

ELSEWHERE LEPIDOPTERA SOCIETY

Lepidoptera Guide



EXOTIC BUTTERFLIES

A. *Papilio astorae* (Assam, India).
 B. *Papilio asmeanus* (Malacca).

B. *Graphis cypria* (Assam, India).
 E. *Papilio eun* (Assam, India).
 G. *Zymphidra Maliana* (Assam, India).

C. *Antiochana cinnabara* (Assam, India).
 F. *Papilio arystus* (Siam).

ABOUT

September 2012

*Lepidoptera is the large order of insects that includes butterflies and moths. It is one of the most widespread and widely recognizable insect orders in the world.

Dear Reader,

This booklet is a carefully compiled field guide to Elsewhere Lepidoptera, as well as to butterflies and moths in general. All info contained in the booklet is culled from the Elsewhere collection.

The curated environment of Elsewhere is an extremely bio-diverse habitat, fit for all kinds of creatures. It contains numerous micro-climates and has a long and quiet winter hibernation season. There are also abundant food sources and minimal predators. As a result, within this closed system, many native and non-native butterflies and moths flourish. Because of this unique confluence of conditions, I came to Elsewhere to locate, observe, and document these Lepidoptera.

During my initial expeditions around and through the site, I found several previously documented species, along with some newly evolved species endemic to the current building and its environs. Many of these species can be seen in the adjacent collection case, as well as in their natural habitats in and around the building.

We hope you enjoy this guide (and exploration, should you chose to go on a Lepidoptera safari!)

Sincerely,

Ann Armstrong
Elsewhere Lepidoptera Society Founder
www.lepidopterasociety.wordpress.com
www.butterflybombing.blogspot.com

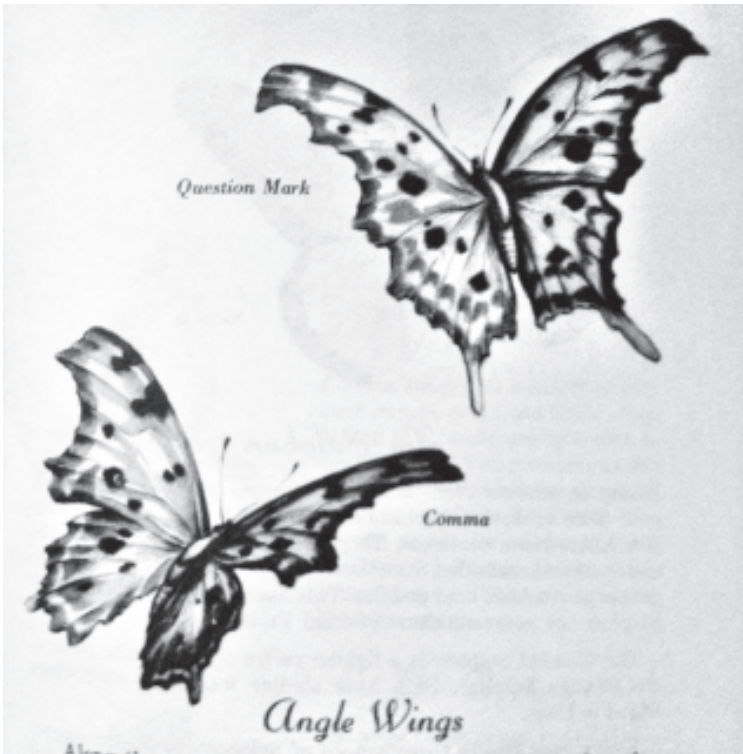
MANIFESTO

“Preservation through Appreciation”

1. We believe in the active study of, and engagement with, our natural and man made surroundings. We are perpetually fascinated with how these two worlds interact.
2. The further we slow down, the closer we observe, and the more fully we listen—the more we can experience. The more we experience, the more human we become.
3. We believe in science and think that what our predecessors observed and studied before us has value. Even so, we believe interacting with the greater world around us is even more valuable, so, we encourage questioning, conjecture, and experiential research. Seeing is believing.
4. We believe in art—because it can tell a story, teach us new things, fill in gaps and reveal the unexpected.
5. We search for the possibilities that appear when science and beauty intersect.
6. We believe our greatest joy is found the act of discovery.
7. Last but not least, we believe the observation of butterflies and moths contributes to all of the above.

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-Above: Childrens Illustrated Treasury of Knowledge Vol. 2, 1960
-Cover Image:Our Wonder World, The Nature Book 1918

PART 1: LEPIDOPTERA OBSERVED AT ELSEWHERE

*NOTES ON THIS CHAPTER:

- *Species that are currently viewable in the Elsewhere region are shown in italics
- * Not all species have been identified.

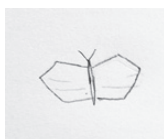
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Charta Verbosa (paper wordy)



This carmel colored butterfly, known for its angular wings, is endemic to the widening expanses of exposed lath throughout Elsewhere. A subspecies, slightly lighter in color, evolved during the 1960's. This variation occurred when a small population lived in isolation on the third floor for 40 years.

Muralis Chartarius (wall papery)



This moth species sequesters itself in the higher elevations of Elsewhere. It's habitat, exposed plaster, is shrinking day by day and as a result sightings are becoming rare. Even so, you may find this subtle creature hovering amongst the falling wall paper in the ghost room on the third floor.

Ferrum Commenticius (steel forged)



This butterfly species is one of the hardiest of the Elsewhere lepidoptera family, and can only be found on the exterior perimeter of Elsewhere (outside). Their dark silhouette, a remnant of when coal was used to heat buildings, makes them hard to find, but once you do, their sharp hind and fore wings make them easy to identify.

Serico Helvus (silk creamy)



This diaphanous cream colored moth can be seen near the many fabric forests that abound here at Elsewhere. It does its best to blend into it's surroundings, but it can still be seen from the 1st to 3rd floors.

Acetabulum Tinea (dish moth)



Discovered by insect afficiando David Dotson in 2007, the delicate dish moth and its straw-like antenna can often be found roosting above the Elsewhere kitchen sink overseeing household tasks.

Vellus Caldarius (fur warm)



The fuzziest of the Elsewhere moths, the Vellus is known for it's prolific fur, as well as for its coppery red antenna.

Reddo Rimosus (mirror cracked)



This reflective creature used to populate the mirror forest on the second floor. This was a hospitable habitat until the spiders moved in and began spinning webs. The Reddo did its best to survive, but the spiders made too many meals of their butterfly eggs.

Crustulum Dromonem (cookie cutter)



This butterfly was found in the kitchen, hibernating with a large group of cookie cutters. This silver colored species is extremely sociable, and makes friends with all walks of life, lepidoptera and non-lepidoptera alike.

Habena Aeneus (holder brass)



This butterfly was found hovering above the circulation desk. Still, very little is known about its habits or habitats. However, we do know that it is the largest butterfly in the Elsewhere collection, reaching nearly 12" in wingspread.

Gemma Purpurius (jewel purple)



This particular species was found hiding in the accessories drawer in the wardrobe on the second floor. One of the more vibrant Elsewhere species, it is known for it's variegated purple coloring and its ornamental wing patterning.

Necto Hirsutus (tie hair)



This tiny butterfly can usually be found fluttering around peoples' heads.

PART II :
NAMING AND COLLECTING

Source: Biology of Animals, 1972

Some General Background...

Taxonomy: The science of finding, describing, classifying and naming organisms.

Order: a taxonomic rank used in the classification of organisms

Species: Collection of individuals or populations sharing the same gene pool.

Carolus Linnaeus (1707-1778): A Swedish botanist, that gave us the modern scheme of classification. He worked out a fairly extensive system of classification for both plants and animals that was published in his classic work *Systema Naturae*, which had gone through 10 editions by 1758. Linnaeus emphasized structural features and he believed strongly in the permanence of species. He divided the kingdom down to species, according to his scheme, each species was given a distinctive name. Many of his schemes have been drastically altered over time, yet the basic principles are followed to this day. The four units, or taxa, he recognized: class, order, genus, species.

Linnaeus adopted the use of two names for each species: the genus name and the species name. These words are from Latin or in Latinized form because Latin was the language of scholars and universally understood. The generic name is usually a noun, and the specific name an adjective. This usage of two names to designate a species is called *binomial nomenclature*.

