográfica e ilustración.* México, Universidad Nacional Autónoma de México. [x] + 230 pp., 28 pls., 4 figs., 3 tabs., 116 maps (December) [general]

Llorente, Jorge Enrique, Andrew D. Warren, Isabel Vargas and Moisés Armando Luis

1996. Mariposas diurnas de Colima. *Dugesiana* 3(2): 1-18 (December) [general; Mexico]

Lôbo, Ailton, Pinheiro

1997. See Bastos, C. S. et al., 1997.

Locatelli, Lucir Maria

1996. See Castellani, T. T. et al., 1996.

Lödl, Martin

1997. See Gaal, S. et al., 1997.

Lödl, Martin, Astrid Keber and Sabine Gaal

1997. Die *Heliconius*-Sammlung von Ruth und Helmuth Holzinger - nunmehr integrierter Bestandteil der Lepidoptera-Sammlung des Naturhistorischen Museums Wien (Insecta: Lepidoptera: Nymphalidae: Heliconiinae). *Entomologisches Nachrichtenblatt* (N.F.) 4(1): 1-6, 3 figs., 1 tab. (30 April) [general]

Longcore, Travis R.

1997. See Mattoni, R. H. T. et al., 1997.

Longino, John Thomas

1994. See Deinert, E. I. et al., 1994.

Lopes, Benedito Cortês

1996. See Castellani, T. T. et al., 1996.

Lopes, Luciene de Oliveira, Alessandra Perazzo Barbosa Mota and Antonio Lindemberg Martins Mesquita

1979. Determinação dos períodos pré-pupal e pupal da lagarta dos citros *Papilio anchisiades capys* Huebner, 1908 [sic]. *Fitossanidade* (Fortaleza) 3(1/2): 49 (December) [Brazil]

López, Carlos

1996. See Salazar, J. A. & C. López, 1996.

López, María Victoria, and Cristian F. Estades

1996. Natural history of the Tamarugo conebill (*Conirostrum tamarugense*) during the breeding period: diet and habitat preferences. *Revista chilena de Historia natural* 69(3): 351-356, 1 fig., 1 tab. (September) [*Leptotes trigemmatus* Butler; Chile]

Louton, Jerry A., Rosser W. Garrison and Oliver S. Flint

1996. *The Odonata of Parque Nacional Manu, Madre de Dios, Peru; natural history, species richness and comparisons with other Peruvian sites,* pp. 431-449, 4 figs., 2 tabs. *In:* Wilson, D.E. & A. Sandoval (Eds.), *Manu. The biodiversity of southeastern Peru.* Washington, D.C., Smithsonian Institution ([December]) [Nymphalidae; mimicry]

Lugo, Carmen Rita

1997. See Johnson, K. & C. R. Lugo, 1997.

Luis, Moisés Armando

1996a. See Vargas, I. et al., 1996.
1996b. See Warren, A. D. et al., 1996.
1996c. See Llorente, J. E. et al., 1996.
1996d. See Llorente, J. E. et al., 1996.
1996e. See Llorente, J. E. et al., 1996.
1996f. See Vargas, I. et al., 1996.
1997. See Llorente, J. E. et al., 1997.

Luis, Moisés Armando, Jorge Enrique Llorente and Isabel Vargas

1996. Distribución geográfica, estacionalidad y comportamiento de *Diaethria asteria* (Lepidoptera: Nymphalidae). *Tropical Lepidoptera* 7(1)(1): 39-44, 7 figs., 2 tabs. (25 June) [Mexico]

Luis, Moisés Armando, Isabel Vargas and Jorge Enrique Llorente

1996. Síntesis de los Papilionoidea (Lepidoptera: Rhopalocera) del Estado de Veracruz. *Folia entomologica mexicana* 93: 91-133, 5 tabs. (30 August) [general; Mexico]

Luque, Jesús Emilio

1994. See Rodríguez, C. L. et al., 1994.
1996. See Rodríguez, C. L. et al., 1996.

McCorkle, David V.

1996. See Hammond, P. C. & D. V. McCorkle, 1996.

Machado, Débora C.

1989. See Iede, E. T. & D. C. Machado, 1989.

Machado, Vera Lígia Letízio

1995. See Vitali, M. de J. et al., 1995.

McMillan, W. Owen

1996a. See Jiggins, C. D. et al., 1996.
1996b. See Mallet, J. L. B. et al., 1996.
1997. See Jiggins, C. D. & W. O. McMillan, 1997.

McMullen, Conley K.

1994. Pollinator availability: A possible explanation of inter-island floral variation in *Justicia galapagana* (Acanthaceae). *Noticias de Galápagos* 54: 22-27, 1 fig., 3 tabs. (November) [*Urbanus dorantes galapagensis* (Williams), *Phoebis sennae* (Linnaeus); Galapagos]

Madero, Alicia

1997. The first NABA Mexican Independence Day butterfly counts. *American Butterflies* 5(4): 22-27, 10 figs. [general; Mexico]

Maes, Jean-Michel

1995a. *Epiphile orea* ssp. *plusios* Godman & Salvin (Lepidoptera: Nymphalidae) nuevo reporte para Nicaragua. *Revista nicara-*

güense de Entomología 33: 17-20, 6 figs. (September)

1995b. See Jolivet, P. & J.-M. Maes, 1995.

1995c. *Hamadryas atlantis* ssp. *atlantis* Bates (Lepidoptera: Nymphalidae) nuevo reporte para Nicaragua. *Revista nicaragüense de Entomología* 34: 1-7, 13 figs. (December)

1995d. Fauna entomológica de la Reserva Natural Bosawas, Nicaragua. I. *Tigridia acesta* (Linnaeus) nuevo para la fauna de Nicaragua (Lepidoptera: Nymphalidae). *Revista nicaragüense de Entomología* 34: 23-24, 2 figs. (December)

1995e. Fauna entomológica de la Reserva Natural Bosawas, Nicaragua. II. *Cissia*: cuatro nuevos reportes para la fauna de Nicaragua (Lepidoptera: Nymphalidae: Satyrinae). *Revista nicaragüense de Entomología* 34: 25-28, 5 figs. (December) [*C. agnata* (Schaus), *C. gomezi* Singer, DeVries & Ehrlich, *C. gulnare* Butler, *C. pseudoconfusa* Singer, DeVries & Ehrlich]

1996a. Fauna entomológica de la Reserva Natural Bosawas, Nicaragua. III. Dos reportes del género *Hamadryas*, nuevos para la fauna de Nicaragua (Lepidoptera: Nymphalidae). *Revista nicaragüense de Entomología* 35: 1-4, 4 figs. (March) [*H. arinome arienis* (Godman & Salvin), *H. feronia farinulenta* (Fruhstorfer)]

1996b. Fauna entomológica de la Reserva Natural Bosawas, Nicaragua. IV. *Taygetis penelea* (Cramer) nuevo para la fauna de Nicaragua (Lepidoptera: Nymphalidae: Satyrinae). *Revista nicaragüense de Entomología* 35: 5-6, 1 fig. (March)

1996c. Fauna entomológica de la Reserva Natural Bosawas, Nicaragua. V. *Morpho cypris* Westwood confirmación de su presencia en Nicaragua (Lepidoptera: Nymphalidae: Morphinae). *Revista nicaragüense de Entomología* 36: 1-3, 1 fig. (June)

1996d. Fauna entomológica de la Reserva Natural Bosawas, Nicaragua. VI. *Amphydecta* [sic] *pignerator* Butler, especie nueva para la fauna de Nicaragua (Lepidoptera: Nymphalidae: Satyrinae). *Revista nicaragüense de Entomología* 36: 5-6, 1 fig. (June)

1996e. Fauna entomológica de la Reserva Natural Bosawas, Nicaragua. VII. Dos Morphinae nuevos para la fauna de Nicaragua (Lepidoptera: Nymphalidae). *Revista nicaragüense de Entomología* 36: 7-9, 4 figs. (June) [*Antirrhea miltiades* (Fabricius), *Caerois gerdrudtus* (Fabricius)]

1997a. Fauna entomológica de la Reserva Natural Bosawas, Nicaragua. IX. *Eunica mygdonia*, Nymphalidae nuevo para la fauna de Nicaragua (Lepidoptera). *Revista nicaragüense de Entomología* 39: 5-7, 2 figs. (March)

1997b. *Oxeoschistus hilarus* Bates (Lepidoptera: Nymphalidae: Satyrinae) nuevo reporte para la fauna de Nicaragua. *Revista nicaragüense de Entomología* 40: 5-6, 2 figs. ("June", [May])

1997c. See Brabant, R. & J.-M. Maes, 1997.

Maes, Jean-Michel, and Ronald Brabant

1996. Premier recensement d'*Hamadryas atlantis* Bates, 1864 pour le Nicaragua (Lepidoptera, Nymphalidae). *Lambillionea* 96(centenaire): 15, 2 figs. (February)

Maimoni-Rodella, Rita C. S., and Roberto Antonio Rodella

1986. Aspectos da biologia floral de *Merremia dissecta* (Jacq.)Hall f. var. *edentata* (Meisn.)O'Donnell (Convolvulaceae). *Revista de Agricultura* (Piracicaba) 61(3): 213-222, 1 fig., 1 tab. [Hesperiidae, Pieridae; pollination; Brazil]

Malcolm, Stephen Baillie

1995a. See Brower, L. P. et al., 1995.

1995b. Milkweeds, monarch butterflies and the ecological significance of cardenolides. *Chemoecology* 5/6(3/4): 101-117, 14 figs., 2 tabs. [*Danaus plexippus* (Linnaeus); Mexico]

Mallet, James Louis Borlase

1996a. See Jiggins, C. D. et al., 1996.

1996b. See Turner, J. R. G. & J. L. B. Mallet, 1996.

1996c. *The genetics of biological diversity: from varieties to species,* pp. 13-47, 3 figs. *In:* Gaston, K.J. (Ed.), *Biodiversity: A Biology of Numbers and Difference.* Oxford, Blackwell Science Ltd. [general]

1997. See Davies, N. et al., 1997.

Mallet, James Louis Borlase, Chris D. Jiggins and W. Owen McMillan

1996. Evolution: Mimicry meets the mitochondrion. *Current Biology* 6(8): 937-940, 2 figs., 1 tab. [*Heliconius*]

Manara, Bruno

1996. Respuesta a Angel Viloria sobre una "nota bibliográfica". *Boletín de Entomología venezolana* (N.S.) 11(2): 205-206 (December) [general; Venezuela]

Marcano, Eugenio de Jesús

1976. Rectificación a lista de mariposas dominicanas. *Naturalista postal* 5/76: [1] (23 January) [*Phoebis trite watsoni* Brown; República Dominicana]

Marini, Onildo J., Filho

1997. See Freitas, A. V. L. et al., 1997.

Marión, Luis

1977. Lepidópteros (Rhopalocera) de la República Dominicana. *Anuario. Academia de Ciencias de la República Dominicana* 2: 49-71 ("1976", 1977) [general]

Mars, Julie

1997. *Butterflies. Grace on the wing.* Kansas City, Andrews McMeel Publshing. 80 pp., figs. [general]

Martin, Julie Ann

1996. See Weller, S. J. et al., 1996.

Martin, Kathy

1996. See Harvey, J. M. V. et al., 1996.

Martínez, Ignacio

1981a. See Patiño, H. et al., 1981.

1981b. See Patiño, H. et al., 1981.

Martins, Olavo F. G.

1979. See Sales, F. M. et al., 1979.

Masó, Albert [1956-], and Manuel Pijoan

1997. *Observar mariposas.* Barcelona, Editorial Planeta, S.A. 319 pp., figs. [general]

Mattoni, Rudolph H. T., Gordon F. Pratt, Travis R. Longcore, John F. Emmel and Jeremiah N. George

1997. The endangered quino checkerspot butterfly, *Euphydryas editha quino* (Lepidoptera: Nymphalidae). *Journal of Research on the Lepidoptera* 34(1/4): 99-118, 3 figs., 1 tab. (15 December) [ecology; conservation; Mexico]

Maza, Roberto F. de la

1995. See Maza, R. G. de la et al., 1995.

Maza, Roberto G. de la

1995. La monarca del vuelo. *Ciencias* (México) 37: 4-18, 12 figs. (January-March) [*Danaus plexippus* (Linnaeus); life history; behavior; distribution; migration; ecology; conservation; Mexico]

Maza, Roberto G. de la, Adolfo White and Roberto F. de la Maza

1995. Exploración de factores compensatorios que permiten el refugio de rhopalocerofauna higrófila en cinco cañadas de clima subhúmedo en Morelos, México. *Revista de la Sociedad mexicana de Lepidopterología* 16(1): 1-63, figs., 1 map (15 November) [general; ecology]

Maza, Roberto G., Adolfo White and Arcadio Ojeda

1995. La horofauna higrófila de la Cañada de la Toma Tilzapotla, Morelos, México (Lepidoptera - Rhopalocera). *Revista de la Sociedad mexicana de Lepidopterología* 15(2): 1-38, figs., 1 tab., 1 map (15 November) [general; ecology]

Mazer, Cynthia

1994. *Creating a seasonal butterfly exhibit from an existing greenhouse,* pp. 147-151, 1 fig. *In: Invertebrates in Captivity 1994.* Tucson, Sonoran Arthropod Studies Institute. [general]

Medal, J.C., R. Charudattan, J.J. Mullahey and R.A. Pitelli

1996. An exploratory insect survey of tropical soda apple in Brazil and Paraguay. *Florida Entomologist* 79(1): 70-73, 1 tab. (15 March) [*Mechanitis lysimnia* (Fabricius); host plant; Brazil]

Medeiros, Alex Giovanny de Barros

1992. See Zanuncio, J. C. et al., 1992.

Medina, Mirian Cecilia, Robert Kanner Robbins and Gerardo

Lamas

1996. *Vertical stratification of flight by ithomiine butterflies (Lepidoptera: Nymphalidae) at Pakitza, Manu National Park, Perú,* pp. 211-216, 3 tabs. *In:* Wilson, D.E. & A. Sandoval (Eds.), *Manu. The biodiversity of southeastern Peru.* Washington, D.C., Smithsonian Institution ([December]) [general]

Medina, Silverio, Frederick D. Bennett, Rosa A. Franqui and Alejandro Segarra

1994. New records of, and notes on, insects (Insecta) from Puerto Rico. *Journal of Agriculture of the University of Puerto Rico* 78(3/4): 181-186 (July-October) [*Dismorphia amphione spio* (Godart); parasitoid]

Meerman, Jan C., and Tineke Boomsma

1997. *Urania fulgens* and other Lepidoptera migrations in Belize, Central America. *News of the Lepidopterists' Society* 39(1): 8-9, 1 fig. (15 March) [general]

Mejía, Kember

[1997]. See Vásquez, J. et al., 1997.

Mendes, Cirilo

1979. See Sales, F. M. et al., 1979.

Méndez, Claudio

1996. See Austin, G. T. et al., 1996.

Mesquita, Antônio Lindemberg Martins

1979. See Lopes, L. de O. et al., 1979.

Mielke, Olaf Hermann Hendrik

1996. See Robbins, R. K. et al., 1996.

1997. See Austin, G. T. et al., 1997.

Miller, Jacqueline Yvonne

1997a. Malcolm, S. B., and M. P. Zalucki (eds.). 1993. Biology and Conservation of the Monarch Butterfly. *Florida Entomologist* 80(3): 416-418 (15 October) [*Danaus plexippus* (Linnaeus); book review]

1997b. See Miller, L. D. & J. Y. Miller, 1997.

Miller, James Stuart

1996. Phylogeny of the Neotropical moth tribe Josiini (Notodontidae: Dioptinae): a hidden case of Müllerian mimicry. *Zoological Journal of the Linnean Society* 118(1): 1-45, 23 figs., 4 tabs. (September) [*Mesenopsis melanochlora* Godman & Salvin, Heliconiinae; North and South America]

Miller, Lee Denmar, and Jacqueline Yvonne Miller

1997. Gondwanan butterflies: The Africa-South America connection. *Metamorphosis, Supplement* 3: 42-51, 6 figs. (December) [general; biogeography]

Miller, Lee Denmar, and Mark J. Simon

1997. New and notable records of Bahamian butterflies. *Bahamas Journal of Science* 4(3): 20-23, 10 figs. (June) [*Ministrymon azia* (Hewitson), *Wallengrenia misera* (Lucas), *Cymaenes tripunctus tripunctus* (Herrich-Schäffer), *Battus devilliers* (Godart), *Eurema larae* (Herrich-Schäffer), *Parachoranthus magdalia* (Herrich-Schäffer)]

Miranda, Hugo

1995. See Harley, K. et al., 1995.

Miyaki, Cosue

1997. See Kubrusly, F. S. et al., 1997.

Molinari, Alicia M., and Delia Susana Avalos

1997. Contribución al conocimiento de taquínidos (Diptera) parasitoides de defoliadoras (Lepidoptera) del cultivo de soja. *Revista de la Sociedad entomológica argentina* 56(1/4): 131-132 (February) [*Colias lesbia* (Fabricius); Argentina]

Monné, Miguel Angel

1993. *Insetos. Insects*, pp. 171-1882, figs. *In:* Monteiro, S. & L. Kaz (Eds.), *Cerrado. Vastos Espaços.* Rio de Janeiro, Livrarte Editora Ltda. [general; Brazil]

Montgomery, Charles A.

1990. See Glendinning, J. I. et al., 1990.

Morais, Helena C.

1997. See Diniz, I. R. & H. C. Morais, 1997.

Morales, Juan Luis

1996. See Rhainds, M. et al., 1996.

Moreira, Gilson R. P.

1997a. See Oliveira, E. M. & G. R. P. Moreira, 1997a.

1997b. See Oliveira, E. M. & G. R. P. Moreira, 1997b.

Moreira, Gilson R. P., Claudine A. Correa and Elna Mugrabi Oliveira

1996. Pollination of *Habenaria pleiophylla* Hoehne & Schlechter (Orchidaceae) by *Heliconius erato phyllis* Fabricius (Lepidoptera, Nymphalidae). *Revista brasileira de Zoologia* 13(3): 791-798, 7 figs. (20 December) [Brazil]

Mota, Alessandra Perazzo Barbosa

1979a. Número de óvulos em fêmeas adultas da lagarta do coqueiro, *Brassolis sophorae* L. *Fitossanidade* (Fortaleza) 3(1/2): 19 (December) [Brazil]

1979b. See Bastos, J. A. M. et al., 1979.

1979c. See Lopes, L. de O. et al., 1979.

Moura, José Inácio Lacerda

1996. See Zanetti, R. et al., 1996.

Mullahey, J. J.

1996. See Medal, J. C. et al., 1996.

Murariu, Dumitru, and Aurelian Popescu-Gorj

1996. Muzeul de Istorie Naturale "Grigore Antipa" in Bucharest, Romania. *Holarctic Lepidoptera* 3(2): 43-46, 9 figs. (16 December) [general]

Murata, Yasutaka

1996. Butterfly treasury around Iguass [sic] Falls. *Yadoriga* 166: 2-4, figs. [In Japanese] [general; Brazil, Argentina]

Murphy, Dennis D.

1996. See Austin, G. T. et al., 1996.

Murray, Brent

1995. See Van den Berghe, E. P. et al., 1995.

Murray, Debra

1997. See DeVries, P. J. et al., 1997.

Murray, Robert R.

1974. See Burke, H. R. & R. R. Murray, 1974.

Nagano, Christopher Dike, and Walter H. Sakai

1988. Making the world safe for monarchs. *Outdoor California* 49: 5-9, 6 figs. (January-February) [*Danaus plexippus* (Linnaeus); migration; conservation; Mexico]

Nahrstedt, Adolf

1985. Cyanogenic compounds as protecting agents for organisms. *Plant Systematics and Evolution* 150(1/2): 35-47, 1 fig., 2 tabs. (20 September) [*Heliconius*]

Nakagoshi, M.

1996. See Tabata, H. et al., 1996.

Nascimento, Eduardo Candido do

1990. See Zanuncio, J. C. et al., 1990.

Navarro, Nils

1995. Incidencias de lepidópteros diurnos en la dieta del murciélago orejudo (*Macrotus waterhousei minor* Gundlach/Peters, [1865]) (Chiroptera: Phyllostomidae). *Garciana* (Holguín) 23: 11-13 (1 July) [general; Cuba]

Neder, Lilia Estela

1996. Morfología e los estados inmaduros y aspectos biológicos de *Tetrastichus* sp. (Hymenoptera: Tetrastichidae), parasitoide de *Methona confusa psamathe* Godm. et Salv. (Lepidoptera: Ithomidae [sic]). *Neotropica* 42(107/108): 41-46, 8 figs., 3 tabs. (November) [*Leptophobia aripa* (Boisduval), *Colias lesbia* (Fabricius); host plants; Argentina]

Negita, Keishi

1994. See Kumazawa, K. et al., 1994.

1996. See Kumazawa, K. et al., 1996.

Neild, Andrew F. E.

1996a. *The Butterflies of Venezuela. Part 1: Nymphalidae I (Limenitidinae, Apaturinae, Charaxinae). A comprehensive guide to the identification of adult Nymphalidae, Papilionidae, and Pieridae.* Greenwich, London, Meridian Publications. 144 pp., 32 pls., 18 figs. ([30] November) [general; taxonomy; distribution; new taxa: *Adelpha ximena willmotti* Neild, *A. irma desousae* Neild & Orellana, *A. olynthia pyrczi* Neild & Orellana, *A.*

cocala orellanae Neild, *A. heraclea antonii* Neild, *A. phylaca joffrei* Neild, *A. juruana gutierrezi* Neild, *A. naxia oteroi* Neild, *A. paraena reyi* Neild, *Callicore texa skinneri* Neild, *C. eunomia valeriae* Neild, *Diaethria marchalii juani* Neild, *D. eupepla aliciae* Neild, *Perisama emma cormieri* Neild, *P. tryphena fernandezi* Attal & Crosson, *P. humboldtii attali* Neild, *Mesotaenia vaninka delafuentei* Neild, *Epiphile boliviana lamasi* Neild, *Nica flavilla lucillae* Neild, *Dynamine racidula trembathi* Neild, *D. myrson manriquei* Neild, *D. artemisia ackeryi* Neild, *Vila emilia mattei* Neild, *Agrias claudina delavillae* Neild]

1996b. See Pyrcz, T. W. & A. F. E. Neild, 1996.

Neukirchen, Walter Michael

1996a. Ein neues Taxon der Gattung *Asterope* nebst Abbildung bislang unbekannter Weibchen (Lepidoptera: Nymphalidae). *Entomologische Zeitschrift* 106(1): 1-4, 3 figs. (18 January) [*A. markii gallardi, A. whitelyi* (Salvin); French Guiana, Peru]

1996b. Zwei neue Subspecies von *Heliconius leucadia* Bates 1862 (Lepidoptera: Nymphalidae). *Entomologische Zeitschrift* 106(7): 279-283, 5 figs. (18 July) [*H. l. birgitae, H. l. andromeda*; Brazil, Ecuador, Peru, Bolivia]

1996c. See Jiggins, C. D. et al., 1996.

1997a. Zwei neue *Heliconius*-Unterarten aus Brasilien (Lepidoptera: Nymphalidae). *Entomologische Zeitschrift* 107(6): 217-222, 6 figs. (12 June) [*H. egeria christiani, H. elevatus sonjae*]

1997b. *Heliconius demeter neildi* n. subsp. aus Ost-Ecuador (Lepidoptera: Nymphalidae). *Entomologische Zeitschrift* 107(9): 357-361, 5 figs. (18 September)

1997c. Zwei neue Heliconiinae aus dem Oriente Ecuadors (Lepidoptera: Nymphalidae). *Entomologische Zeitschrift* 107(11): 482-487, 4 figs. (13 November) [*Heliconius elevatus willmotti, Neruda aoede auca*]

1997d. Neue peruanische *Heliconius*-Unterarten. *Entomologische Zeitschrift* 107(12): 493-497, 4 figs. (18 December) [*H. demeter angeli, H. melpomene michellae*]

Neves, Ludmila Lafetá de Melo

1997. See Bastos, C. S. et al., 1997.

New, Timothy Richard

1997. Are Lepidoptera an effective 'umbrella group' for biodiversity conservation? *Journal of Insect Conservation* 1(1): 5-12, 4 tabs. (March) [general]

Nieves, José Luis

1997. See Viejo, J. L. et al., 1997.

Oberhauser, Karen S.

1995. See Brower, L. P. et al., 1995.

1997. Sojourn in Mexico. *Monarch Watch* 5(1): 12-13, 1 fig. (May) [*Danaus plexippus* (Linnaeus)]

Ojeda, Arcadio

1995. See Maza, R. G. de la et al., 1995.

Oliveira, Elna Mugrabi

1996. See Moreira, G. R. P. et al., 1996.

Oliveira, Elna Mugrabi, and Gilson R. P. Moreira

1997a. Conspecific mimics and low host plant availability reduce egg laying by *Heliconius erato phyllis* (Fabricius) (Lepidoptera, Nymphalidae). *Revista brasileira de Zoologia* 13(4): 929-937, 4 figs. (16 July) [Brazil]

1997b. Size of and damage on shoots of *Passiflora suberosa* (Passifloraceae) influence oviposition site selection of *Heliconius erato phyllis* (Fabricius) (Lepidoptera, Nymphalidae). *Revista brasileira de Zoologia* 13(4): 939-953, 7 figs. (16 July) [Brazil]

Oliveira, Evandro G.

1996. See Srygley, R. B. et al., 1996.

Oliveira, Maria Ester Santiago de

1979. See Bastos, J. A. M. & M. E. S. de Oliveira, 1979.

Oliveira, Paulo S.

1996. See Freitas, A. V. L. & P. S. Oliveira, 1996.

Oñate, Leonor

1997. See Llorente, J. E. et al., 1997.

Opler, Paul Alexander

1997. See Robbins, R. K. & P. A. Opler, 1997.

Orellana, Andrés M.

1996. Nueva subespecie de *Adelpha justina* Felder & Felder 1861, (Lepidoptera: Nymphalidae: Limenitidinae) en Venezuela. *Zoocriaderos* 1(2): 21-24, 2 figs. (30 August) [*A. j. inesae*]

Ortiz, Fernando, and Valentina Ortiz

1984. *Mariposa monarca. Vuelo de papel.* México, Centro de Información y Desarrollo de la Comunicación y la Literatura Infantiles. 63 pp., figs. (October) [*Danaus plexippus* (Linnaeus); life history; migration; conservation; Mexico]

Ortiz, Valentina

1984. See Ortiz, F. & V. Ortiz, 1984.

Otero, Luis Daniel

1997. See Freitas, A. V. L. et al., 1997.

Otero, Luis Daniel, and Annette Aiello

1996. Descriptions of the immature stages of *Adelpha alala* (Nymphalidae). *Journal of the Lepidopterists' Society* 50(4): 329-336, 6 figs. (30 December) [egg, larva, pupa, imago; host plant; Venezuela]

Otero, Luíz Soledade

1974. Contribuição ao conhecimento da entomofauna do Parque Nacional da Tijuca (Estudo das espécies mais interessantes). *Brasil florestal* 5(19): 37-39 (July-September) [general; Brazil]

Otero, Luíz Soledade, and Alexandre Soares

1996. Nova subespécie de *Morpho* Fabricius, 1807, da Bahia, Brasil (Lepidoptera, Nymphalidae, Morphinae). *Boletim do Museu nacional* (Rio de Janeiro) (*Zoologia*) 369: 1-6, 5 figs. (15 May) [*M. aega amargosensis*]

Owen, Denis Frank

1995. See Brower, L. P. et al., 1995.

Pacheco, José Fernando, and Claudia Bauer

1995. Predação de *Morpho athena* (Lepidoptera: Nymphalidae) por *Falco femoralis* (Falconiformes: Falconidae) no Rio de Janeiro, Brasil. *Ararajuba* 3: 74-75 (December)

Papavero, Nelson

1996. See Lenko, K. & N. Papavero, 1996.

Parsons, Michael J.