For instance, for the Monarch Butterfly:

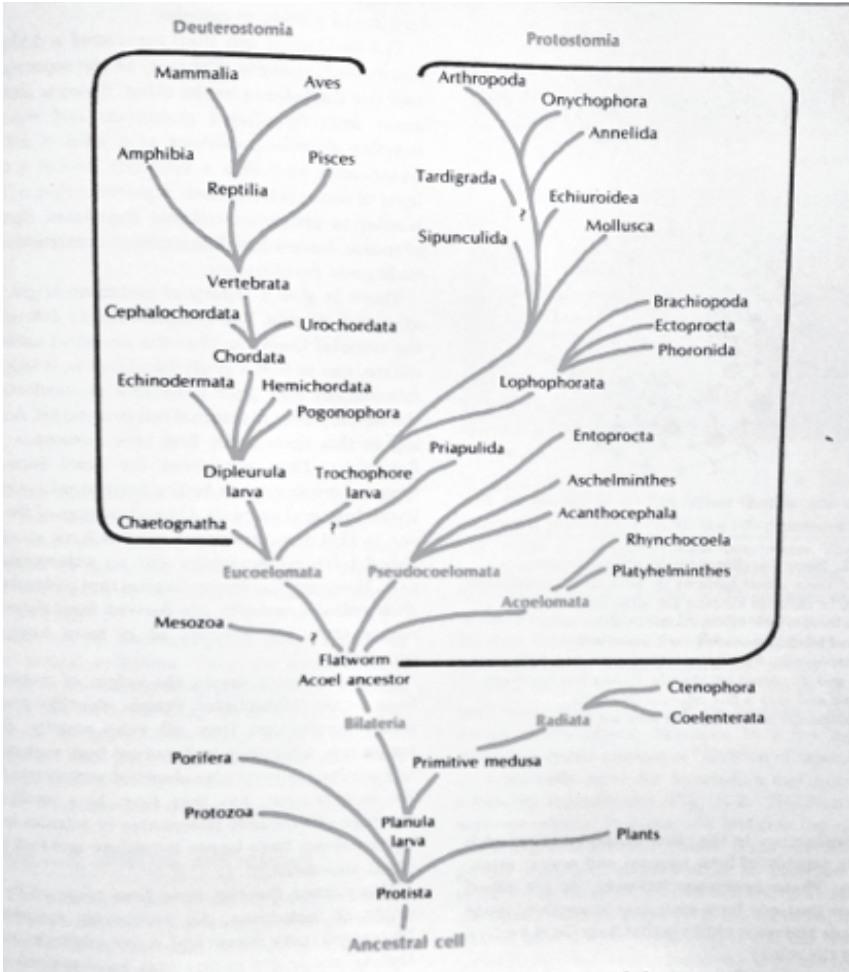
Kingdom: Animalia
Phylum*: Arthropoda
Class: Insecta
Order: Lepidoptera
Family*: Nymphalidae
Genus: Danaus
Species: Danaus plexippus

*Phylum and Family are post Linnean taxa.

****It is interesting to note that Linnaeus coined the term *Lepidoptera* as well.**

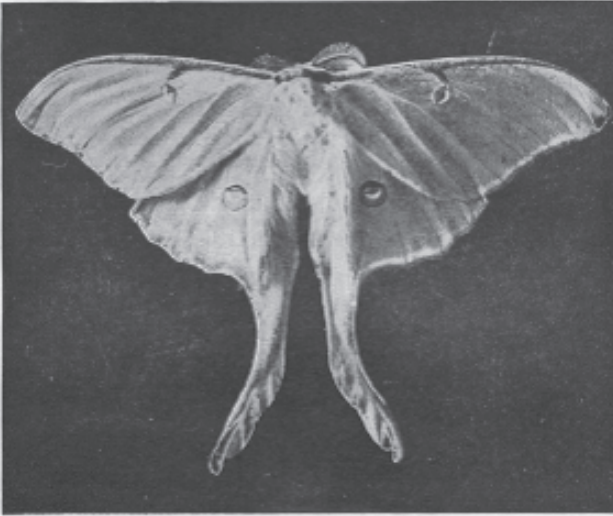


Source: Biology of Animals, 1972



The Concept of Phylogeny (Hypothetical)

TRAMPS AFIELD



THE LUNA MOTH, A PRIZE HIGHLY VALUED BY THE COLLECTOR

Boxes. Boxes for the preservation of specimens are made with a tongue on the edges of the bottom fitting into a groove upon the lid, or they may be made with inside pieces fastened around the inner edge of the bottom and projecting so as to catch the lid. The accompanying outline shows one method of joining the parts of a specimen box. The bottom of the box should be lined with some substance which will enable the specimens to be pinned into it securely. For this purpose sheet cork about a quarter of an inch thick is to be preferred to all other substances. Boxes should

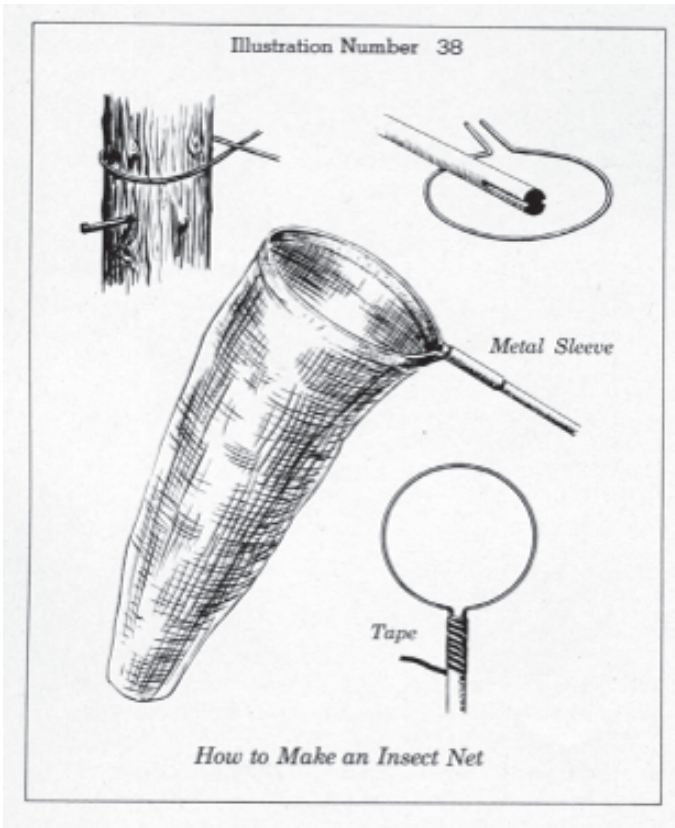


DETAIL OF CONSTRUCTION O

be made of light, thoroughly seasoned wood, and should be very tight. They are sometimes made so that specimens may be pinned both upon the top and the bottom, but this is not to be commended. The depth of the box should be sufficient to admit of employing the longest insect pin in use, and a depth between top and bottom of two and a quarter inches is therefore sufficient.

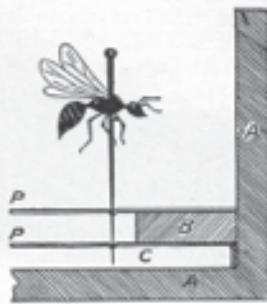
**NOTE: The Elsewhere Lepidoptera Society is not encouraging the capture or pinning of any live insect. These excerpts are only included for their historical value. We instead encourage you to look for lepidoptera that have already completed their life cycle or to make your own.*

Source: Nature Encyclopedia of America, 1954



HOW TO ARRANGE AND LABEL

"The beginner who has not a long purse will do well to preserve his collections in boxes such as have been described. They can be obtained



OF BOXES, AND METHOD OF PINNING

quite cheaply and are most excellent. Cabinets are more or less of a luxury for the amateur, and are only a necessity in the case of great collections which are constantly being consulted. The boxes may be arranged upon shelves. Some of the largest and

best collections in the world are preserved in boxes, notably those of the United States National Museum.

"*Labeling.* Each specimen should have on the pin below the specimen a small label giving the date of capture, if known, and the locality.

Below this should be a label of larger size, giving its scientific name, if ascertained, and the sex. Labels should be neat and uniform in size. A good size for labels for large species is about one inch long and five eighths of an inch wide. The labels should be written in a fine but legible hand. Smaller labels may be used for smaller species.



ARRANGEMENT OF SPECIMENS IN CASE

A crowquill pen and India ink will be found best suited for the purpose of writing labels.

"*Arrangement of Specimens.* Specimens are best arranged in rows.

PART III :
GENERAL LEPIDOPTERA FACTS + SCIENCE

Source: The Boyscout Handbook, 1980

THE SIX-LEGGERS

Squat down anywhere outdoors and look down and around. Soon you will see small, six-legged creatures moving about.

Six legs and three sections to their bodies are the way you tell the half-million kinds of insects on this earth. Spiders are sometimes mistaken for insects. But look at them closely. Notice their eight legs and bodies with two parts, and you can rule them out of the insect kingdom. And what a kingdom!

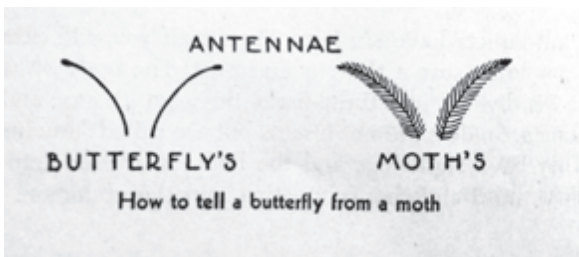
INSECTS RULE THE WORLD. Rattlesnakes are dangerous. Yet, more people are killed each year through the bites of some mosquitoes. Rodents destroy the farmers' fields. But they are not as bad as grasshoppers. Fire wastes acres of forests and thousands of houses. But that is nothing compared with the damage done by bark beetles, gypsy moths, termites.

Man spends millions of dollars every year to keep down the billions of dollars' worth of damage done by insects. The situation is not all bad, though. The help we get from many insects outweighs the harm the others do.