1996a. Gondwanan evolution of the troidine swallowtails (Lepidoptera: Papilionidae): Cladistic reappraisals using mainly immature stage characters, with focus on the birdwings *Ornithoptera* Boisduval. *Bulletin of the Kitakyushu Museum of natural History* 15: 43-118, 34 figs., 2 tabs. (28 March) [general; Neotropics]

1996b. A phylogenetic reappraisal of the birdwing genus *Ornithoptera* (Lepidoptera: Papilionidae: Troidini) and a new theory of its evolution in relation to Gondwanan vicariance biogeography. *Journal of natural History* 30(11): 1707-1736, 6 figs., 1 tab. (November) [general]

Pashley, Dorothy P.

1996. See Weller, S. J. et al., 1996.

Passos, Fernando de C.

1996. See Caldas, A. & F. de C. Passos, 1996.

Patiño, Hernando, Saulo Kuratomi, Ignacio Martínez and Alfredo Estrada

1981. Elementos de trama ecológica en la entomofauna asociada con *Asclepias curassavica* L. *Revista de la Asociación colombiana de Ciencias biológicas* 3(3): 56-61. [*Danaus plexippus* (Linnaeus), *D. gilippus berenice* (Cramer), *Anartia amathea* (Linnaeus); host plant; ecology; Colombia]

Patiño, Hernando, Ignacio Martínez and Saulo Kuratomi

1981. Aspectos ecológicos de interés didáctico en especies de *Danaus*. *Revista de la Asociación colombiana de Ciencias biológicas* 3(3): 62-66. [*D. plexippus* (Linnaeus), *D. gilippus* (Cramer), *D. eresimus* (Cramer); host plants; parasitoids; predator; Colombia]

Peck, Stewart B.

1996. *Origin and development of an insect fauna on a remote archipelago: The Galápagos Islands, Ecuador,* pp. 91-122, 11

pls., 6 figs., 13 tabs. *In:* Keast, A. & S. E. Miller (Eds.), *The origin and evolution of Pacific Island biotas, New Guinea to Eastern Polynesia: patterns and processes.* Amsterdam, SPB Academic Publishing [general]

Pelz, Volker

1997. Life history of *Pedaliodes parepa* from Ecuador (Lepidoptera: Nymphalidae: Satyrinae). *Tropical Lepidoptera* 8(1): 41-45, 2 figs. (5 September) [egg, larva, pupa; host plant]

Penz, Carla Maria, and Ronaldo Bastos Francini

1996. New species of *Actinote* Hübner (Nymphalidae: Acraeinae) from southeastern Brazil. *Journal of the Lepidopterists' Society* 50(4): 309-320, 4 figs. (30 December) [*A. dalmeidai, A. catarina, A. bonita*; distribution; life histories; host plants]

Peña, Luis E., and Alfredo J. Ugarte

1997. *Las mariposas de Chile. The butterflies of Chile.* Santiago de Chile, Editorial Universitaria. 359 pp., figs., maps (July) [general]

Picanço, Marcelo

1997. See Bastos, C. S. et al., 1997.

Pijoan, Manuel [1956-]

1997. See Masó, A. & M. Pijoan, 1997.

Pinheiro, Carlos E. G.

1996. Palatability and escaping ability in Neotropical butterflies: tests with wild kingbirds (*Tyrannus melancholicus*, Tyrannidae). *Biological Journal of the Linnean Society* 59(4): 351-365, 2 figs., 1 tab. ("December" [29 November]) [general; Brazil]

Pino, José Manuel

1988. See Ramos, J. & J. M. Pino, 1988.

1990. See Ramos, J. & J. M. Pino, 1990.

Pinto, Nozor P. O.

1996. See Campos-Farinha, A. E. C. & N. P. O. Pinto, 1996.

Pitelli, R. A.

1996. See Medal, J. C. et al., 1996.

Plester, Leigh

1994. De fus' time in Tobago. *Bulletin of the amateur Entomologists' Society* 53(393): 89-96 (20 April), (394): 99-103 (20 June), (395): 151-156 (20 August) [general]

Poinar, George O.

1997. See DeVries, P. J. & G. O. Poinar, 1997.

Pomiankowski, Andrew

1997. See Davies, N. et al., 1997.

Ponce, Hugo E.

1997. Butterflies of ancient Mexico. *Cultural Entomology Digest* 4: 6-9, figs. (November) [general; ethnoentomology]

Popescu-Gorj, Aurelian

1983. *Lumea insectelor in Muzeul de Istorie Naturala "Grigore Antipa"*, pp. 7-61, 24 figs. *In: Ghidul Colectiilor. 1 - insecte.* Bucuresti, Muzeul de Istorie Naturala "Grigore Antipa". [general]

1996. See Murariu, D. & A. Popescu-Gorj, 1996.

Posada, Francisco Javier, and Reinaldo Cárdenas

1996. Gusanos en otra palma. *MIP - Notas y Noticias* (Bogotá) 2(6): 15 (27 September) [*Opsiphanes* sp.; host plant; Colombia]

Posada, Francisco Javier, Reinaldo Cárdenas and Alex Enrique Bustillo

1996. Monarca en la zona cafetera. *MIP - Notas y Noticias* (Bogotá) 2(5): 6-7 (January-March) [*Danaus plexippus* (Linnaeus); host plant; parasite; Colombia]

Pough, F. Harvey

1988. Mimicry of vertebrates: are the rules different? *American Naturalist* 131(supplement): 67-102, 2 pls., 4 figs. (June) [general]

Pratt, Gordon F.

1997. See Mattoni, R. H. T. et al., 1997.

Prieto, Aída Viviana, and Luis Miguel Constantino

1996. Abundancia, distribución y diversidad de mariposas (Lep. Rophalocera [sic]) en el Río Tatabro, Buenaventura (Valle - Colombia). *Boletin del Museo de Entomologia de la Universidad del Valle* 4(2): 11-18, 4 tabs. (December) [general]

Pyrcz, Tomasz Wilhelm

1996. See Rey, F. & T. W. Pyrcz, 1996.

Pyrcz, Tomasz Wilhelm, and Andrew F. E. Neild

1996. *Tribe Anaeini*, pp. 99-116. *In:* Neild, A.F.E., *The Butterflies of Venezuela. Part 1: Nymphalidae I (Limenitidinae, Apaturinae, Charaxinae). A comprehensive guide to the identification of adult Nymphalidae, Papilionidae, and Pieridae.* Greenwich, London, Meridian Publications. 144 pp., 32 pls., 18 figs. ([30] November) [new species: *Memphis maria, M. viloriae*]

Quidet, Pierre

1996. Don d'une collection de lépidoptères au Muséum d'Histoire Naturelle de Nîmes. *Alexanor* 19(2/3): 159-164, figs. (15 October) [general]

Racheli, Luigi

1996a. See Racheli, T. & L. Racheli, 1996a.

1996b. See Racheli, T. & L. Racheli, 1996b.

1997. See Racheli, T. & L. Racheli, 1997.

Racheli, Tommaso

1996. An annotated checklist of Ecuadorian Pieridae (Lepidoptera, Pieridae). *Atalanta* 27(3/4): 545-580 (December) [general]

Racheli, Tommaso, and Luigi Racheli

1996a. Notes on *Parides erithalion* and description of a new subspecies from Peru (Lepidoptera: Papilionidae). *Lambillionea* 96(centenaire): 59-62, 2 figs. (February) [*P. e. callegarii*]

1996b. A new subspecies of *Pterourus zagreus* Doubleday, 1847 from western Amazonia (Lepidoptera: Papilionidae). *Lambillionea* 96(4)(2): 699-702, 1 fig. (December) [*P. z. batesi*; Peru, Brazil]

1997. An annotated checklist of Ecuadorian Nymphalidae, Part I: Heliconiinae (Lepidoptera). *Nachrichten der entomologischer Verein Apollo* (N.F.) 18(2/3): 231-260, 1 fig. (October) [general; distribution]

Raguso, Robert A., and Oliver Gloster

1996. Preliminary checklist and field observations of the butterflies of the Maquipucuna Field Station (Pichincha Province, Ecuador). *Journal of Research on the Lepidoptera* 32: 135-161, 4 figs., 4 tabs. (1 May) [general]

Raguso, Robert A., and Jorge Enrique Llorente

1997. *Papilionoidea,* pp. 257-291, 7 tabs. *In:* González, E.S., R. Dirzo & R.C. Vogt (Eds.), *Historia Natural de Los Tuxtlas.* Mexico, Universidad Nacional Autónoma de México. [general; Mexico]

Ramos, Julieta, and José Manuel Pino

1988. The utilization of insects in the empirical medicine of ancient Mexicans. *Journal of Ethnobiology* 8(2): 195-202. [*Aegiale hesperiaris* Walker]

1990. Contenido calórico de algunos insectos comestibles de México. *Revista de la Sociedad química de México* 34(2): 56-68, 6 tabs. (March-April) [*Aegiale hesperiaris* Walker, *Eucheira socialis* Westwood, *Catasticta teutila* (Doubleday), *Danaus plexippus* (Linnaeus)]

Ramos, Stuart J.

1996. An annotated checklist of the butterflies of Puerto Rico. *Annals of the New York Academy of Sciences* 776: 217-238 (26 June) [general]

Rangnow, Rudolf

1938. *Tropenpracht und Urwaldnacht. Auf Tierfang am Amazonas.* Braunschweig, Gustav Wenzel & Sohn. 176 pp., figs. [general; Brazil]

Remington, Charles Lee

1995. *Lepidoptera studies,* pp. 274-283. *In:* Alexandrov, V. E. (Ed.), *The Garland Companion to Vladimir Nabokov.* New York, Garland Publishing, Inc. 798 pp. [general; Neotropics]

Rey, Fernando, and Tomasz Wilhelm Pyrcz

1996. A perfect mimicry of two cloud forest pierids: *Leptophobia eleone* and *Catasticta revancha* new sp. (Lepidoptera: Pieridae). *Genus* (Wroclaw) 7(3): 497-502, 3 figs. (30 October) [Venezuela]

Rhainds, Marc, Gerhard Gries and Juan Luis Morales

1996. Oviposition deterrency in pineapple borer females, *Thecla basilides* (Lepidoptera: Lycaenidae). *Ecological Entomology* 21(1): 105-106, 1 fig. (February) [Costa Rica]

Rickard, Mike A.

1993. Definitive destination: Bentsen-Rio Grande Valley State Park, Mission, TX. *American Butterflies* 1(2): 4-9, 7 figs. (May) [general; Mexico]

Rieger, Juan

1997. Una breve historia... *Mariposas del Mundo* (Buenos Aires) 2: 26 (March) [*Phoebis*; Argentina]

Riva, Rita

[1997]. See Couturier, G. et al., 1997.

Robbins, Robert Kanner

1993. False heads: the real tale. *American Butterflies* 1(4): 19-22, 4 figs. (November) [Lycaenidae; behavior; Neotropics]

1996. See Medina, M. C. et al., 1996.

[1997]a. See Lamas, G. et al., 1997.

1997b. These legs were made for walking - and so much more! *American Butterflies* 5(1): 28-33. figs. [general; morphology; behavior]

Robbins, Robert Kanner, Gerardo Lamas, Olaf Hermann Hendrik Mielke, Donald James Harvey and Mirna Martins Casagrande

1996. *Taxonomic composition and ecological structure of the species-rich butterfly community at Pakitza, Parque Nacional del Manu, Perú,* pp. 217-252, 1 tab. *In:* Wilson, D.E. & A. Sandoval (Eds.), *Manu. The biodiversity of southeastern Peru.* Washington, D.C., Smithsonian Institution ([December]) [general]

Robbins, Robert Kanner, and Paul Alexander Opler

1997. *Butterfly diversity and a preliminary comparison with bird and mammal diversity,* pp. 69-82, 4 figs., 2 tabs. *In:* Reaka-Kudla, M. L., D. E. Wilson & E. O. Wilson (Eds.), *Biodiversity II. Understanding and protecting our biological resources.* Washington, D.C., Joseph Henry Press. [general; Neotropics]

Rodella, Roberto Antonio

1986. See Maimoni-Rodella, R. C. S. & R. A. Rodella, 1986.

Rodríguez, Claudia Luz, Carlos Suárez and Jesús Emilio Luque

1994. El género *Morpho* en Colombia: I. Especies presentes en Colombia, distribución geográfica y altitudinal. *Agronomía colombiana* 11(1): 13-19, 5 figs., 1 tab. (January-June) [general]

1996. El Género *Morpho* en Colombia: II. Clave taxonómica para las especies presentes en Colombia. *Agronomía colombiana* 13(1): 1-22, 20 figs. [general]

Rodríguez, Jon Paul, and Franklin Rojas

[1996]. *Libro Rojo de la Fauna Venezolana.* Caracas, PROVITA, Fundación Polar. 444 pp., figs., maps ("1995" [1996]) [general; conservation]

Rodríguez, José

1991. Mariposas monarca. *Geomundo* 15(2): 114-121, figs. (February) [*Danaus plexippus* (Linnaeus); life history; migration; Mexico]

Rojas, Franklin

[1996]. See Rodríguez, J. P. & F. Rojas, 1996.

Romeiro, Reginaldo da Silva

1978. See Zanuncio, J. C. et al., 1978.

Romero, Francisco

1996. See González, J. M. & F. Romero, 1996.

Romeu, Emma

1997. La monarca: Atrapar el problema al vuelo. *Biodiversitas* (Mexico) 3(12): 8-15, figs. (April) [*Danaus plexippus* (Linnaeus); conservation; Mexico]

Roque, Lázaro, Valentina Cruz and Gerardo Lamas

1997. *Hemiargus ramon* (Dognin, 1887) (Lycaenidae: Polyommatinae) a new resident butterfly of the Galápagos Islands. *Noticias de Galápagos* 58: 29, 1 fig. (May) [host plants; Ecuador, Peru]

Rosenberg, G.

1996. D. L. G. Karsten (1789), Museum Leskeanum, vol. 1 (Regnum Animale): proposed suppression for nomenclatural purposes. *Bulletin of zoological Nomenclature* 53(1): 38-42 (29 March) [general]

Ross, Edward Shearman

1996. How to become a butterfly shutterbug. *American Butterflies* 4(2): 28-31, figs. [general; Ecuador, Brazil, Mexico]

Ross, Gary Noel

1993. Butterfly round trips. *Natural History* (New York) 102(9): 3, 1 fig. (September) [*Danaus plexippus* (Linnaeus); migration; Mexico]

1996. Butterfly houses: Magic gardens of the 1990's. *American Butterflies* 4(3): 14-21, figs. [general]

1997. Goddesses fly again: Butterfly images in Mexican myth and textiles. *American Butterflies* 5(4): 14-18, 7 figs. [general]

Ruiz, Natalia

1996. See Fagua, G. & N. Ruiz, 1996.

Ruszczyk, Alexandre

1996. Spatial patterns in pupal mortality in urban palm caterpillars. *Oecologia* 107: 356-363, 1 fig., 6 tabs. [*Brassolis sophorae* (Linnaeus), *Opsiphanes invirae* (Hübner); parasitoids; Brazil]

1997. See Fortunato, L. & A. Ruszczyk, 1997.

Ruszczyk, Alexandre, and C. F. Silva

1997. Butterflies select microhabitats on building walls. *Landscape and Urban Planning* 38: 119-127, 4 figs., 1 tab. [general; behavior; Brazil]

Rutkowski, Frank

1995. A Bahamian source for the Florida Atala butterfly. *Bahamas Journal of Science* 2(3): 21-22, 2 figs. (June) [*Eumaeus atala* (Poey); behavior]

Sakai, Walter H.

1988. See Nagano, C. D. & W. H. Sakai, 1988.

Salazar, Julián Adolfo

1992. Notas sobre cinco raras especies de Riodininae (Lepidoptera: Lycaenidae) en Colombia. *Agricultura tropical* 29(3): 64-68, 5 figs. (December) [*Xenandra prasinata* Thieme, *X. vulcanalis* Stichel, *Hermathena candidata columba* Stichel, *Syrmatia aethiops* Staudinger, *Euselasia uzita* Hewitson; distribution; behavior]

1994. See Vélez, J. H. & J. A. Salazar, 1994.

1995. Mariposas vagarosas. *Ecológica* (Bogotá) 6(20): 36-39, figs. (January-June) [general; Colombia]

1996a. Sobre la concentración de lepidópteros ropalóceros en la cumbre de un cerro del noroccidente de Caldas, Colombia (Insecta: Lepidoptera). *Shilap* 24(94): 183-195, 9 figs., 1 tab. (30 June) [general; behavior]

1996b. Nuevos registros colombianos de algunas especies de Lepidoptera (Insecta: Lepidoptera). *Boletín científico. Museo de Historia natural. Universidad de Caldas* 1: 7-10, 3 figs. ("August", September) [*Caligopsis seleucida* (Hewitson), *"Thecla" ematheon* (Cramer), *Evenus regalis* (Cramer), *Asterope sapphira* (Hübner)]

1996c. Noticias sobre algunos Satyrinae poco conocidos para Colombia (Lepidoptera: Nymphalidae). *Boletín científico. Museo de Historia natural. Universidad de Caldas* 1: 17-21 ("August", September) [general]

1996d. Avances sobre el proyecto "Revisión de Theclinae de Colombia" (Review of Colombian Theclinae) (Lepidoptera; Lycaenidae). *Boletín científico. Museo de Historia natural. Universidad de Caldas* 1: 27-30 ("August", September) [general]

1997a. See Callaghan, C. J. & J. A. Salazar, 1997.

1997b. See Johnson, K. et al., 1997.

1997c. See Johnson, K. et al., 1997.

1997d. See Johnson, K. et al., 1997.

1997e. Una nueva subespecie de *Antirrhea pterocopha* para Colombia (Lepidoptera: Nymphalidae: Morphinae). *Tropical Lepidoptera* 8(1): 39-40, 1 fig. (5 September) [*A. p. chocoensis*]

Salazar, Julián Adolfo, Luis Miguel Constantino and Kurt Johnson

1997. Additional new species and records of "elfin"-like Eumaeini from Colombia (Lycaenidae). *Revista de Theclinae colombia-*

nos 2(17): [ii] + 1-15, pls. 15-16 (15 August) [*Candora galeraensis, C. incisalia, Rhamma argentopicta, Solanorum xavieri, S. pyrczi*; Venezuela]

Salazar, Julián Adolfo, and Kurt Johnson

1997. A new genus of Neotropical hairstreaks utilizing bird excrement as their protective color substrate (Eumaeini; Macusiina). *Revista de Theclinae colombianos* 2(13): [ii] + 1-10, 2 figs. (15 August) [*Aveexcrenota, A. mimianna*; Colombia]

Salazar, Julián Adolfo, and Carlos López

1996. *Gibbonota*, nuevo género de mariposas listadas tropicales de América (Lepidoptera: Lycaenidae). *Boletín científico. Museo de Historia natural. Universidad de Caldas* 1: 22-26, 3 figs. ("August", September)

Sales, Fernando M., Maria de Fátima Barros Gonçalves, Olavo F. G. Martins and Cirilo Mendes

1979. Insetos e outros artrópodes de importância agrícola, em perímetros irrigados e de sequeiro do Estado do Piauí. *Fitossanidade* (Fortaleza) 3(1/2): 12-19, 1 tab. (December) [*Papilio thoas brasiliensis* Rothschild & Jordan; host plant; Brazil]

Sánchez, Consuelo

1997. See Viejo, J. L. et al., 1997.

Santis, Luis de

1979. *Catálogo de los himenópteros calcidoideos de América al sur de los Estados Unidos.* Buenos Aires, Comisión de Investigaciones Científicas de la Provincia de Buenos Aires. 488 pp. (March) [general; parasitoids]

Santos, Celia M.

1994. *Catálogo de los insectos recolectados por la Comisión Científica del Pacífico (1862-1865).* Madrid, Consejo Superior de Investigaciones Científicas. (Manuales Técnicos de Museología, vol. 5). 196 pp., 6 tabs., 1 graph (March) [general; Panama, South America]

Santos, Germi Porto

1986. See Anjos, N. dos et al., 1986.
1990. See Zanuncio, J. C. et al., 1990.
1993. See Zanuncio, J. C. et al., 1993.

Schappert, Phillip J.

1997. The nature of monarch butterflies: beauty takes flight by Eric S. Grace. 1997. *News of the Lepidopterists' Society* 39(4): 76. [*Danaus plexippus* (Linnaeus); migration; Mexico; book review]

Scherer, Karla Zanenga

1996. See Castellani, T. T. et al., 1996.

Schulz, Stefan

1992. Absolute configuration and synthesis of 2-hydroxy-2-(1-hydroxyethyl)-3-methyl-τ-butyrolactone, a presumed pheromone of ithomiine butterflies. *Liebigs Annalen der Chemie* 1992: 829-834, 2 figs., 2 tabs. [*Prittwitzia hymenaea* (Prittwitz), *Callithomia hezia* (Hewitson)]

Schwartz, Albert

1996. See Wetherbee, D. K. & A. Schwartz, 1996.

Schwartz, Albert, and David Kenneth Wetherbee

1996. *Calisto* (Lepidoptera: Saturidae [sic]) of the Hispaniolan Western Cordillera Central. *Caribbean Journal of Science* 32(2): 158-165, 2 figs. (August) [general]

Schweighofer, Mona

1995. See Van den Berghe, E. P. et al., 1995.

Scott, Jane Vicroy

1996. Orange snow on the mountains: Monarchs in Mexico. *American Butterflies* 4(1): 4-8, figs. [*Danaus plexippus* (Linnaeus)]

Scriber, J. Mark

1996. Tiger tales: Natural history of native North American swallowtails. *American Entomologist* 42(1): 19-32, figs., 1 tab. [*Papilio*; life history; host plants; Mexico]

Scriber, J. Mark, and Robert C. Lederhouse

1996. Illustrated field notes on *Papilio astyalus pallas* in Costa Rica (Lepidoptera: Papilionidae). *Tropical Lepidoptera* 7(2): 119-120, 9 figs. (30 December) [life history; host plant; behavior]

Segarra, Alejandro

1994. See Medina, S. et al., 1994.

Segura, Ricardo

1995. See Harley, K. et al., 1995.

Serrano, Francisco

1994. *How dangerous are Salvadorean Papilios?*, pp. 188-124, 2 tabs. *In: Invertebrates in Captivity 1994.* Tucson, Sonoran Arthropod Studies Institute. [general; El Salvador]

1995. *Invertebrados terrestres (artrópodos),* pp. 241-270, figs. *In:* Serrano, F. (Ed.), *Historia Natural y Ecología de El Salvador. Tomo 1.* San Salvador, Ministerio de Educación (September) [general; El Salvador]

Seufert, Peter

1996. See Fiedler, K. et al., 1996.

Shapiro, Arthur Maurice

1996. From darkness to light to flight: Monarch - The miracle butterfly, by Jules H. Poirier. 1995. *News of the Lepidopterists' Society* 38(2): 58-59 (April) [*Danaus plexippus* (Linnaeus); book review]

1997. Impactos antropogénicos sobre la fauna de mariposas (Lepidoptera: Rhopalocera) de Patagonia austral y Tierra del Fuego. *Anales del Instituto de la Patagonia (Ciencias naturales)* 25: 117-126, 1 tab. [general; Argentina, Chile]

Shields, Oakley

1996. Geographic isolation in southwestern North American butterflies (Lepidoptera, Rhopalocera). *Nachrichten der entomologischer Verein Apollo* (N.F.) 17(1): 71-92 [general; biogeography; evolution; Mexico]

Shoumatoff, Alex

1996. My father's butterfly. *Natural History* (New York) 105(3): 12-15, figs. (March) [*Nesiostrymon shoumatoffi* (Comstock & Huntington); Jamaica]

Shuey, John A.

1997. Mariposas de Chiapas, by Roberto G. de la Maza E. and Javier de la Maza E. 1993. *Journal of the Lepidopterists' Society* 51(2): 191-193 (11 July) [general; Mexico; book review]

Silberglied, Robert Elliot

1997. See Davies, N. et al., 1997.

Silva, C. F.

1997. See Ruszczyk, A. & C. F. Silva, 1997.

Silva, Edimar Antônio da

1997. See Bastos, C. S. et al., 1997.

Silva, Elliet

1989. See Jiménez, M. et al., 1989.

Silva, M. Helena Pinto Bivar de Matos e

1996. See Anken, R. H. & M. H. P. B. de M. e Silva, 1996.

Simões, Luíz Carlos G.

1997. See Kubrusly, F. S. et al., 1997.

Simon, Mark J.

1997. See Miller, L. D. & M. J. Simon, 1997.

Sisk, Thomas D.

1996. See Austin, G. T. et al., 1996.

Smith, David Spencer

1996. See Knowles, D. O. & D. S. Smith, 1996.

Smith, J. A. D.

1995. An observation of *Prepona dexamenus* (Hopffer). *Bulletin of the amateur Entomologists' Society* 54(401): 154 (20 August) [Costa Rica]

Smith, Martha R. Bressan

1993. See Zanuncio, J. C. et al., 1993.

Soares, Alexandre

1996. See Otero, L. S. & A. Soares, 1996.

Soberón, Jorge

1996. See Llorente, J. E. et al., 1996.

Sourakov, Andrei

1996a. Notes on the genus *Calisto*, with descriptions of the immature stages (Part 1) (Lepidoptera: Nymphalidae: Satyrinae). *Tropical Lepidoptera* 7(1)(2): 91-112, 23 figs., 3 tabs. (25 June) [eggs, larvae, pupae; host plants; morphology; República Dominicana]

1996b. See Emmel, T. C. & A. Sourakov, 1996.

Sourakov, Andrei, and Thomas Chadbourne Emmel

1996. Notes on the life history of *Anetia jaegeri* from Hispaniola (Lepidoptera: Nymphalidae: Danainae). *Tropical Lepidoptera* 7(2): 155-159, 4 figs., 1 tab. (30 December) [morphology; host plant; República Dominicana]

Spalding, Adrian

1996. See Waring, P. et al., 1996.

Srygley, Robert B., Evandro G. Oliveira and Robert Dudley

1996. Wind drift compensation, flyways, and conservation of diurnal, migrant Neotropical Lepidoptera. *Proceedings of the Royal Society of London* (B) 263(1375): 1351-1357, 3 figs., 2 tabs. (22 October) [*Aphrissa statira* (Cramer), *Marpesia chiron* (Fabricius), *Phoebis argante* (Fabricius); Panama]

Steinhauser, Stephen Rogers

1996a. Three new *Paratrytone* species from Mexico (Hesperiidae: Lepidoptera). *Bulletin of the Allyn Museum* 141: 1-11, 15 figs. (5 June) [*P. kemneri, P. miahua, P. omiltemensis*]

1996b. See Austin, G. T. & S. R. Steinhauser, 1996.

1997. See Austin, G. T. et al., 1997.

Stutz, Bruce

1993. Butterfly flyby. *Audubon* 95(1): 16, 1 fig. (January-February) [*Danaus plexippus* (Linnaeus); migration; Mexico]

Suárez, Carlos

1994. See Rodríguez, C. L. et al., 1994.

1996. See Rodríguez, C. L. et al., 1996.

Suplicy, Nelson, Filho

1978. See Zanuncio, J. C. et al., 1978.

1979. See Zanuncio, J. C. et al., 1979.

Suzuki, Yoshiko

1988. Evolution of mating strategies in butterflies. *Special Bulletin of lepidopterological Society of Japan* 6: 301-321, 2 figs., 1 tab. (30 September) [In Japanese] [general]

Swinethrottle, Reginald B. [pseudonym; = P. J. DeVries, *q.v.*]

1997. A commentary on the recent book, Butterflies of Costa Rica and their natural history: vol. 2. *Journal of Research on the Lepidoptera* 34(1/4): 154-160, 1 tab. (15 December) [Riodinidae; book review]

Tabata, Hiroshi

1994. See Kumazawa, K. et al., 1994.

1996a. See Kumazawa, K. et al., 1996.