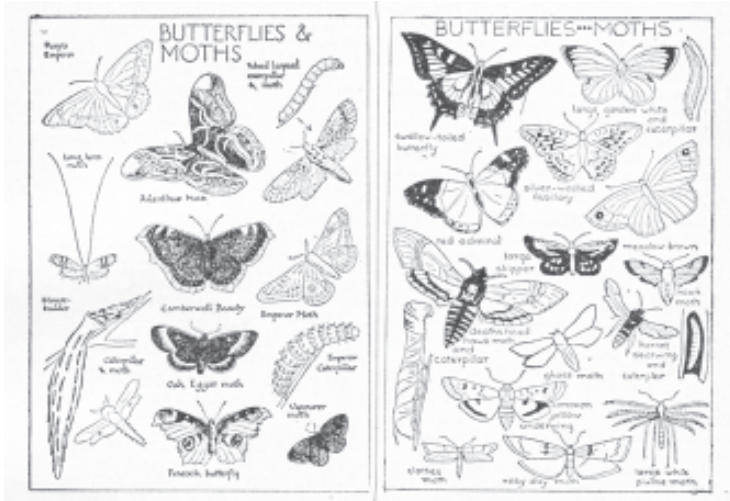
BUTTERFLIES AND MOTHS. Butterflies and moths are the most beautiful insects. They all have four broad wings that are covered with tiny scales.

How can you tell butterflies and moths apart? This way: Butterflies fly around in the daytime. Moths fly at night. Most butterflies at rest hold their wings straight up. Most moths keep theirs out flat or curled around their bodies. Butterflies have antennae or feelers on their head shaped like tiny clubs. Moths have thread-shaped or featherlike antennae.

Source: The Girlscout Handbook, 1947



Source: The New American Encyclopedia Illustrated, 1945.



Butterfly, common name for a group of insects which together with moths constitute the insect order Lepidoptera. Butterflies differ from moths in being diurnal, instead of nocturnal; antennae of butterflies are club-shaped, while those of moths are fine and thread-like; in resting, wings of butterflies are carried erect, while wings of moths are folded over the abdomen. Butterflies are found all over the world, over 40 species having been found within the Arctic Circle, but they are most numerous in tropical countries, especially S.A. Life history has four stages: egg, larva, pupa or chrysalis, adult. The larva or caterpillar moults several times before passing into pupal stage. There are 5 principal families: Nymphalidae, Lemoniidae, Lycaenidae, Papilionidae, Hesperidae; over 13,000 species have been listed. Some butterflies migrate thousands of miles. The *Monarch* variety, abundant in U.S., fly southward in autumn in enormous flocks; a few have reached England. The small, yellow *Terias Lisa* has been marked as flying from N.A. to

Bermuda, 6000 mi.; the *Painted Lily* flies in clouds from N. Africa to Europe, and to Iceland. In Calif. in 1924 a flight of this variety 40 mi. wide took 3 days to pass, at a speed of 66 m. per hour; a scientist estimated the flight contained 3000 million butterflies. Butterflies are fighters; the males, having assumed possession of a selected area, will defend it against all comers, including small birds.



BUTTERFLIES, MOTHS, AND OTHER INSECTS

THE LIFE OF A BUTTERFLY

A SKETCH OF HIS LIFE

Aught unsavory or unclean
Hath my insect never seen;
But violets and bilberry bells,
Maple sap and daisies,
Grass with green flag half-mast high,
Succory to match the sky,
Columbine with horn of honey,
Scented fern and agrimony,
Clover, catchfly, soldier's-tongue,
And briar roses dwell among.

EMERSON.

EVERYBODY knows a lion from a dandelion, but not everybody knows the name of just one moth or beetle or butterfly. Now there are a few things which live outdoors that everybody, every intelligent body, ought to know by name. There are hundreds of butterflies that I don't know and that you don't know; but I do know the milkweed or monarch butterfly, and so ought you.

The monarch is an American and found all over the continent as far north as Canada. He is four or five inches across, of bright orange, brown, and black, and is to be seen from May until late October, but is most easily found in July and August upon the milkweeds.

His life begins as a tiny but curious egg laid

upon the leaf of the milkweed, which hatches into a tiny caterpillar with a skin that won't grow and so has to be burst through and left behind when the body gets too big for it. Children sometimes look like their parents, but this little larva (caterpillar) looks about as much like a butterfly as you do.

After a week of ravenous feeding it again outgrows its skin and comes out a strikingly marked worm with black, yellow, and green rings, as you see in the photograph (page 309).

Four or five times this molt takes place before the caterpillar is full grown.

"After the last of these larval molts," says Mr. Weed,¹ "the caterpillar feeds for a week or ten days. Then apparently the prodigious appetite it has shown throughout its life becomes satisfied, for the insect becomes restless and wanders about. It is searching for some sort of shelter where it may spend the quiet pupal period, when it will be utterly helpless to escape the attack of its many enemies. Having found a sheltered corner of a fence, or some similar situation, it proceeds to spin a silken web upon the under side of the chosen board, in which a little later it entangles its feet and hangs downward preparatory to becoming a chrysalis.

"In this position it remains for some hours — perhaps a day — the body juices gravitating

¹ "Nature Biographies." By permission of Doubleday, Page & Co.

downward and causing a swelled appearance on the lower segments. Then the skin splits apart again, and it is wriggled off by the contortions of the body.

"When it finally drops away, there is left a strange-looking creature, broader below than above. This is a transition stage that lasts but a very short time; soon the form is entirely changed, so that the broadest part is above instead of below. The definite outline of the chrysalis is soon taken on, the oster tissues hardening into a distinct covering. The insect now looks like the picture of the chrysalis (page 311); in color it is a beautiful green with wonderful golden spots upon its surface, and a few black spots just below the black cremaster by which the chrysalis is connected with the web of silk upon the leaf.

"In this quiet chrysalis the insect remains for nearly a fortnight. Then the structure of the forthcoming butterfly begins to show through the thin outer covering, and you know that the period of the chrysalis is nearly ended. If you keep watch, you will probably see the sudden bursting of the outer envelope and the quick grasping of its surface by the legs of the newly emerged butterfly. Its wings at first are short and crumpled, bearing little resemblance to those of the fully developed butterfly. But as it hangs there with one pair of legs holding to the empty chrysalis and the other to the leaf above, the wings lengthen, hanging limply downward as the body juices penetrate the veins. A little later they expand in the other direction, the hind wings reaching full size before the front ones.

"Finally both pairs of wings are fully expanded, and the butterfly is likely to walk to the top of the support, where it rests for an hour or two while its tissues harden, before it attempts to fly."

POINTS FOR STUDY

That is the outline story of the monarch's life. But how little it really tells! Wonderful as is the change from grub to butterfly, still more wonderful are its ways of life that you can watch for yourself.

You see one flitting along and alighting for an instant upon a leaf of young milkweed; then

it is off to another. Mark the leaf and look under it — a tiny milk-white egg, smaller than a mustard seed, glued to the under side of that leaf, an egg which under the microscope in your hand shows a sugar-loaf shape with beautiful markings.

How did she know that that weed was milkweed? She cannot see well for all her thousands of lenses in her compound eyes. She can smell marvelously well with her two noses at the ends of her antennae (or feelers); but there were no flowers to smell on the plant. How did she know? Please study that question out for us.

Then she always chooses a milkweed, with one exception — the dogbane, a close relative. Try to find her egg on some other plant.

Then the monarch has been seen in vast flocks like swallows, sailing out to sea as if bound for Bermuda or South America — as perhaps they were. I want to see that sight some day, and so do you.

Then the flight of the creature! Did you ever see one in a gale of wind, holding its own above the summer tree tops? The monarch loves a blow, loves to spread her wide wings and conquer the elements in the air.

Oh, look at those wings under your microscope — see them, rooed as it were with shinglelike scales which give them color; find the scent pouch too on the upper surface of the hind wings of the male, and study what it may be for.

Watch to discover what birds eat the monarch. As a matter of fact it is extremely nauseous to birds, so that they let it alone — monarch indeed!

This fact has led to a most interesting case of what we call "protective coloration"; for another smaller butterfly, the viceroy, thrives because it looks so much like the monarch that, though sweet as a nut to the taste of birds, it is let severely alone. You can tell the difference between the two by the extra black cross bands on the viceroy's hind wings.

Don't kill the monarchs, for they are friends. But get Mr. Scudder's "Life of a Butterfly" and read it. Then in your cage place fresh milkweed leaves and raise by hand the caterpillar, and watch with your own eyes one of the

most marvelous of Nature's magic works — the birth of a butterfly.

TWO CURIOUS TRICKS OF THE VICEROY CATERPILLAR

The butterfly is lovely; but the caterpillar is, too, when you come to think him lovely, in your mind, as you can when you really get acquainted with things and so get interested in them.

The butterfly that looks on the wing exactly like a smaller red brown monarch is the viceroy. Late in the summer you will find him sipping cider from the fallen apples under the trees. Besides knowing him by sight, there are two interesting things performed by the caterpillar that every Nature lover ought to see.

THE SWINGING PACKET

"Soon after birth," writes Mr. Scudder, "when it has eaten but a very few swaths down the leaf, the little fellow constructs a small and loose packet from minute bits of leaf and other rejectamenta, loosely fastened to one another and to the midrib, close to but scarcely touching the eaten edge of the leaf; and as fast as the leaf is eaten it removes this packet (continually added to until it becomes almost as big as a small pea) farther and farther down the midrib away from its perch, always keeping it near the eaten edge. It should be noted that it is so loosely attached (the bits of leaf at all possible angles) that it is moved by the least breath. Meanwhile the caterpillar has been growing larger and more conspicuous, and thus in greater peril from its enemies. There are two possible services that this odd packet may render.