1996b. See Kumazawa, K. & H. Tabata, 1996.

Tabata, Hiroshi, Toshinori Hasegawa, M. Nakagoshi, S. Takikawa and M. Tsusue

1996. Occurrence of biopterin in the wings of *Morpho* butterflies. *Experientia* 52: 85-87, 3 figs.

Takikawa, S.

1996. See Tabata, H. et al., 1996.

Tanaka, Shingo

1994. See Kumazawa, K. et al., 1994.

Tanchiva, Elva

[1997]a. See Couturier, G. et al., 1997.

[1997]b. See Couturier, G. et al., 1997.

Tanner, J.

1995. See Bingham, L. et al., 1995.

Tate, George Henry Hamilton

1931. The ascent of Mount Turumiquire. The hub of the mountainous portion of Venezuela adjoining Trinidad is climbed for the first time. *Natural History* (New York) 31(5): 539-548, figs. (September-October) [general]

1933. Mountain by-ways of Bolivia. An account of an expedition to the Cordillera Real - the eastern slope of the Andes. *Natural History* (New York) 33(1): 81-94, figs. (January-February) [general]

Taylor, Barbara [1954-]

1996. *Butterflies & moths*. London, Dorling Kindersley Limited. 160 pp., figs. [general]

Taylor, Orley R., Jr.

1995. See Brower, L. P. et al., 1995.

Teshirogi, Motomu

1994. Food plants of Nymphalidae in the world (2). *Butterflies* (Tokyo) 8: 59, 3 figs. (30 September) [In Japanese] [*Hamadryas guatemalena* (Bates); Peru, Bolivia]

1996. Foodplants of Nymphalidae in the world (IV). *Butterflies* (Tokyo) 15: 56-57, 4 figs. (15 December) [In Japanese] [*Marpesia petreus* (Cramer)]

1997. Food plants of Nymphalidae in the World (V). *Butterflies* (Tokyo) 18: 43-45, 15 figs. (20 December) [In Japanese] [*Siproeta stelenes* (Linnaeus), *Anartia fatima* (Fabricius), *A. jatrophae* (Linnaeus)]

Thomas, Chris D.

1990. Fewer species. *Nature* 347(6290): 237 (20 September) [*Heliconius*; diversity; Costa Rica]

Tognelli, Marcelo

1994. See Igarzábal, D. et al., 1994.

Tokiwa, Toru

1994. The pattern transformation rule in Lepidoptera. *Butterflies* (Tokyo) 8: 22-29, 7 figs. (30 September) [In Japanese] [*Hamadryas*]

Torres, Rodrigo

1997. See Johnson, K. et al., 1997.

Torres, Rodrigo, Jason Piers Wilton Hall, Keith Richard Willmott and Kurt Johnson

1996. A new genus of "elfin" butterflies from the northern high Andes (Lepidoptera: Lycaenidae). *Tropical Lepidoptera* 7(1)(1): 881-86, 8 figs. (25 June) [new taxa: *Podanotum, P. clarissimus, P. metallicus*; Ecuador, Colombia]

Torres, Rodrigo, and Jean François Le Crom

1997. Una nueva especie de *Pedaliodes* Butler, 1867 de la cordillera oriental de Colombia (Lepidoptera: Nymphalidae, Satyrinae, Pronophilini). *Shilap* 25(100): 213-218, 6 figs. (30 December) [*P. chingazaensis*]

Treviño, Rocío

1997. Welcome the Monarchs. *American Butterflies* 5(4): 19-21, 4 figs. [*Danaus plexippus* (Linnaeus); conservation; Mexico]

Trigo, José Roberto

1995a. See Brown, K. S., Jr. & J. R. Trigo, 1995a.

1995b. See Brown, K. S., Jr. & J. R. Trigo, 1995b.

1996. See Freitas, A. V. L. et al., 1996.

Trigo, José Roberto, Lauro Euclides Soares Barata and Keith Spalding Brown, Jr.

1994. Stereochemical inversion of pyrrolizidine alkaloids by *Mechanitis polymnia* (Lepidoptera: Nymphalidae: Ithomiinae): Specificity and evolutionary significance. *Journal of chemical Ecology* 20(11): 2883-2899, 4 figs. [Brazil]

Trigo, José Roberto, Keith Spalding Brown, Jr., Silvana Aparecida Henriques and Lauro Euclides Soares Barata

1996. Qualitative patterns of pyrrolizidine alkaloids in Ithomiinae butterflies. *Biochemical Systematics and Ecology* 24(3): 181-188, 1 fig., 1 tab. (April) [general]

Trigo, José Roberto, Keith Spalding Brown, Jr., Ludger Witte, Thomas Hartmann, Ludger Ernst and Lauro Euclides Soares Barata

1996. Pyrrolizidine alkaloids: different acquisition and use patterns in Apocynaceae and Solanaceae feeding ithomiine butterflies (Lepidoptera: Nymphalidae). *Biological Journal of the Linnean Society* 58(1): 99-123, 3 figs., 11 tabs. (May) [general; Brazil]

Tsusue, M.

1996. See Tabata, H. et al., 1996.

Turner, John Richard George

1988. The evolution of mimicry: a solution to the problem of punctuated equilibrium. *American Naturalist* 131(supplement): 42-66, 8 figs. (June) [general]

Turner, John Richard George, and James Louis Borlase Mallet

1996. Did forest islands drive the diversity of warningly coloured butterflies? Biotic drift and the shifting balance. *Philosophical Transactions of the royal Society of London* (B) 351: 835-845, 2 figs. [*Heliconius*; Neotropics]

Ugarte, Alfredo J.

1997. See Peña, L. E. & A. J. Ugarte, 19997.

Van den Berghe, Eric P., Brent Murray, Mona Schweighofer and Jeremy Hale

1995. Mariposas de la Laguna de Apoyo, Nicaragua. *Revista nicaragüense de Entomología* 34: 33-39 (December) [general]

Vane-Wright, Richard Irwin

1996a. See Jong, R. de et al., 1996.

1996b. Bibliography of Butterflies. An annotated bibliography of the Neotropical butterflies and skippers (Lepidoptera: Papilionoidea and Hesperioidea). G. Lamas, R. G. Robbins and W. D. Field. 1995. *Antenna* 20(3): 132-133 (July) [book review]

1997. Florida white monarchs - a touch of incest? *News of the Lepidopterists' Society* 39(4): 72, 88, 1 fig. [*Danaus plexippus* (Linnaeus); Mexico]

Van Hook, Tonya

1995. See Brower, L. P. et al., 1995.

Varga, Andrés Eugenio

1997a. Criando mariposas. *Mariposas del Mundo* (Buenos Aires) 2: 10-22, 13 figs. (March) [general; host plants; Argentina]

1997b. See Díaz, N. B. & A. E. Varga, 1997.

Vargas, Héctor

1993. See Bobadilla, D. et al., 1993.

Vargas, Isabel

1996a. See Luis, M. A. et al., 1996.

1996b See Warren, A. D. et al., 1996.

1996c. See Luis, M. A. et al., 1996.

1996d. See Llorente, J. E. et al., 1996.

1996e. See Llorente, J. E. et al., 1996.

1996f. See Llorente, J. E. et al., 1996.

1997a. Zone 12 Mexico, pp. 72-74. *In:* 1996 Season Summary. *News of the Lepidopterists' Society* 39(2): 1-76 (1 May) [general]

1997b. See Llorente, J. E. et al., 1997.

Vargas, Isabel, Jorge Enrique Llorente and Moisés Armando Luis

1996. Distribución y fenología de tres especies del género *Eunica* en México (Lepidoptera: Nymphalidae). *Tropical Lepidoptera* 7(2): 121-126, 7 figs. (30 December) [*E. alcmena alcmena* Doubleday, *E. malvina albida* Jenkins, *E. olympias agustina* Maza, *E. o. augusta* Bates; new subspecies: *E. malvina almae*]

Vargas, Isabel, Moisés Armando Luis, Jorge Enrique Llorente and Andrew D. Warren

1996. Butterflies of the State of Jalisco, Mexico. *Journal of the Lepidopterists' Society* 50(2): 97-138, 1 fig., 2 tabs. (5 July) [general]

Vásquez, Joel

[1997]. See Couturier, G. et al., 1997.

Vásquez, Joel, Kember Mejía and Guy Couturier

[1997]. Insectos de la "uña de gato" (*Uncaria guianensis* y *U. tomentosa*: Rubiaceae), planta medicinal de la Amazonía peruana. *Revista peruana de Entomología* 39: 121-124, 6 figs. ("December 1996" [18 February 1997]) [*Spioniades artemides* (Stoll)]

Vélez, Jesús Hernán

1989. Mariposas de la zona cafetera en Colombia. *Lámpara* 27(108): 10-19, figs. [general]

1997a. See Johnson, K. et al., 1997.

1997b. See Johnson, K. et al., 1997.

Vélez, Jesús Hernán, and Julián Adolfo Salazar

1994. Mariposas. *Hexágono* (Bogotá) 3(2): 7-20, figs. [general; Colombia]

Viard, Michel

1997. See Eid, A. & M. Viard, 1997.

Vickerman, Danel

1995. See Brower, L. P. et al., 1995.

Viejo, José Luis, José Luis Nieves, Félix M. Fontal and Consuelo Sánchez

1997. *Contribución al conocimiento de las mariposas de la Isla de Coiba, Panamá (Lepidoptera: Papilionidae, Pieridae et Nymphalidae)*, pp. 363-373, figs. *In:* Castroviejo, S. & M. Velayos (Eds.), *Flora y fauna del Parque Nacional de Coiba (Panamá). Inventario Preliminar.* Madrid, Agencia Española de Cooperación Internacional. [general]

Vilela, Evaldo Ferreira

1978. See Zanuncio, J. C. et al., 1978.

1979. See Zanuncio, J. C. et al., 1979.

1996. See Zanetti, R. et al., 1996.

Viloria, Angel Luis

1997a. Liquid excretion during puddling in *Tegosa anieta* (Nymphalidae: Melitaeinae). *News of the Lepidopterists' Society* 39(1): 6-7, 1 fig. (15 March) [Venezuela]

1997b. Andrew F. E. Neild. The Butterflies of Venezuela. Part 1: Nymphalidae I (Limenitidinae, Apaturinae, Charaxinae). 1996. *Shilap* 25(97): 52 (30 March) [general; book review]

Vitali, Maria de Jesus, João Clovis Stanzani Dutra and Vera Lígia Letízio Machado

1995. Entomofauna visitante de *Belamcanda chinensis* (L.)DC (Iridaceae) durante o período de floração. *Revista brasileira de Zoologia* 12(2): 239-250, 7 figs., 3 tabs. (16 October) [*Ascia monuste orseis* (Godart), Hesperiidae, Papilionidae; Brazil]

Walton, Richard K.

1993. Tracking North American monarchs. Part I. The East. *American Butterflies* 1(3): 11-16, 6 figs. (August) [*Danaus plexippus* (Linnaeus); migration; Mexico]

Waring, Paul, Graham Collins and Adrian Spalding

1996. The BENHS expedition to Belize, January-February 1996. *British Journal of Entomology and natural History* 9(4): 197-203, 5 figs. (December) [general]

Warren, Andrew D.

1993. *Region IX: Neotropics (Mexico)*, pp. 71-73. *In:* Swengel, A.B. & P.A. Opler (Eds.), *Fourth of July Butterfly Counts. 1992 Report.* Portland, Xerces Society. [general]

1995. *Region 24: Neotropics. Mexico*, pp. 64-65. *In:* Swengel, A.B. & P.A. Opler (Eds.), *NABA-Xerces Fourth of July Butterfly Counts. 1994 Report.* Morristown, North American Butterfly Association, Inc. [general]

1996a. See Vargas, I. et al., 1996.

1996b. *Amblyscirtes patriciae:* Description of the female and notes on its synonymy, behavior, habitat and distribution in Mexico (Lepidoptera: Hesperiidae: Hesperiinae). *Tropical Lepidoptera* 7(2): 127-132, 10 figs. (30 December)

1996c. See Llorente, J. E. et al., 1996.

1996d. See Llorente, J. E. et al., 1996.

1997a. A new species of *Dalla* from Guatemala (Lepidoptera: Hesperiidae). *Tropical Lepidoptera* 8(1): 35-37, 3 figs. (5 September) [*D. freemani*]

1997b. *Urbanus belli* (Hesperiidae: Pyrginae): A new record for the United States. *News of the Lepidopterists' Society* 39(3): 41, 60, figs. F, J. [Mexico]

1997c. *Region 24: Neotropics (Mexico)*, pp. 67-69. *In:* Swengel, A.B. & P.A. Opler (Eds.), *NABA Fourth of July Butterfly Counts. 1996 Report.* Morristown, North American Butterfly Association, Inc. [general]

1997d. Definitive destination: Mismaloya, Jalisco, Mexico. *American Butterflies* 5(4): 4-12, 14 figs. [general]

Warren, Andrew D., and Luis Lamberto González

1996. Rediscovery of *Dalla bubobon* in Michoacán, Mexico (Lepidoptera: Hesperiidae: Heteropterinae). *Tropical Lepidoptera* 7(1)(1): 68-70, 5 figs. (25 June) [taxonomy; distribution]

Warren, Andrew D., Isabel Vargas, Moisés Armando Luis and Jorge Enrique Llorente

1996. Mariposas diurnas de Jalisco. *Dugesiana* 3(1): 1-20 (July) [general; Mexico]

Weller, Susan J., Dorothy P. Pashley and Julie Ann Martin

1996. Reassessment of butterfly family relationships using independent genes and morphology. *Annals of the entomological Society of America* 89(2): 184-192, 3 figs., 3 tabs. (March) [general]

West, Brian K.