"It should be remembered that the leaves preferred by these creatures as food are mostly such as are easily shaken by the wind, and as the caterpillar moves with the leaf and with all the surrounding leaves, in a continual fluttering in the case of the trembling aspen, and to a less degree in the other food plants, this of itself is a protection to it, as it would more readily escape observation as an object distinct from the leaves, all being in motion together; but on the more stable leaves, like the willow,



CATERPILLAR OF THE MONARCH BUTTERFLY FEEDING ON MILKWEED

the motion in a feeble wind would not be sufficient to be serviceable, and here, at least, the packet comes into play. *An object in motion among others at rest is a noticeable thing — a fact well recognized among animals, as a host of them show when they fear being seen.* This packet attached by loose silken threads moves, as stated, with a breath of wind, and so would *distract attention* from its architect near by, who has taken pains to place it at the farthest remove from his perch, while still (to avoid undesirable steps) on his daily track. If this be really its object, it is surely one of the oddest devices in Nature."

THE VICEROY'S WINTER HOUSE

There are two broods of viceroys a year. Those that come to wing in August lay eggs



MAGNIFIED SECTION OF BUTTERFLY WINGS, SHOWING ARRANGEMENT OF SCALES

SOME OF THE MOTHS YOU OUGHT TO KNOW

WHAT the butterflies are to the day the moths are to the night, for one of the characteristics of the moth family is the night flying of most of them. When

"The winds are wist and the owl is still
The bat in the shelvy rock is hid,"

go out for the butterflies; but for moths you will wait until the twilight falls and the bats come out, and the whip-poor-wills begin their night-long calling.

In the blinding sunlight on the snowy peak of Mt. Hood I found the little *Vanessa* butterflies playing on the wind; so down in the deepest, darkest midnight swamp you will find great wide-winged moths of marvelous colors flapping softly through the gloom.

There are flowers that open by day and others that open only at night. The day flowers have their insect friends; so do the night flowers have theirs. If you will watch by the honeysuckles, or the trumpet creeper, or the big, rank flowers of the Jimson weed in the dusk, you will see the shadowy, whirring wings of some large insect hovering over the long tubes; and looking closer you will see the creature's tongue like the long bill of a humming bird reaching into the honey depths of the blossoms. The flying visitor is one of the moths, one of

the sphinx or hawk moths perhaps, as many of the other large moths do not eat at all after the caterpillar stage.

They are not only gatherers of sweets, but they are also pollen bearers, carrying the life-giving dust from flower to flower, as bees do in the clover and cucumber fields; and so dependent are several of the long-tubed or spurred flowers upon the night-flying moths for the fertilizing of their seeds that they would perish from the fields without them.

These flowers with long tubes have nectar at their bases, and pollen sacks so placed that they must come into contact with the moth's head or eyes when his proboscis or tongue is pushed to their depths. You will find a most interesting account of this dependent relationship in William Hamilton Gibson's "My Studio Neighbors" (pages 171-224).

THE DIFFERENCE BETWEEN MOTHS AND BUTTERFLIES

There be Insects with little *Aveses* peaking out before their eyes, but weak and tender they be, and good for nothing; as the Butterflies. — PLINY (Philemon Holland's Translation).

Most people think there are toadstools and mushrooms — two *different* kinds of plants; and most people think of butterflies and moths as butterflies only. Now toadstools and mushrooms are two names for one thing — but moths and butterflies are two names for two things. They both belong to the order Lepidoptera (*Lep'-i-dop'-ter-a*), that is, the scale-winged insects (look at the wings with your pocket microscope); but the moths (1) mostly fly at night; (2) they have feathered antennae, never threadlike and knobbed on the end like the butterflies; (3) they have *stout*, hairy bodies; (4) they do not fold their wings above the back when resting; (5) the chrysalis is never naked or angular, but rounded and protected by a covering — generally a cocoon — though some caterpillars burrow underground, letting the earth take the place of cocoon.

But the best field marks of the moths are the night-flying habits, the feathered antennae, and the position of the wings when at rest, which are either spread or folded against the body.



CATERpillars OF BROWNTAIL MOTH CRAWLING UP A TREE

The shaded portion of the trunk is black with the pests.

A GROUP OF MOTH PESTS

It is not scientific but it is perfectly natural to group things, as you think of them, according as to how they are related to you. And you come to have very pronounced feelings for things where they are so closely related to you as

the moths are. No family group in all the animal world is causing me so much trouble as the moths.

Early in the summer the tent-moth caterpillars swept like a fearful fire from the skeleton branches of the wild cherry into my apple trees, then over the grass into the shade and hillside trees, climbing the stone walls, wiggling up every path, scaling the sides of the house in untold numbers to leave their dusty whitish cocoons over the grass, over the fences, outside and inside the house itself.

I shall lose some of my precious old orchard trees on account of them, — to say nothing of all my apple crop this year — and the ghostly, leprous look of all the orchard until cleaned of their nasty webs! That is the work of *one* moth — the tent caterpillar.

THE BROWNTAIL

Worse than the tent caterpillar is the wretched browntail, blighting every branch it touches, and with its fine, prickling hairs poisoning the skin, as you work among them, with a fiery itch that burns as burns the rash of poison ivy or sumach. All winter long, whenever chance offered, I was out with a long-handled tree trimmer cutting off the cocoons or nest webs of the browntail that dangled full of live young caterpillars from the tips of my apple and white-oak twigs.

THE GYPSY

But worse than either of the other two is the terrible gypsy moth, brought over here and allowed some years ago to escape. To-night (July 21) the oaks and pines all around my house are bare because of them. All over each tree are the long, hairy caterpillars and bunches of cocoons up and down the tree trunks at the base of the branches, and already the white moths are hatching and laying the big yellow patches of eggs for the next year's destruction.

THE COBBLING MOTH, AND OTHERS

But these terrible and triumphant three are not all. Yesterday all the clothes — winter

overcoats, etc. — were brought out into the yard, hung on the line, brushed, sunned, and repacked in camphor — at great labor. Why? Because of a mean little moth (the clothes moth), so small that he runs over your garments and into the folds almost before you can see him.

And there is the apple codling moth that destroys more of my apples yearly than all the family eat. Then there is the wax moth that over and over again has got into my beehives, tunneled through the combs, and destroyed the whole bee colony.

Then — but there is hardly any end to this group of moth terrors, for that is the way I think of them and group them, though they represent several of the ten moth families.

THE SILK MAKERS

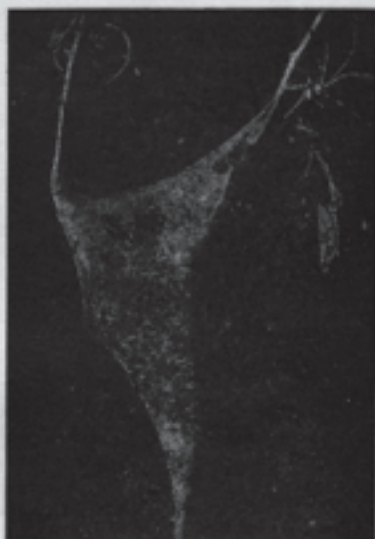
Not all the moths, however, are of this destructive nature. Among the most useful of all the animals that man has learned to adapt to his needs is a moth — the Chinese silk moth.

There are several small silk-moth "farms" in this country, and I recall a time when all the people in my neighborhood began planting mulberry trees with the idea of raising the caterpillars and making silk; but the venture has never yet succeeded in the United States because it costs too much to unwind the long, fine thread of silk from the cocoons. Labor is not so high-priced in China.

But the life of the silkworm is interesting and will serve as an outline for the life of all of its family.

The eggs hatch in the spring, the young caterpillars feeding upon the mulberry leaves for about six weeks, when they reach maturity and begin to spin their golden-yellow or white cocoons. Each cocoon is made of a continuous thread from four to nine hundred feet long and of rich luster.

Inside this silken house sleeps the chrysalis for three weeks, when the moth breaks open its skin, secretes the boobyacid which dissolves the gummy mortar of the cocoon, loosens up the threads, and, through a round hole in the top, comes out a small cream-white moth, with broadly feathered antennae. So long has



TENT CATERPILLARS, CHIEF AMONG ORCHARD PESTS

it been reared in captivity that it has quite lost the power of flight.

Silk manufacture is one of the three great textile industries of the world, and every thread of the silk mills, whether in China, Japan, France, Italy, or the United States, is first spun by a moth.

OUR NATIVE SILK MAKERS

The best known of our native silk makers is the great *Cecropia* moth (*Ce-cro'-pi-a*), whose immense brown cocoons you will find in the fall and winter attached to bushes, shade trees, fences — almost anywhere, as necessity or chance happened to order.

This is the best of all the native moths for your study. *Cecropia* spins this huge cocoon out in the open where you can watch its process. It is a double-walled affair too, hence very elaborate, and very instructive to watch. The caterpillar is large, brilliantly colored, hearty, easily kept in captivity, and a steady, skillful worker. He is twenty-four hours spin-

ning his cocoon, spinning altogether a vast number of yards of thread, but the threads sticking so tight together as they touch in the spinning that it is not easy to unwind the silk.