1996. *Hypanartia lethe* Fab., ssp. *demonica* Hübner, 1821 (Lep.:

Nymphalidae): A synonym designated a subspecies. *Entomologist's Record and Journal of Variation* 108(11/12): 289-290, pl. F (15 November)

1997. The enchanted building. *Entomologist's Record and Journal of Variation* 109(3/4): 77-79 (25 March) [general; behavior; Argentina]

Wetherbee, David Kenneth

1985. *The historical development of Comparative Zoology in the West Indies.* Shelburne, Author. 75 pp. [general]

1988. *Larval host-plants, mostly determined, of several Hispaniolan butterflies (Rhopalocera) and notes on some early stages.* Shelburne, Author. 20 pp., figs. [general]

1989a. *Sixth contribution on larvae and/or larval host-plants of Hispaniolan butterflies (Rhopalocera), and notice of "neoteny"-like pupa of* Pyrgus oileus *L. (Hesperiidae).* Shelburne, Author. 12 pp. [general]

1989b. *Summary of reputed larval host-plants of Hispaniolan butterflies, with some new determinations.* Shelburne, Author. 32 pp. [general]

1991. *Seventh contribution on larvae and/or larval host-plants of Hispaniolan butterflies (Rhopalocera), and nocturnal activity of adult* Hypanartia paulla *(Fabricius) (Nymphalidae).* Shelburne, Author. 13 pp., 3 figs. [general; Haiti, República Dominicana]

1992. *Eighth contribution on the larvae and/or larval host plants of Hispaniolan butterflies: The butterfly/larva flora with a theory of* Calisto *(Satyridae) origin and endemicity.* Shelburne, Author. 173 pp., figs. [general; Haiti, República Dominicana]

1996a. See Schwartz, A. & D. K. Wetherbee, 1996.

1996b. *Ninth contribution on larvae and/or larval host-plants of Hispaniolan butterflies, with explanation of* Ascia *migrations at Monte Cristi, and pupal mimicry of lizard modality by* Hamadryas, pp. 255-309. *In:* Wetherbee, D. K., *La Xaiba Prieta and La Xaiba Piñita (*Epilobocera, *Decapoda) in Hispaniola, and 20+ further contributions on Hispaniolan fauna.* Shelburne, Author. 465 pp. (9 December) [general]

1996c. *The* Hamadryas *(Nymphalidae, Lepidoptera) of Daubenton's 1765 Miscelenea* [sic], pp. 438-440, 1 fig. *In:* Wetherbee, D. K., *La Xaiba Prieta and La Xaiba Piñita (*Epilobocera, *Decapoda) in Hispaniola, and 20+ further contributions on Hispaniolan fauna.* Shelburne, Author. 465 pp. (9 December) [general; Haiti]

1996d. *Taxonomic woes of* Calisto hysia *(Godart 1819), with a sketch of the Baudin voyage (1797-1799) in the West Indies*, pp. 441-446, 2 figs. *In:* Wetherbee, D. K., *La Xaiba Prieta and La Xaiba Piñita (*Epilobocera, *Decapoda) in Hispaniola, and 20+ further contributions on Hispaniolan fauna.* Shelburne, Author. 465 pp. (9 December) [general; Hispaniola]

1997. A critical review of The Butterflies of the West Indies and South Florida. *Lepidoptera News* (Gainesville) 1997(3): 4-5 (15 September) [general; book review]

Wetherbee, David Kenneth, and Albert Schwartz

1996. *Summary of reputed host-plants of Hispaniolan butterflies*, pp. 403-437, 1 fig. *In:* Wetherbee, D. K., *La Xaiba Prieta and La Xaiba Piñita (*Epilobocera, *Decapoda) in Hispaniola, and 20+ further contributions on Hispaniolan fauna.* Shelburne, Author. 465 pp. (9 December) [general]

Whitaker, G. Warren

1996. See Johnson, K. et al., 1996.

White, Adolfo

1995a. See Maza, R. G. de la et al., 1995.

1995b. See Maza, R. G. de la et al., 1995.

Willmott, Keith Richard

1996a. See Hall, J. P. W. & K. R. Willmott, 1996a.

1996b. See Hall, J. P. W. & K. R. Willmott, 1996b.

1996c. See Torres, R. et al., 1996.

1996d. See Hall, J. P. W. & K. R. Willmott, 1996c.

Willmott, Keith Richard, and Jason Piers Wilton Hall

1997. The butterflies of Venezuela. Part 1: Nymphalidae I (Limenitidinae, Apaturinae, Charaxinae). A comprehensive guide to the identification of adult Nymphalidae, Papilionidae and Pieridae by Andrew F. E. Neild. 1996. *Tropical Lepidoptera* 8(1): 46 (5 September) [general; book review]

Winder, John

1995. See Harley, K. et al., 1995.

Winhard, Walter

1996. Konvergente Farbmusterentwicklungen bei Tagfaltern. Freilanduntersuchungen in Asien, Afrika und Südamerika. *Spixiana. Supplement* 21: 1-192, figs., tabs. (1 November) [general; mimicry]

Witte, Ludger

1996a. See Trigo, J. R. et al., 1996.

1996b. See Freitas, A. V. L. et al., 1996.

Wolf, Theodor

1892. *Geografía y geología del Ecuador. Publicada por órden del Supremo Gobierno de la República.* Leipzig, F. A. Brockhaus. 657 pp., 12 pls., 47 figs., 2 maps [*Pieris* sp.. *Libythea carinenta* (Cramer); migration]

Zalucki, Myron P.

1995. See Brower, L. P. et al., 1995.

Zanetti, Ronald, Evaldo Ferreira Vilela, José Cola Zanuncio and José Inácio Lacerda Moura

1996. Ritmo de atividade diária de vôo de *Brassolis sophorae* (L., 1758) (Lepidoptera, Nymphalidae). *Revista brasileira de Entomologia* 40(2): 245-248, 2 figs., 2 tabs. (30 June) [Brazil]

Zanuncio, José Cola

1986. See Anjos, N. dos et al., 1986.

1996. See Zanetti, R. et al., 1996.

Zanuncio, José Cola, Marcílio Fagundes, Teresinha Vinha Zanuncio and Alex Giovanny de Barros Medeiros

1992. Principais lepidópteros, pragas primárias e secundárias, de *Eucalyptus grandis* na região de Guanhães, Minas Gerais, durante o periodo de junho de 1989 a maio de 1990. *Científica* (Jaboticabal) 20(1): 145-155, 4 tabs. [general; Brazil]

Zanuncio, José Cola, Juliana Ferreira Garcia, Germi Porto Santos, Teresinha Vinha Zanuncio and Eduardo Candido do Nascimento

1990. Biologia e consumo foliar de lagartas de *Euselasia apisaon* (Dalman, 1823) (Lepidoptera: Riodinidae) em *Eucalyptus* spp. *Revista Arvore* 14(1): 45-54, 1 fig., 2 tabs. [egg, larva, pupa; host plant; predator; Brazil]

Zanuncio, José Cola, Germi Porto Santos, Teresinha Vinha Zanuncio and Martha R. Bressan Smith

1993. Levantamento e flutuação populacional de lepidópteros associados à eucaliptocultuta: VII - Região de Belo Oriente, Minas Gerais, junho de 1988 a maio de 1989. *Científica* (Jaboticabal) 21(2): 361-371, 4 tabs. [*Hamadryas amphinome* (Linnaeus), *Agraulis vanillae* (Linnaeus); Brazil]

Zanuncio, José Cola, Nelson Suplicy, Filho, Evaldo Ferreira Vilela and Abdon Braga de Faria

1979. Controle químico e microbiológico da *Euselasia apisaon* (Lepidoptera: Riodinidae) em condições de laboratório e de campo. *Revista Arvore* 3(1): 75-87, 8 tabs. [host plant; Brazil]

Zanuncio, José Cola, Nelson Suplicy, Filho, Evaldo Ferreira Vilela and Reginaldo da Silva Romeiro

1978. Caracterização bioquímica e patogenicidade do *Bacillus thuringiensis* à *Euselasia apisaon* (Lepidoptera: Riodinidae), em condições de laboratório. *Revista Arvore* 2(1): 51-60, 3 tabs. [host plant; Brazil]

Zanuncio, Teresinha Vinha

1990. See Zanuncio, J. C. et al., 1990.

1992. See Zanuncio, J. C. et al., 1992.

1993. See Zanuncio, J. C. et al., 1993.

Zaragoza, Santiago

1993. See Brailovsky, H. U. et al., 1993.

Zelich, Mateo R.

1997. Observaciones sobre el papiliónido *Euryades corethrus* (Boisd.). *Mariposas del Mundo* (Buenos Aires) 2: 23-25, 2

figs. (March) [host plant; Argentina]

Zimmer, Dieter E.

1996. *A guide to Nabokov's Butterflies and Moths.* Hamburg, Author. 214 pp., 75 figs. [general]

Zirlin, Harry

1997. Taxonomists just wanna have fun: Purplewings, bluewings, daggerwings and crackers. *American Butterflies* 5(4): 36-37, 1 fig. [*Eunica, Myscelia, Marpesia, Hamadryas*; Mexico]

CORRECTIONS

Adams, Michael Jan

1986. Pronophiline butterflies **(Satyridae)**...

Agassiz, Jean Louis Rodolphe

1846**a.** *Nomina systematica generum... Fasciculus IX. et X.* **[before 8 October]** [general]

1846**b.** *Nomenclatoris zoologici...* Solodurii, **J**ent et Gassmann. *Fasciculus XII.* **[29 December]** [general]

Aiello, Annette **[1941-]**

Andrade, Miguel Gonzalo **[1963-]**

Austin, George T. **[1943-]**

Beingolea, Oscar **Demetrio**

Berthold, Arnold Adolphe

1827. *Latreille's...* **[8 November]**...

Beutelspacher, Carlos Rommel, and Harry **Urad** Brailovsky

Blanchard, Chales Emile

1840. *Orthoptères...* **[26 December]**...

1844. Pl. 32... **[18 November]**...

1845b. *Sixième...* **[28 June]**...

Boitard, Pierre

[1826]. *Manuel...* **("1827", [30 December 1826])**...

Bonaterre, Pierre Joseph

1790-97. *Insectes...* [pls. 1-32, **[6 February]** 1790; 33-65, **21 November]** 1791; 66-145, **[1 October]** 1792; 146-268, **[9 February]** 1797]...

Borkhausen, Moritz Balthasar [1760-1806]

1797. See Fabricius, J. C. 1797.

Brailovsky, Harry **Urad [1946-]**

Bros, Emmanuel de [1914-**1997**]

Brower, Andrew Van Zandt **[1962-]**

Bullock, Dillman **Samuel** [1878-**1971**]

Butler, Arthur Gardiner

1873d-74a. *Lepidoptera... Morpho* ***zephyritis;...***

Callaghan, Curtis John **[1943-]**

Carpenter, Geoffrey Douglas Hale, and **Charles** Bernard Lewis**, Jr.**

Carvalho, José Cândido de Melo **[1914-1994]**

Chacón, Isidro A. **[1956-]**

Clench, Harry Kendon, Gary **Noel** Ross, **Charles** Bernard Lewis**, Jr.** and Eduardo Cecilio Welling

Costa, **Ramiro** Gomes

Coxey, W. Judson **[1887-?]**

Dal, Björn

1985. Grågiokar... *Svenska* ***Linnésällskapets Årsskrift*** 1984/5: 9-88, **figs.** [general; history]

Dalman, Johann Wilhelm

1823. *Analecta...* **[7 September]**...

Dierl, Wolfgang [1935-**1996**]

D'Orbigny, Charles Victor Dessalines [1806-1876]

Drury, Dru

1770-82. *Illustrations...* **([23 April]** 1770);... **([14 May]** 1773);... **([23 July]** 1782)...

Dudevant, Maurice [= Maurice Sand, pseudonym] [1823-1889]

1867. *Le Monde des Papillons. **P**romenade à travers champs. **O**rné de 62 déssins par l'auteur, avec une **préface** de George Sand...*

Edwards, Henry

1884. *Suborder...* **([1 November])**...

Erichson, Wilhelm Ferdinand

[1849]. *Insecten...* **["1848"; 10 March 1849]**...

Fabricius, Johan Christian

1775. *Systema entomologiae... ...P. menalcas, **P. actaeon;*** Neotropics]

1781-[82]. *Species...* 1-494 **([March] 1781)**; Appendix, pp. 495-514; Index: pp. 515-517 ("1781" **[28 September** 1782])...

1787. *Mantissa...* **([27 December])**...

1797. *Epitome...* **[authorship attributed to M. B. Borkhausen]**

1798. *Supplementum...* **([20 May])**...

1799. *Index...* **([12 December])**...

Farr, Thomas **H. [? -1996]**

Garraway, Eric, Audette J. A. Bailey, Thomas **H.** Farr and J. Woodley

Gerstäcker, Carl **Erhard** Adolph

Gilbert, Lawrence Edmund **[1942-]**

Gmelin, Johann Friedrich

1790. *Caroli...* **([6 December])**]...

Goeze, Johann August Ephraim

1779-83. *Entomologische...* **([4 December]** 1779),... **([16 December]** 1780),... **([29 November]** 1781),... **([30 October]** 1783)...

Gómez, Luis Diego **[1944-]**

Graham, Violet E. **[1911-1991]**

Gravenhorst, Johann Ludwig Karl Christian

1807. *Vergleichende...* **([19 March])**...

Gray, George Robert

1832. *[Descriptions...* 15(34) **([December])**

Griffith, Edward..., and Edward Pidgeon

1832a. *The tenth...* 15(34) **([December])**...

1832b. *Supplement...* 15(34) **([December])**...

Guérin-Méneville, Félix Edouard

1828. *Insectes...* **([13 December])**...

1844. *Dixième...* **([12 August])**...

Häuser, Christoph **Leonard [1959-]**

Handlirsch, Anton

1924. *Ordnung:...* **([25 September])**...

Harbison, Charles **Francis [1904-]**

Hardy, Robert William **Hale** [**?1794**-1871]

Hayward, Kenneth John

1943e. Estudios... *zoologica...*

Heitzman, John Richard, and Robert **Lynn** Heitzman

Heitzman, Robert **Lynn**

Hempel, Ad**o**lpho

Henderson, Robert W. **[1945-]**

Hering, **Martin Erich Richard**

Hering, **Martin Erich Richard**, and Walter Ernst Hopp

Holzinger, Ruth **[1921-1995]**

Illiger, Johann **K**arl Wilhelm

1801. Neue... *Insektenkunde...*

International Commission on Zoological Nomenclature

1958i. *Official list... First instalment...*

Johnson, Kurt

[1990]a. A revision of the South... *...F. strobilata, **F. auria***]

Johnson, Theodore **[=Theophilus] [1836-1919]**

Kaye, William James

1907b. Separation of *Heliconius...* [general; **new taxa: *H. microclea, H. vulcanus pyrforus***]

1919g. New sub-species...1918(3/4): **clx**-clxi...