Cecropia is among the most gorgeous of all moths, sometimes having an expanse of wing of six and one half inches, the whole creature a wonderful blend of red and white against a background of rich dusky-brown.

The only way to learn the difference between the markings of Cecropia, Promethea (Pro-me'-the-a), Cynthia (Cyn'-thi-a), and Polyphemus (Poly-phe'-mus)—our four most splendid moths in yellows, reds, whites, and browns—is to study them carefully side by side.

POLYPHEMUS

It is Polyphemus, however, that is called the American silkworm, for his thick whitish cocoons, built without openings and wrapped in a leaf, are made of a continuous thread of silk some eight hundred feet in length, that can be easily unwound.

The cocoon of Polyphemus falls to the ground when the leaf in which it is rolled lets go in the autumn; so look for them under the trees—hard, white, leaf-rolled, and about one and one half inches long. The thick, deeply segmented caterpillar is of a leaf-green color, with rows of orange tubercles and seven slender, oblique yellow stripes on the first abdominal segments of its body. Whereas the longer tubercles on Cecropia are blue on the sides and yellow along the back, with four large red ones near the head.

Not so gorgeous, but even more enchantingly colored, is Luna—the large green moth with long, streaming swallowtails. If Cecropia is colored with pigments from the sun, then Luna, as its name implies, is painted with the dyes of the moon. So large, so delicate in texture and color, the wings of Luna, when you come upon them in the woods, opened wide against some tree-trunk, or sitting waveringly through the gloom, seem almost ghostly and not of our world—as if they came down on the moonbeams and found themselves unable to fly back.

There are two others of this giant silk-

worm group that give to our out-of-doors the touch of the tropics. One of these two is Promethea, whose brown cocoon, smaller than Cecropia and cut open at the end like it, you will find securely fastened to the twigs by silk so that it cannot fall, as Polyphemus falls when the leaves drop. You will often find it upon the twigs of barberry, blackberry, saffraas, and other shrubs and trees.

"The cocoon," says Mr. Weed, "is of special interest because it shows a remarkable instinct on the part of the caterpillar that constructed it. If you examine the structure of the cocoon carefully, you see that a leaf forms the framework on which the silken web was spun. Sometimes the leaf may have disappeared, but the impression of its midrib and principal veins is easily seen. Notice how cleverly it is attached to the twig by silken threads woven tightly around it.

"By keeping the Promethea cocoons under observation late in spring or early in summer, you may be able to see the moths develop. Sometimes, however, you may get only a four-winged parasite for your pains."

The other of the two is Io or the bull's-eye moth, the least of giants, measuring hardly more than three inches from tip to tip, but lacking nothing in color—especially in the hind wings with their brilliant reds, yellows, blacks, and blues and their great eyespots at the centers.

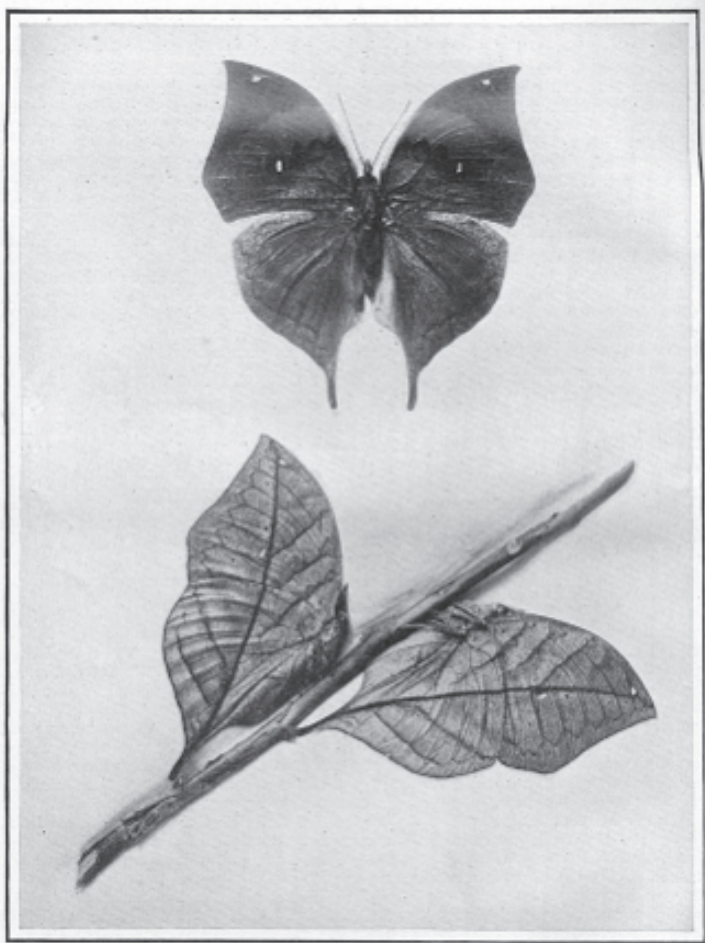
MIMICRY

Protective mimicry is common among the moths and butterflies. In animals it may be the simulation in form or color, or both, of natural objects; or it may be the aping of form and color of another animal, which is not attacked by enemies which prey upon it. Of course this mimicry is unconscious and is the result of a slow process of development which has no doubt gone on for ages.

The "walking sticks," creatures which resemble the twigs of trees; the "leaf insects," which look like the foliage of plants; the "leaf butterfly" of India, in which the form and the color and even the venation of leaves are mimicked, are familiar illustrations.

Repulsive objects are frequently mimicked, as in the case of one kind of spider which escapes its foes by resembling a patch of bird lime. The resemblance is so exact as to deceive the most sagacious, and the discovery of the creature was due to the fact that the naturalist who happened to see it observed, to his surprise, that what he was positive was a mass of ordure moved!

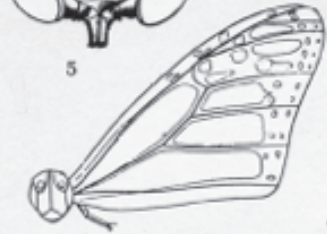
Among the moths this strange thing is seen in the wonderful manner of their matching the thing upon which they settle. You will often fail to see the creature because of its perfect blending with its surroundings.



Courtesy of Boston Society of Natural History

KALLIMA OR LEAF BUTTERFLY, FROM INDIA, A WELL-KNOWN EXAMPLE OF PROTECTIVE RESEMBLANCE

Upper: Wings expanded in flying. Lower: At rest on twig, with wings folded and resembling a dead leaf.



2

6



3



7



a



b



c

4



d

The monarch or milkweed butterfly, *Danaus plexippus*, (1) hatches from a tiny, dome-shaped egg shown here greatly enlarged (2); then turns into a hungry caterpillar (3) in about five days. As soon as the eggs hatch, the caterpillar devours its egg shell, then eats the milkweed leaves to which its egg was attached. In two or three weeks the caterpillar changes into a pupa or chrysalis. The caterpillar attaches itself by a pair of hook legs to a bit of silk that it places on a twig or some other object (4a) and hangs upside down with its head curved upward. The larval skin splits from the bottom upward, (4b). The larval skin is shed completely (4c); and, finally, a beautiful green chrysalis covered with golden spots develops (4d). In 9 to 15 days the chrysalis splits open and the adult emerges.

The large, compound eyes that have hundreds of facets per square millimeter are attached to a freely moving head (5). Both the front and rear wings (6 and 7) are well developed and covered with tiny scales.

Relation to other Living Things

If all the eggs laid by butterflies and moths developed into mature insects, the country would soon be overrun by them, but nature has provided various controls that limit their numbers. As it is, some species have become so numerous as to destroy crops. In many instances their numbers are the fault of man, who has made the land untenable for the birds and other animals that would normally have devoured great quantities of the caterpillars. Caterpillars are an important food for many birds and mammals. Spiders help to keep some kinds in check. And then there are the parasites, several species of small flies and wasps that lay their eggs on or in the body of the caterpillar. The parasite larva hatches, burrows into the caterpillar, and feeds on its tissues (See *Insect: Predators and Parasites; also Parasite*). Sometimes the caterpillar dies before reaching full size, and sometimes it forms its cocoon or chrysalis in an apparently normal manner but, instead of a butterfly or moth, only one or more parasitic flies or wasps will emerge. Farmers have found that these parasites, where sufficiently numerous, are better than dusting with insecticides as a means of controlling destructive caterpillars (See *Biological Control*).

Not all butterflies and moths are necessarily harmful to agriculture. Many kinds are not numerous enough to do any appreciable damage because their natural enemies keep them in check. Many species eat unwanted weeds. It is the caterpillars that eat the leaves of growing plants; adult butterflies and moths

have no means of chewing and can only sip nectar from the flowers and the juices of damaged fruit.

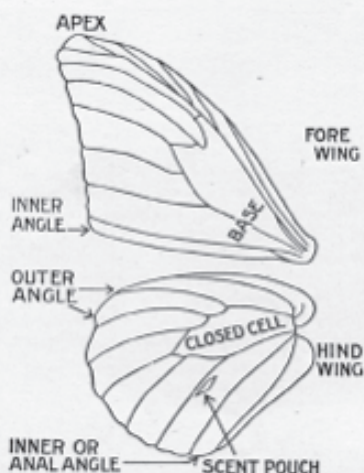
As the adults visit the flowers in search of nectar, they rub against the stamens and pistils, aiding in the process of pollination (See *Pollination*). The little pronuba moth is especially important in this respect, being the only means by which the blossoms of the beautiful desert, yuccas are fertilized. This moth deliberately gathers a large ball of pollen, then hunts for a flower that has just bloomed and stuffs the pollen into the opening in the pistil. The moth then deposits an egg or two in

the seed cup of the flower, where the larva can feed upon the developing seeds. But some seeds are always left to mature, to produce more yucca plants.

All living things are protected from their enemies in many different ways. Among butterflies and moths their coloring is their chief method of protection. It is difficult to see an angle-wing butterfly when it is at rest because, with its wings folded, it is almost indistinguishable from the bark of a tree. Some of the sphinx moths (or hawkmoths) and others look very much like dry leaves when their wings are folded. Other species resemble a daub of mud.



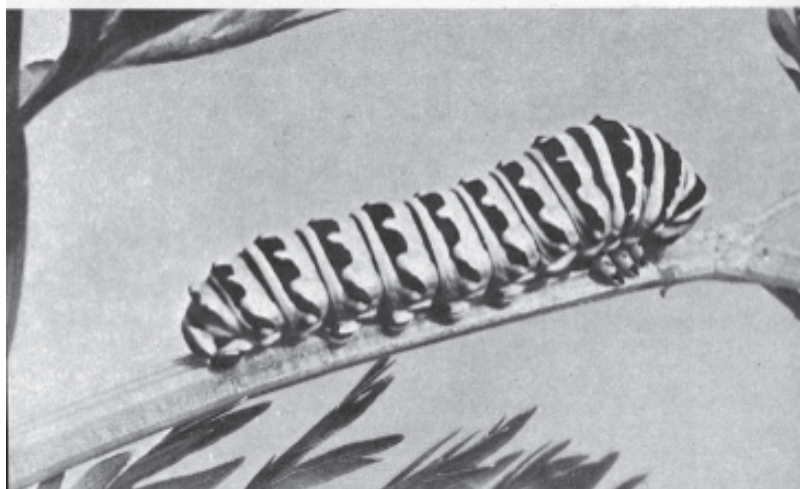
CATERPILLAR AND CHRYSALIS OF BLACK SWALLOWTAIL BUTTERFLY



BUTTERFLY'S WING, SHOWING PARTS AND VEINING

Notice especially location of the scent pouch.

Black swallowtail caterpillar



**Food Plants and Overwintering Stages
of a Few of the
More Common Caterpillars**

BUTTERFLIES

Kinds of Caterpillars

Monarch
Fritillaries
Anglewings
Mourning cloak
Red-spotted purple
Cabbage butterfly
Black swallowtail
Spicebush swallowtail
Tiger swallowtail
Zebra swallowtail
Silver-spotted skipper

Principal Food Plants

milkweed
violets
nettles, elm, hops
willow, elm, poplar
willow, cherry
cabbage
carrots, parsley
spicebush, sassafras
wild cherry
papaw
black locust

Overwintering Stage

adults migrate south
young larva
adult
adult
young larva, in leaf shelter
pupa (chrysalis)
pupa (chrysalis)
pupa (chrysalis)
pupa (chrysalis)
pupa (chrysalis)
pupa

MOTHS

Tomato sphinx
Cynthia
Cecropia
Promethea
Luna
Polyphemus
Io
Royal walnut
Imperial
Woolly bear (tiger moth)
White-marked tussock moth
Cypsy moth
Tent caterpillar
Cankerworms
Bagworm

tomato, tobacco
ailanthus and other trees
various deciduous trees
spice bush, sassafras
walnut, hickory, etc.
various deciduous trees
various trees and shrubs
walnut, hickory, etc.
various trees and shrubs
grasses, herbacious plants
various deciduous trees
various deciduous trees
wild cherry
various trees
conifers, etc.

pupa, in ground
cocoon, in leaf on twig
cocoon, on twig
cocoon, in leaves on ground
cocoon, in leaves on ground
cocoon, in leaves on ground
pupa, in ground
pupa, in ground
larva
egg
egg
egg
egg or pupa
egg, in bag

SAWFLY LARVAE

various plants

pupa, sometimes in a
cocoon, usually in ground

Source: Guinness Book of World Records, 1990.

Largest Butterflies and Moths

The largest known butterfly is the protected Queen Alexandra birdwing (*Ornithoptera alexandrae*) of Papua New Guinea. Females may have a wing span exceeding 11.02 in and weigh over 0.88 oz.

The largest moth (though not the heaviest) is the Hercules moth (*Coscinoscera hercules*) of tropical Australia and New Guinea. A wing area of up to 40.8 sq in and a wing span of 11 in have been recorded. In 1948 an unconfirmed measurement of 14.17 in was reported for a female captured near the post office at the coastal town of Innisfail, Queensland, Australia. The rare owl moth (*Thysania agrippina*) of Brazil has been measured up to 12.16 in wing span.

Rarest Butterfly

The birdwing butterfly *Ornithoptera* (= *Troides*) *allotiei* of Bougainville, Solomon Islands is known from less than a dozen specimens. A male from the collection of C. Rousseau Decelle was auctioned for £750 (then \$2,100) in Paris on Oct 24, 1966.

Largest Butterfly Preserves

The Australian Butterfly Sanctuary at Kuranda, Queensland, is the world's largest butterfly farm in terms of flight space. The main flight "aviary" consists of a huge all-weather aluminum-framed glasshouse with an internal flight capacity of 129,250 sq ft. The Sanctuary encompasses 7 acres, 3 acres of which are under cultivation with butterfly-food plants, and the other 4 acres natural rain forest. Since Australian law forbids the importation of live insect material, all butterfly eggs, pupae and larvae are bred in the Sanctuary.

Smallest Butterfly

The smallest known butterfly is the recently discovered *Micropsyche ariana*, which has a wing span of 0.275 in. The type specimen was collected on Mt. Khwajaghar in the Koh-i-Baba range, Afghanistan. The smallest of the estimated 140,000 known species of Lepidoptera are the moths *Johanssonia acetosae* (Stainton), found in Great Britain, and *Stigmella ridiculosa* from the Canary Islands, which have a wing span of 0.08 in and a similar body length.

Source: How Far How Fast, 1969

The most fleet footed of men have not reached 23 mph. Of the two divisions of lepidoptera, the fastest moths can fly 33 mph, and the fastest butterfly flies at 20 mph. In the microscopic world of protozoa, the ameoba does not even reach a speed of half an inch an hour....

PART IV: LEPIDOPTERA IN LITERATURE

- A. Non-Fiction
- B. Fiction
- C. Poetry

A. LEPIDOPTERA NON-FICTION



Source: The Greatest - Muhammad Ali, 1975....

When I'm ready to leave the hospital the nurses hand me a stack of mail. One message stands out. It's addressed to me and written on the back of a brown bag:

THE BUTTERFLY HAS LOST ITS WINGS
THE BEE HAS LOST ITS STING

You are through, you loud-mouthed braggart. Your mouth has been shut up for all times. It's a great day for America. You are finished.

I read it aloud to the embarrassed nurses. There is something about the poem I like. I read it again and again:

THE BUTTERFLY HAS LOST ITS WINGS
THE BEE HAS LOST ITS STING

Later I tape it up on the wall of the gym so that every day I train, I remember that the butterfly has got to get back its wings and the bee has to get back its sting. Of all the messages that came in to me while I was at Claremont Hospital, this is the one I like best. It's funny, but those who hate me most sometimes inspire me the most. As long as I know they're out there.

*Float like a butterfly
Sting like a bee
Rumble young man, Rumble
W-a-a-a-a-a-a-a-a-a!*

The Insect World

THE GREAT PEACOCK MOTH

by J. HENRI FABRE

Though he was the greatest French naturalist, Fabre spent almost all of his long life working in obscurity and terrible poverty. For many years this "Homer of the insects" lacked even a microscope; he had only a pocket lens with which to make his astonishingly accurate observations of insect life. No other scientist has done so much with so little. It was not until the end of his life, when he was over 80 and too old to use it, that the state finally presented him with a modern laboratory. But Fabre's instruments were his keen observations, extraordinary intuitive powers, unending patience, and undeniable genius. His laboratory was the sun-scorched little plot of earth around his home in the south of France. Though he was one of the greatest entomologists of all time, he did not obtain public recognition until the age of 84 when the last of the ten volumes of his writings appeared. The most famous of his experiments—and this account of the assembling of the male moths is one of the most interesting—have been collected into a single volume called The Insect World of J. Henri Fabre, by Edwin Way Teale. Even to the age of 92, Fabre never lost his zest for exploring the insect mysteries, and he was able to convey his enthusiasm in his beautifully clear writings about their fascinating world.

It was a memorable evening. I shall call it the Great Peacock evening. Who does not know the magnificent Moth, the largest

in Europe, clad in maroon velvet with a necktie of white fur? The wings, with their sprinkling of grey and brown, crossed by a faint zig-zag and edged with smoky white, have in the centre a round patch, a great eye with a black pupil and a variegated iris containing successive black, white, chestnut and purple arcs.