Klug, Johann **Christoph** Friedrich

Krüger, **Eugen** [*nec* Eduard]

Küppers, Peter **Victor**

Lamarck, Jean Baptiste Pierre Antoine de Monet de

1801. *Système...* **([25 January])**...

1835. *Histoire...* **([December])**...

Lamotte, Maxime **Georges [1920-]**, and Patrick Blandin

Latreille, Pierre André

1803a. **([13 June])**...

1803b. **([13 June])**...

1803c. **([23 October])**...

1804. **([7 March])**...

1809a. **([20 March])**...

1810. **([23 May])**...

1811. **([22 November])**...

1813. **([24 September])**...

1816**a**. *Argynne*... (**[14 September]**)...
1816**b**. *Les crustacés*...
1817**a**. *Danaide*... (**[15 March]**)...
1817**b**. *Erycine*... (**[15 March]**)...
1817**c**. *Heliconien*... (**[13 September]**)...
1817**d**. Pl. E14... (**[13 September]**)...
1817**e**. *Insectes de l'Amérique*... (**[13 December]**)...
1817f. *Libythée*... (**[27 December]**)...
1818a. (**[30 May]**)...
1818b. (**[5 September]**)...
1818c. (**[5 September]**)...
1818d. (**[26 December]**)...
1819a. (**[13 February]**)...
1819b. (**[1 May]**)...
1824a. (**[17]** July)...
1825. *Familles*... (**[16 May]**)...
1829. *Les crustacés*... (**[11 April]**)...

Lepesme, Pierre **Charles** [1913-1957]
Lesse, **Jacques** Hubert de [1914-1972]
Lewis, **Charles** Bernard**, Jr. [1913-]**
Lindner, Erwin [1888-**1988**]
Linnaeus, Carolus
1767. *Systema*... (**[14 June]**)...
1771. *Regni*... (**[17 October]**)...

pp. 219-220: The 1993 and 1994 papers listed on p. 220 under"Llorente, Jorge Enrique, and Moisés Armando Luis" should be included after the penultimate line of p. 219, right column; on p. 220, the 1993 entry by "Llorente, Jorge Enrique, Moisés Armando Luis, Isabel Vargas and Jorge Soberón" should be listed after line 10 from above, left column.

Lucas, Pierre Hippolyte
1838. Papillon... (**[December]**)...
1839b. Pieride... (**[8 April]**)...
1857. *Lepidópteros*... (**[17 June]**) [a French edition...
Lutz, Adolfo [1855-1940], Hugo...
Marschall, August Friedrich Graf von
1873. *Nomenclator*... (**[3 December]**)...
Martín, Rafael **[1910-1987]**
May, Edward **George Last [1870-1956]**
May, Edward **George Last**, and Mário Rosa
Meuschen, Friedrich Christian [1719-**1811**]
Michelbacher, A**be Ezra [1899-]**, and Edward Shearman Ross
Miller, James **Stuart [1953-]**
Miller, James **Stuart**, and Paul P. Feeny
Miller, Lee Denmar
1986a. The relationship... **[P. petronius kerrianna]**
Monroe, Rose Sawyer, Gary **Noel** Ross and Roger N. Williams
Mooser, Oswaldo **[1903-1983]**, and Manuel García
Müller, Philip Ludwig Statius
1776. *Des Ritters*... (**[21 April]**)...
Neder, **Lilia** Estela, and Martha Gladys Arce
Neidhoefer, James R. [1917-**1995**]
Niepelt, Friedrich Wilhelm
1908e. Zwei neue... 213-**214**...
1909b. Neue... 54(1/**2**):...
Owen, Denis Frank **[?-1996]**
Perty, Joseph Anton Maximilian
1833. *Lepidoptera*, pp. 151-164 (**[December]**), pls. 29-32 (**[September]**). *In:*...
Plaumann, **Friedrich [=Fritz]** [1902-1994]
Popescu-Gorj, Aurelian **[1914-1997]**
Porter, Duncan M. **[1937-]**
Ramos, Julieta **[1940-]**
[Reichenbach, Heinrich Gottlieb Ludwig] [1793-**1879**]
Restrepo, Rubén **[1939-1996]**
Ridoutt, César Augusto **[1901-1956]**
Rivera, Lucio **[1937-]**
Rosa, Mário
1938. See May, E. **G. L.** & M. Rosa, 1938.
Ross, Gary **Noel**
Rzedowski, Jerzy **[1926-]**
Salazar, Juan **Aurelio**
Sallé, Auguste **[1820**-1896]
Sánchez, Rosa **[1935-]**
Schulz, **Stefan**, W. Francke, John A. Edgar and Dietrich Schneider
Schulze, **Leopold Ernst Paul** [1887-1949]
Scopoli, Giovanni Antonio
[1771]. *V. Observationes*... (**"1772", [22 August 1771]**)...
1777. *Introductio*... (**[13 April]**)...
Sharp, David
1899. *Insects*... (**[16 November]**)...
Sherborn, Charles Davies
1902. *Index*... (**[October]**)...
Shoumatoff, Nicholas **[1918-]**
Stahl, Agustín **[1842-1917]**
Sulzer, Johann Heinrich
1776. *Abgekürzte*... (**[21 April]**)...
Suplicy, N**elson**, Filho, Eloys J. Giacomelli, A. S. Sampaio and Antônio Orlando
Swainson, William, and William Edward Shuckard
1840. *On the history*... (**[December]**)...
Swezey, Otto Herman
1913. Miscellaneous notes... (**[22]** April)...
1923. Records of introduction... (**[4]** September)...
Travassos, Lauro Pereira, and Edward **George Last** May
Vaurie, Patricia **[1909-1982]**
Vázquez, Leonila [1914-**1995**]
Weber, Friedrich **[1781-1823]** [*nec* Friedrich August]
West, **Brian** K.
Westwood, John Obadiah
1837b-**[42]d.** *Illustrations*... 1: xxvi + 123 pp., 50 pls. (**[August 1837]**); 2: vi + 100 pp., 50 pls. (**[1840]**); 3: vi + 94 pp., 50 pls. (**[1842]**)...
1841-42a. *Arcana entomologica*... **1(1): 1-16, pls. 1-4 ([1 May 1841], (2): 17-32, pls. 5-8 ([1 July 1841]), (3): 33-48, pls. 9-12 ([1 September 1841]), (4): 49-64, pls. 13-16 ([1 November 1841]), (5): 65-80, pls. 17-20 (1 January 1842)**...
White, Adam [1817-1879]
Wiggins, Ira Loren [1899-**1987**], and Duncan M. Porter
Wood, John George
1863. *The Illustrated*... **[new species: *Morpho neoptolemus*]**
1874. *Insects*... (**[December]**)...
Wygodzinsky, Petr **Wolfgang** [1916-1987]
Zaragoza, Santiago **[1935-]**
Zschach, Johann Jacob
1788. *Museum*... (**[14 July]**)...

REVISED FAMILY LIST FOR LEPIDOPTERA

J. B. Heppner

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

The following family list supercedes my listing used in "Keys to Families of Lepidoptera" (1996. *Trop. Lepid.*, 4 (Suppl. 3):1-28). The reason for this involves the transfer of the family Ochsenheimeriidae from Tineoidea to Yponomeutoidea, due to confirmation that the pupa is lacking dorsal spines (Davis, pers. comm.): all known Tineoidea have spines. Consequently, family numbers from Amphitheridae to Epermeniidae are reduced by one number. Ochsenheimeriidae are now placed as family number 48, just before Glyphipterigidae. Also, added subfamilies include Oditinae in Lecithoceridae and Ypsolophinae in Plutellidae.

It may be well to also note here that recent splitting of some families is not necessary. Thus, differences that have been promoted to split Pyralidae into "Crambidae" and "Pyralidae" are no different in extent than between some subfamilies of Nymphalidae, Arctiidae, and Noctuidae, which also on occasion have been suggested should be split off to separate families. In each of these cases (Pyralidae, Nymphalidae, Arctiidae, and Noctuidae), I have placed such divisions as "Groups" within a family, a level between family and subfamily, thus maintaining a better integrity of family-level status relative to all Lepidoptera families. Likewise, four superfamilies (Tineoidea, Cossoidea, Papilionoidea, and Bombycoidea) have "Series" subdivisions added to preclude the need for unwarranted splitting of these superfamilies.

An item to also note includes the split of the Arctiidae subfamilies Ctenuchinae (all New World) and Syntominae (all Old World): these subfamilies are often combined by other workers but are divergent enough to be in separate subfamilies due to the lack of tympanal organs in Syntominae. Also, Noctuidae subfamilies are arranged according to the most recent research: subfamilies that are not listed involve tribes often elevated to subfamily status, particularly among some European workers, but this extensive splitting is unwarranted.

The controversy regarding flannel moths and slug caterpillar moths, and their relatives, should be noted further as well. Megalopygidae and Limacodidae are placed in separate superfamilies due to their ancestral lineages: their similar caterpillars are only homologous due to convergent evolution to similar feeding and defensive strategies, and are not similar because of some immediate common ancestor. Ditrysia are separated into two sections, Tineina and Cossina, due to early evolutionary divergence of the thoracic heart, positioned either ventrally (Tineina) or dorsally (Cossina). Thus, families Acrolophidae to Megalopygidae are all in the Tineina lineage and families Cossidae to Noctuidae are all in the Cossina lineage. Consequently, the Megalopygidae and Limacodidae are in different sections of Ditrysia and not in a common superfamily as some authors claim: their form is a matter of evolutionary convergence on a similar morphology, not an indication of a recent common ancestor. Flannel moths are related to burnet moths (Zygaenidae), while the slug caterpillar moth families (Dalceridae, Limacodidae, and Chrysopolomidae) are related to carpenterworm moths (Cossidae).

The sections of Ditrysia are each likewise split from early divergences into two subsections: Tineina and Sesiina in Section Tineina, and Cossina and Bombycina in Section Cossina. These early divergences into 4 lineages (2 in each major lineage of Ditrysia) shows why earlier classifications could not settle on where to place the most primitive families: the Tineina families in Tineoidea (like Acrolophidae and Tineidae) and in Sesioidea (like Brachodidae and Sesiidae), and the Cossina families in Cossoidea (like Cossidae and Tortricidae) and in Calliduloidea (like Ratardidae). Many authors placed these families near each other, since all show some primitive characters. Yet, when one follows the present classification, one can easily note the early divergences into the 4 subsections in a logical manner, with each of these subsections having primitive families retaining characteristics of some pre-Ditrysian ancestor. The present classification, thus, provides a logical phylogeny and arrangement of the families as they progressed from pre-Ditrysian ancestors to advanced groups, in each lineage having the originator groups still evident in the most primitive families and with each lineage then separately developing a phylogeny to the most advanced family within that lineage: thus Acrolophidae to Pterophoridae in Subsection Tineina, from Brachodidae to Megalopygidae in Subsection Sesiina, from Cossidae to Tortricidae in Subsection Cossina, and from Ratardidae to Noctuidae in Subsection Bombycina. Ratardidae-like moths, then, were the basic cossine-type ancestors of the butterflies and the higher macro-moths.

For further details, see my work entitled, "Classification of Lepidoptera. Part 1. Introduction" (1998. *Holarctic Lepid.*, 5 (Suppl. 1):1-120).

LEPIDOPTERA

Suborder ZEUGLOPTERA

MICROPTERIGOIDEA
1. MICROPTERIGIDAE
   - Mandibulate Archaic Moths

Suborder AGLOSSATA

AGATHIPHAGOIDEA
2. AGATHIPHAGIDAE - Kauri Moths

Suborder HETEROBATHMIINA

HETEROBATHMIOIDEA
3. HETEROBATHMIIDAE
   - Valdivian Archaic Moths

Suborder GLOSSATA

Cohort DACNONYPHA
Infraorder DACNONYPHA

ERIOCRANIOIDEA
4. ERIOCRANIIDAE
   - Sparkling Archaic Sun Moths
5. ACANTHOPTEROCTETIDAE
   - Archaic Sun Moths
   - Acanthopteroctetinae
   - Catapteriginae

Infraorder LOPHOCORONINA

LOPHOCORONOIDEA
6. LOPHOCORONIDAE
   - Australian Archaic Sun Moths

Cohort MYOGLOSSATA
Infraorder NEOPSEUSTINA

NEOPSEUSTOIDEA
7. NEOPSEUSTIDAE - Archaic Bell Moths

Infraorder EXOPORIA

MNESARCHAEOIDEA
8. MNESARCHAEIDAE
   - New Zealand Primitive Moths

HEPIALOIDEA
9. NEOTHEORIDAE
   - Amazonian Primitive Ghost Moths
10. ANOMOSETIDAE
   - Australian Primitive Ghost Moths
11. PROTOTHEORIDAE
   - African Primitive Ghost Moths
12. HEPIALIDAE - Ghost Moths
13. PALAEOSETIDAE
   - Miniature Ghost Moths

Infraorder HETERONEURA

Division MONOTRYSIA
Section NEPTICULINA

NEPTICULOIDEA
14. NEPTICULIDAE - Pygmy Moths
   - Pectinivalvinae
   - Nepticulinae
15. OPOSTEGIDAE - Eye-Cap Moths

TISCHERIOIDEA
16. TISCHERIIDAE
   - Trumpet Leafminer Moths

PALAEPHATOIDEA
17. PALAEPHATIDAE - Gondwanaland Moths

Section INCURVARIINA

INCURVARIOIDEA
18. INCURVARIIDAE - Leafcutter Moths
   - Incurvariinae
   - Crinopteryginae