Well, on the morning of the 6th of May, a female emerges from her cocoon in my presence, on the table of my insect-laboratory. I forthwith cloister her, still damp with the humours of the hatching, under a wire-gauze bell-jar. For the rest, I cherish no particular plans. I incarcerate her from mere habit, the habit of the observer always on the look-out for what may happen.

It was a lucky thought. At nine o'clock in the evening, just as the household is going to bed, there is a great stir in the room next to mine. Little Paul, half-undressed, is rushing about, jumping and stamping, knocking the chairs over like a mad thing. I hear him call me:

"Come quick!" he screams. "Come and see these Moths, big as birds! The room is full of them!"

I hurry in. There is enough to justify the child's enthusiastic and hyperbolic exclamations, an invasion as yet unprecedented in our house, a raid of giant Moths. Four are already caught and lodged in a bird-cage. Others, more numerous, are fluttering on the ceiling.

At this sight, the prisoner of the morning is recalled to my mind.

"Put on your things, laddie," I say to my son. "Leave your cage and come with me. We shall see something interesting."

We run downstairs to go to my study, which occupies the right wing of the house. In the kitchen I find the servant, who is also bewildered by what is happening and stands flicking her apron at great Moths whom she took at first for Bats.

The Great Peacock, it would seem, has taken possession of pretty well every part of the house. What will it be around my prisoner, the cause of this incursion? Luckily, one of the two windows of the study had been left open. The approach is not blocked.

We enter the room, candle in hand. What we see is unforgettable. With a soft flick-flack the great Moths fly around the bell-jar,

alight, set off again, come back, fly up to the ceiling and down. They rush at the candle, putting it out with a stroke of their wings; they descend on our shoulders, clinging to our clothes, grazing our faces. The scene suggests a wizard's cave, with its whirl of Bats. Little Paul holds my hand tighter than usual, to keep up his courage.

How many of them are there? About a score. Add to these the number that have strayed into the kitchen, the nursery and the other rooms of the house; and the total of those who have arrived from the outside cannot fall far short of forty. As I said, it was a memorable evening, this Great Peacock evening. Coming from every direction and appraised I know not how, here are forty lovers eager to pay their respects to the marriageable bride born that morning amid the mysteries of my study.

For the moment let us disturb the swarm of wooers no further. The flame of the candle is a danger to the visitors, who fling themselves into it madly and singe their wings. We will resume the observation tomorrow with an experimental interrogatory thought out beforehand.

But first let us clear the ground and speak of what happens every night during the week that my observation lasts. Each time it is pitch dark, between eight and ten o'clock, when the Moths arrive one by one. It is stormy weather, the sky is very much overcast and the darkness is so profound that even in the open air, in the garden, far from the shadow of the trees, it is hardly possible to see one's hand before one's face.

In addition to this darkness there is the difficulty of access. The house is hidden by tall plane-trees; it is approached by a walk thickly bordered with lilac- and rose-trees, forming a sort of outer vestibule; it is protected against the *mistral* by clumps of pines and screens of cypresses. Clusters of bushy shrubs make a rampart a few steps away from the door. It is through this tangle of branches, in complete darkness, that the Great Peacock has to tack about to reach the object of his pilgrimage.

Under such conditions, the Brown Owl would not dare leave the hole in his olive-tree. The Moth, better-endowed with his

faceted optical organs than the night-bird with its great eyes, goes forward without hesitating and passes through without knocking against things. He directs his tortuous flight so skilfully that, despite the obstacles overcome, he arrives in a state of perfect freshness, with his big wings intact, with not a scratch upon him. The darkness is light enough for him.

Even if we grant that it perceives certain rays unknown to common retinae, this extraordinary power of sight cannot be what warns the Moth from afar and brings him hurrying to the spot. The distance and the screens interposed make this quite impossible.

Besides, apart from deceptive refractions, of which there is no question in this case, the indications provided by light are so precise that we go straight to the thing seen. Now the Moth sometimes blunders, not as to the general direction which he is to take, but as to the exact spot where the interesting events are happening. I have said that the children's nursery, which is at the side of the house opposite my study, the real goal of my visitors at the present moment, was occupied by the Moths before I went there with a light in my hand. These certainly were ill-informed. There was the same throng of hesitating visitors in the kitchen; but here the light of a lamp, that irresistible lure to nocturnal insects, may have beguiled the eager ones.

Let us consider only the places that were in the dark. In these there are several stray Moths. I find them more or less everywhere around the actual spot aimed at. For instance, when the captive is in my study, the visitors do not all enter by the open window, the safe and direct road, only two or three yards away from the caged prisoner. Several of them come in downstairs, wander about the hall and at most reach the staircase, a blind alley barred at the top by a closed door.

These data tell us that the guests at this nuptial feast do not make straight for their object, as they would if they derived their information from some kind of luminous radiation, whether known or unknown to our physical science. It is something else that apprises them from afar, leads them to the proximity of the

exact spot and then leaves the final discovery to the airy uncertainty of random searching. It is very much like the way in which we ourselves are informed by hearing and smell, guides which are far from accurate when we want to decide the precise point of origin of the sound or the smell.

What are the organs of information that direct the rutting Moth on his nightly pilgrimage? One suspects the antennæ, which, in the males, do in fact seem to be questioning space with their spreading tufts of feathers. Are those glorious plumes mere ornaments, or do they at the same time play a part in the perception of the effluvia that guide the enamoured swain? A conclusive experiment seems to present no difficulty. Let us try it.

On the day after the invasion, I find in the study eight of my visitors of the day before. They are perched motionless on the transoms of the second window, which is kept closed. The others, when their dance was over, about ten o'clock in the evening, went out as they came in, that is to say, through the first window, which is left open day and night. Those eight persevering ones are just what I want for my schemes.

With a sharp pair of scissors, without otherwise touching the Moths, I cut off their antennæ, near the base. The patients take hardly any notice of the operation. Not one moves; there is scarcely a flutter of the wings. These are excellent conditions: the wound does not seem at all serious. Undistraught by pain, the Moths bereft of their horns will adapt themselves all the better to my plans. The rest of the day is spent in placid immobility on the cross-bars of the window.

There are still a few arrangements to be made. It is important in particular to shift the scene of operations and not to leave the female before the eyes of the maimed ones at the moment when they resume their nocturnal flight, else the merit of their quest would disappear. I therefore move the bell-jar with its captive and place it under a porch at the other end of the house, some fifty yards from my study.

When night comes, I go to make a last inspection of my eight victims. Six have flown out through the open window; two remain

behind, but these have dropped to the floor and no longer have the strength to turn over if I lay them on their backs. They are exhausted, dying. Pray do not blame my surgical work. This quick decrepitude occurs invariably, even without the intervention of my scissors.

Six, in better condition, have gone off. Will they return to the bait that attracted them yesterday? Though deprived of their antennæ, will they be able to find the cage, now put in another place, at a considerable distance from its original position?

The cage is standing in the dark, almost in the open air. From time to time, I go out with a lantern and a Butterfly net. Each visitor is captured, examined, catalogued and forthwith let loose in an adjoining room, of which I close the door. This gradual elimination will enable me to tell the exact number, with no risk of counting the same Moth more than once. Moreover, the temporary jail, which is spacious and bare, will in no way endanger the prisoners, who will find a quiet retreat there and plenty of room. I shall take similar precautions during my subsequent investigations.

At half past ten no more arrive. The sitting is over. In all, twenty-five males have been caught, of whom only one was without antennæ. Therefore, of the six on whom I operated yesterday and who were hale enough to leave my study and go back to the fields, one alone has returned to the bell-jar. It is a poor result, on which I dare not rely when it comes to asserting or denying that the antennæ play a guiding part. We must begin all over again, on a larger scale.

Next morning I pay a visit to the prisoners of the day before. What I see is not encouraging. Many are spread out on the floor, almost lifeless. Several of them give hardly a sign of life when I take them in my fingers. What can I hope from these cripples? Still, let us try. Perhaps they will recover their vigour when the time comes to dance the lovers' round.

The twenty-four new ones undergo amputation of the antennæ. The old, hornless one is left out of count, as dying or close to it. Lastly, the prison-door is left open for the remainder of the day.

He who will may leave the room, he who can shall join in the evening festival. In order to put such as go out to the test of searching for the bride, the cage, which they would be sure to notice on the threshold, is once more removed. I shift it to a room in the opposite wing, on the ground-floor. The access to this room is of course left free.

Of the twenty-four deprived of their antennæ, only sixteen go outside. Eight remain, powerless to move. They will soon die where they are. Out of the sixteen who have left, how many are there that return to the cage in the evening? Not one! I sit up to capture just seven, all newcomers, all sporting feathers. This result would seem to show that the amputation of the antennæ is a rather serious matter. Let us not draw conclusions yet: a doubt remains and an important one.

"A nice state I'm in!" said Mouflard, the Bull-pup, when his pitiless breeder has docked his ears. "How dare I show my face before the other Dogs?"