19. CECIDOSIDAE - Gall Moths
20. PRODOXIDAE - Yucca Moths
    Lamproniinae
    Prodoxinae
21. ADELIDAE - Longhorned Fairy Moths
22. HELIOZELIDAE - Shield Bearer Moths

Division DITRYSIA

Section TINEINA

Subsection TINEINA

TINEOIDEA
Series Tineiformes
23. ACROLOPHIDAE - Tube Moths
24. TINEIDAE - Fungus Moths
    Nemapogoninae
    Scardiinae
    Euplocaminae
    Tinissinae
    Meessiinae
    Teichobiinae
    Dryadaulinae
    Setomorphinae
    Phthoropoeinae
    Myrmecozelinae
    Siloscinae
    Tineinae
    Erechthiinae
    Hieroxestinae
25. ERIOCOTTIDAE
    - Old World Spiny-Winged Moths
    Eriocottinae
    Compsocteninae
26. PSYCHIDAE - Bagworm Moths
    Penestoglossinae
    Taleporiinae
    Psychinae
    Oiketicinae
27. ARRHENOPHANIDAE
    - Tropical Lattice Moths

Series Gracillariiformes
28. AMPHITHERIDAE - Double-Eye Moths
29. SCHRECKENSTEINIIDAE
    - Bristle-Legged Moths
30. DOUGLASIIDAE - Douglas Moths
31. BUCCULATRICIDAE
    - Ribbed-Cocoon Maker Moths
32. GRACILLARIIDAE - Leafminer Moths
    Gracillariinae
    Lithocolletinae
    Phyllocnistinae

GELECHIOIDEA
33. OECOPHORIDAE - Concealer Moths
    Depressariinae
    Ethmiinae
    Peleopodinae
    Autostichinae
    Xyloryctinae
    Stenomatinae
    Oecophorinae
    Hypertrophinae
    Physoptilinae
    Chimabachinae
    Deuterogoniinae
34. LECITHOCERIDAE
    - Tropical Longhorned Moths
    Ceuthomadarinae
    Oditinae
    Lecithocerinae
    Torodorinae
35. ELACHISTIDAE - Grass Miner Moths
    Coelopoetinae
    Elachistinae
36. PTEROLONCHIDAE - Lance-Wing Moths
37. GELECHIIDAE - Twirler Moths
    Gelechiinae
    Pexicopiinae
    Dichomeridinae
38. BLASTOBASIDAE - Scavenger Moths
    Symmocinae
    Holcocerinae
    Blastobasinae
39. COLEOPHORIDAE - Casebearer Moths
    Coleophorinae
    Batrachedrinae
40. MOMPHIDAE - Mompha Moths
41. AGONOXENIDAE - Palm Moths
    Agonoxeninae
    Blastodacninae
42. COSMOPTERIGIDAE - Cosmet Moths
    Antequerinae
    Cosmopteriginae
    Chrysopeleiinae
43. SCYTHRIDIDAE - Flower Moths

COPROMORPHOIDEA
44. COPROMORPHIDAE
    - Tropical Fruitworm Moths
45. ALUCITIDAE - Many-Plumed Moths
46. CARPOSINIDAE - Fruitworm Moths
47. EPERMENIIDAE - Fringe-Tufted Moths
    Epermeniinae
    Ochromolopinae

YPONOMEUTOIDEA
48. OCHSENHEIMERIIDAE
    - Cereal Stem Moths
49. GLYPHIPTERIGIDAE - Sedge Moths
    Orthoteliinae
    Glyphipteriginae
50. PLUTELLIDAE - Diamondback Moths
    Ypsolophinae
    Plutellinae
    Scythropinae
    Praydinae
51. ATTEVIDAE - Tropical Ermine Moths
52. YPONOMEUTIDAE - Ermine Moths
    Saridoscelinae
    Yponomeutinae
    Cedestinae
53. ARGYRESTHIIDAE
    - Shiny Head-Standing Moths
54. LYONETIIDAE - Leaf Skeletonizer Moths
    Cemiostominae
    Lyonetiinae
    Bedelliinae
55. ACROLEPIIDAE
    - False Diamondback Moths
56. HELIODINIDAE - Sun Moths

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57. IMMIDAE - Imma Moths

PYRALOIDEA
58. HYBLAEIDAE - Teak Moths
59. THYRIDIDAE
    - Picture-Winged Leaf Moths
    Whalleyaninae
    Argyrotypinae
    Thyridinae
    Siculodinae
    Striglininae
60. PYRALIDAE - Snout Moths
    Group Crambinina
    Crambinae
    Schoenobiinae
    Cybalomiinae
    Linostinae
    Wurthiinae
    Glaphyriinae
    Dichogaminae
    Scopariinae
    Musotiminae
    Midilinae
    Nymphulinae
    Odontiinae
    Noordinae
    Evergestinae
    Pyraustinae
    Group Pyralinina
    Pyralinae
    Chrysauginae
    Galleriinae
    Epipaschiinae
    Phycitinae

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62. OXYCHIROTIDAE - Tropical Plume Moths
63. PTEROPHORIDAE - Plume Moths
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    Agdistinae
    Ochyroticinae
    Deuterocopinae
    Pterophorinae

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64. BRACHODIDAE - Little Bear Moths
    Pseudocossinae
    Brachodinae
    Phycodinae
65. SESIIDAE - Clearwing Moths
    Tinthiinae
    Paranthreninae
    Sesiinae
66. URODIDAE - False Burnet Moths
    Galacticinae
    Urodinae
67. CHOREUTIDAE - Metalmark Moths
    Millieriinae
    Brenthiinae
    Choreutinae

ZYGAENOIDEA
68. HETEROGYNIDAE
    - Mediterranean Burnet Moths
69. ZYGAENIDAE - Burnet Moths
    Zygaeninae
    Phaudinae
    Charideinae
    Chalcosiinae
    Anomoeotinae
    Procridinae
70. HIMANTOPTERIDAE
    - Long-Tailed Burnet Moths
71. LACTURIDAE - Tropical Burnet Moths
72. SOMABRACHYIDAE
    - Mediterranean Flannel Moths
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    Megalopyginae
    Trosiinae

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Subsection COSSINA

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    Hypoptinae
    Cossulinae
    Cossinae
    Zeuzerinae
75. DUDGEONEIDAE
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Tortricinae
Chlidanotinae
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Hibrildinae
86. CALLIDULIDAE
- Old World Butterfly Moths
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Callidulinae

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- Oriental Swallowtail Moths
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88. APOPROGONIDAE
- African Skipper Moths
89. SEMATURIDAE
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91. EPIPLEMIDAE - Crenulate Moths

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92. GEOMETRIDAE - Geometer Moths
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Ennominae
Geometrinae
Sterrhinae
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96. PIERIDAE - Yellow-White Butterflies
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98. RIODINIDAE - Metalmark Butterflies
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Danainae
Ithomiinae
Acraeinae
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Amathusiinae
Morphinae
Brassolinae
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103. CYCLIDIIDAE - Giant Hooktip Moths
104. DREPANIDAE - Hooktip Moths
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105. CARTHAEIDAE
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107. APATELODIDAE
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Stictopterinae
Sarrothripinae
Chloephorinae
Nolinae
Plusiinae
Acontiinae
Amphipyrinae
Psaphidinae
Agaristinae
Cocytiinae
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Acronictinae
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BOOK NEWS

COLLINS FIELD GUIDE: BUTTERFLIES OF BRITAIN & EUROPE

by T. Tolman. 1997. 320pp, 104 pl. (13 x 19cm). Harper Collins, London. £17.99 (cloth).

This new field guide for European butterflies and skippers basically replaces the well-known Higgins and Riley work of 20 years ago. It is well done, with excellent color plates: 440 species are illustrated in over 2,000 color figures. Range maps are adjacent to the text for each species account. As with older European field guides, this new one continues the unfortunate tradition of ignoring Georgia, Turkey and European Russia, as well as the new countries of Belarus and Ukraine, although the range maps do show extensions into these regions for species that occur there. A paper bound version is not indicated but is sure to follow, yet with 104 color plates the price of this new book certainly is a bargain even in the cloth edition.

DIE GROßSCHMETTERLINGE (MAKROLEPIDOPTERA) DER RASTATTER RHEINAUE: Habitatwahl sowie Überflutungstoleranz und Überlebensstrategien bei Hochwasser.

by C. Köppel. In *Neue Entomologische Nachrichten*, Vol. 39. 624pp (16 x 24cm). DM 160 (paper). Publ.: U. Eitschberger, Marktleuthen, Germany.

This work is the author's doctoral dissertation in natural history at the University of Karlsruhe, Karlsruhe, Germany. The text is in German, with a short English summary. The work summarizes an ecological and faunal study of the Lepidoptera of the Rastatter Rheinaue nature reserve, in the state of Baden-Württemberg, for the years 1992-94, in terms of comparing historical records with current biodiversity of the area for conservation needs.

A TAXONOMICAL AND ECOLOGICAL STUDY OF THE WINTER GEOMETRID MOTHS (Lepidoptera, Geometridae) FROM JAPAN

by H. Nakajima. 1998. In *Tinea* (Tokyo), Vol. 15, Suppl. 2. 246pp (60 pl.) (18 x 25cm). Cost? (paper). Publ.: Japan Heterocerists' Soc., Tokyo, Japan.

An excellent and authoritative review of the so-called winter moths of Japan. The plates include genitalia figures and some color plates of the adults and larvae. The work is in Japanese but there is a short English summary; plate legends are also in English.

THE BUTTERFLIES OF CANADA

by R. A. Layberry, P. W. Hall, and J. D. Lafontaine. 1998. 354pp, 32 pl. (21 x 28cm). Univ. Toronto Press, Toronto. $29.95 (paper), $100.00 (cloth).

A major large-format guide to the butterfly fauna of Canada, including nearly 300 species. Notes are included on biology and immature stages, hostplants, all subspecies, and distributions.

BUTTERFLIES OF NEW JERSEY:
A Guide to Their Status, Distribution, Conservation, and Appreciation

by M. Gochfeld and J. Burger. 1997. 330pp (13 x 19cm). Rutgers Univ. Press, New Brunswick, New Jersey. $20.00 (paper), 55.00 (cloth).

This regional field guide covers about 140 species of butterflies from New Jersey and nearby states. This excellent new guide emphasizes conservation of local species and is geared most to the so-called butterfliers.

MOTHS OF NEPAL. Part 5

edited by T. Haruta. 1998. In *Tinea* (Tokyo), Vol. 15, Suppl. 1. 314pp, pl. 129-160 (18 x 25cm). Cost: ca. ¥8,000 (paper). Publ.: Japan Heterocerists' Soc., Tokyo, Japan.

The 5th part of the series on the moth fauna of Nepal includes contributions from various authors on several moth families, with discriptions of new species interspersed in the catalog. The text is in English and is mainly a catalog of the collections from Nepal collected by H. Haruta. The excellent illustrations show the genitalia of new species as halftones, with adults on the color plates (plate numbering is sequential from in Part 1). As with the earlier parts, the treatment is disorganized and without any particular order within the series, families being treated repeatedly in each part as species seem to have been identified. Notwithstanding the title "Moths of Nepal," the current part includes a long article on the Noctuidae of the Himalayas region (by Hreblay and Ronkay, the only non-Japanese authors), and incongruently includes the descriptions of a number of new species endemic to Taiwan!

CATALOGUE OF THE BOHEMIAN LEPIDOPTERA

by I. Novák and J. Liška. 1997. In *Klapalekiana* (Prague), Vol. 33, Suppl. 159pp (16 x 23cm). Cost? (paper). Publ.: Czech Ent. Soc., Prague, Czech Republic.

All species of Lepidoptera known to occur in the province of Bohemia are listed, totalling 2,936 species. The catalog gives each name with the synonymy and authorship (in parentheses as needed), plus date of description. The notes section is in Czech and German; the introduction is in these languages plus English.

GLASFLÜGLERNACHWEISE IN ÖSTERREICH (Lepidoptera, Sesiidae)

by F. Pühringer. 1997. In *Mitteilungen der Entomologischen Arbeitsgemeinschaft Salzkammergut* (Gmunden), Vol. 2. 171pp (21 x 30cm). Cost? (paper). Publ.: Ent. Arbeitsgem. Salzkammergut, Gmunden, Austria.

This work is a distributional catalog of the clearwing moths of Austria, treating 46 species. All collection records are noted in detail for Austria. Distributional maps cover Austria in detail, plus additional maps showing ranges within Europe.

CONTRIBUTIONS TO THE KNOWLEDGE OF THE INSECTS OF THE PHILIPPINES, III

edited by W. A. Nässig, C. G. Treadaway, and J. Settele. 1998. In *Nachrichten des Entomologischen Vereins Apollo* (Frankfurt), Suppl. 17. 576 pp (15 x 21cm). Cost? (paper). Publ.: Ent. Verein Apollo, Frankfurt-am-Main, Germany.

This hefty third part of a series on the Lepidoptera of the Philippines continues a mixture of revisionary treatments on various families or genera. Several authors (mostly Germans) have contributed to this work, including papers on Sphingidae, Lasiocampidae, Saturniidae, Brahmaeidae, Sesiidae, Pyralidae, and Cosmopterigidae, plus one paper on Trichoptera. Earlier parts were in 1993 (Suppl. 12) and 1995 (Suppl. 14). Several color plates are included; texts are in English.

PASSINGS

† **David E. Gaskin**, 14 September 1998, in Guelph, Ontario, Canada. He was a well-known specialist of crambine Pyralidae. He was a professor at the University of Guelph for many years, formerly living in New Zealand. He was a charter member of ATL.

† **James R. Merritt**, 20 May 1998, in Louisville, Kentucky, USA. He was a Charter Member of ATL, as well as of the Lepidopterist' Society.

MEETINGS

1998 **Southern Lepidopterists' Society**, October 3-4, Gainesville, Florida, USA

1999 **Association for Tropical Lepidoptera**: April 16-18, Gainesville, Florida, USA
Lepidopterists' Society, August 4-8, Sierra Vista, Arizona, USA

2000 **Association for Tropical Lepidoptera**: April 14-16, Gainesville, Florida, USA
Societas Europaea Lepidopterologica, June?, Bialowieza Forest, eastern Poland

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