Can it be that my Moths entertain Master Mouflard's apprehensions? Once deprived of their fine plumes, dare they no longer appear amidst their rivals and a-wooing go? Is it bashfulness on their part or lack of guidance? Or might it not rather be exhaustion after a wait that exceeds the duration of an ephemeral flame? Experiment shall tell us.

On the fourth evening, I take fourteen Moths, all new ones, and imprison them, as they arrive, in a room where I intend them to pass the night. Next morning, taking advantage of their daytime immobility, I remove a little of the fur from the center of their corselet. The silky fleece comes off so easily that this slight tonsure does not inconvenience the insects at all; it deprives them of no organ which may be necessary to them later, when the time comes to find the cage. It means nothing to the shorn ones; to me it means the unmistakable sign that the callers have repeated their visit.

This time there are no weaklings incapable of flight. At night, the fourteen shaven Moths escape into the open. Of course the place of the cage is once more changed. In two hours, I capture

twenty Moths, including two tonsured ones, no more. Of those who lost their antennæ two days ago, not one puts in an appearance. Their nuptial time is over for good and all.

Only two return out of the fourteen marked with a bald patch. Why do the twelve others hang back, although supplied with what we have assumed to be their guides, their antennary plumes? Why again that formidable list of defaulters, which we find nearly always after a night of sequestration? I perceive but one reply: the Great Peacock is quickly worn out by the ardours of pairing-time.

With a view to his wedding, the one and only object of his life, the Moth is gifted with a wonderful prerogative. He is able to discover the object of his desire in spite of distance, obstacles and darkness. For two or three evenings, he is allowed a few hours wherein to indulge his search and his amorous exploits. If he cannot avail himself of them, all is over: the most exact of compasses fails, the brightest of lamps expires. What is the use of living after that? Stoically we withdraw into a corner and sleep our last sleep, which is the end of our illusions and of our woes alike.

The Great Peacock becomes a Moth only in order to perpetuate his species. He knows nothing of eating. While so many others, jolly companions one and all, flit from flower to flower, unrolling the spiral of their proboscis and dipping it into the honeyed cups, he, the incomparable faster, wholly freed from the bondage of the belly, has no thought of refreshment. His mouth-parts are mere rudiments, vain simulacra, not real organs capable of performing their functions. Not a sup enters his stomach: a glorious privilege, save that it involves a brief existence. The lamp needs its drop of oil, if it is not to be extinguished. The Great Peacock renounces that drop, but at the same time he renounces long life. Two or three evenings, just time enough to allow the couple to meet, and that is all: the big Moth has lived.

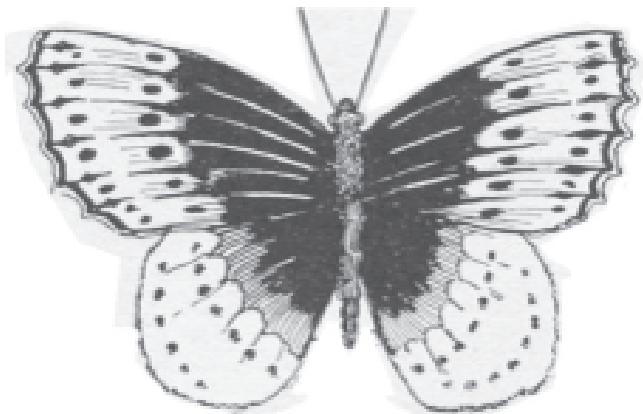
B. LEPIDOPTERA FICTION

Source: Animal and Nature Stories - 1918.

THE BUTTERFLY'S CHILDREN

By Mrs. Alfred Gatty

“LET me hire you as a nurse for my poor children,” said a Butterfly to a quiet Caterpillar, who was strolling along a cabbage-leaf in her odd lumbering way. “See these little eggs,” continued the Butterfly; “I don’t know how long it will be before they come to life, and I feel very sick and poorly, and if I should die, who will take care of my baby Butterflies when I am gone? Will *you*, kind, mild, green Caterpillar? But you must mind what you give them to eat, Caterpillar!—they cannot, of course, live on *your* rough food. You must give them early dew, and honey from the flowers:



and you must let them fly about only a little way at first; for, of course, one can't expect them to use their wings properly all at once. Dear me! it is a sad pity you cannot fly yourself. But I have no time to look for another nurse now, so you will do your best, I hope. Dear! dear! I cannot think what made me come and lay my eggs on a cabbage-leaf! What a place for young Butterflies to be born upon! Still you will be kind, will you not, to the poor little ones? Here, take this gold-dust from my wings as a reward. Oh, how dizzy I am! Caterpillar! you will remember about the food—"

And with these words the Butterfly drooped her wings and died; and the green Caterpillar, who had not had the opportunity of even saying 'Yes or No to the request, was left standing alone by the side of the Butterfly's eggs.

"A pretty nurse she has chosen, indeed, poor lady!" exclaimed she, "and a pretty business I have in hand! Why, her senses must have left her or she never would have asked a poor crawling creature like me to bring up her dainty little ones! Much they'll mind me, truly, when they feel the gay wings on their backs, and can fly away out of my sight whenever they choose!"

However, there lay the eggs on the cabbage-leaf; and the green Caterpillar had a kind heart, so she resolved to do her best. But she got no sleep that night, she was so very anxious. She made her back quite ache with walking all night round her young charges, for fear any harm should happen to them; and in the morning says she to herself—

"Two heads are better than one. I will consult

some wise animal upon the matter, and get advice. How should a poor crawling creature like me know what to do without asking my betters?"

But still there was a difficulty—whom should the Caterpillar consult? There was the shaggy Dog who sometimes came into the garden. But he was so rough!—he would most likely whisk all the eggs off the cabbage-leaf with one brush of his tail. There was the Tom Cat, to be sure, who would sometimes sit at the foot of the apple-tree, basking himself and warming his fur in the sunshine; but he was so selfish and indifferent! "I wonder which is the wisest of all the animals I know," sighed the Caterpillar, in great distress; and then she thought, and thought, till at last she thought of the Lark; and she fancied that because he went up so high, and nobody knew where he went to, he must be very clever, and know a great deal, for to go up very high (which *she* could never do), was the Caterpillar's idea of perfect glory.

Now in the neighboring corn-field their lived a Lark, and the Caterpillar sent a message to him, to beg him to come and talk to her, and when he came she told him all her difficulties, and asked him what she was to do to feed and rear the little creatures so different from herself.

"Perhaps you will be able to inquire and hear something about it next time you go up high," observed the Caterpillar, timidly.

The Lark said, "Perhaps he should;" but he did not satisfy her curiosity any further. Soon afterwards, however, he went singing upwards into the bright, blue sky. By degrees his voice died away in

the distance, till the green Caterpillar could not hear a sound. So she resumed her walk round the Butterfly's eggs, nibbling a bit of the cabbage-leaf now and then as she moved along.

"What a time the Lark has been gone!" she cried, at last. "I wonder where he is just now! I would give all my legs to know!" And the green Caterpillar took another turn round the Butterfly's eggs.

At last the Lark's voice began to be heard again. The Caterpillar almost jumped for joy, and it was not long before she saw her friend descend with hushed note to the cabbage bed.

"News, news, glorious news, friend Caterpillar!" sang the Lark; "but the worst of it is, you won't believe me!"

"I believe everything I am told," observed the Caterpillar, hastily.

"Well, then, first of all, I will tell you what these little creatures are to eat. What do you think it is to be? Guess!"

"Dew, and the honey out of flowers, I am afraid," sighed the Caterpillar.

"No such thing, old lady! Something simpler than that. Something that *you* can get at quite easily."

"I can get at nothing quite easily but cabbage-leaves," murmured the Caterpillar, in distress.

"Excellent! my good friend," cried the Lark, exultingly; "you have found it out. You are to feed them with cabbage-leaves."

"*Never!*" said the Caterpillar, indignantly. "It was their dying mother's last request that I should do no such thing."

"Their dying mother knew nothing about the matter," persisted the lark; "but why do you ask me, and then disbelieve what I say? You have neither faith or trust."

"Oh, I believe everything I am told," said the Caterpillar.

"Nay, but you do not," replied the Lark; "you won't believe me even about the food, and yet that is but a beginning of what I have to tell you. Why, Caterpillar, what do you think those little eggs will turn out to be?"

"Butterflies, to be sure," said the Caterpillar.

"*Caterpillars!*" sang the Lark; "and you'll find it out in time;" and the Lark flew away, for he did not want to stay and contest the point with his friend.

"I thought the Lark had been wise and kind," observed the mild green Caterpillar, once more beginning to walk around the eggs, "but I find that he is foolish and saucy instead. Perhaps he went up *too* high this time. I still wonder whom he sees, and what he does up yonder."

"I would tell you if you would believe me," sang the Lark, descending once more.

"I believe everything I am told," reiterated the Caterpillar, with as grave a face as if it were a fact.

"Then I'll tell you something else," cried the Lark; "for the best of my news remains behind. *You will one day be a Butterfly yourself.*"

"Wretched bird!" exclaimed the Caterpillar, "you jest with my inferiority—now you are cruel as

well as foolish. Go away! I will ask your advice no more."

"I told you you would not believe me," cried the Lark, nettled in his turn.

"I believe everything that I am told," persisted the Caterpillar; "that is"—and she hesitated—"everything that it is *reasonable* to believe. But to tell me that Butterflies' eggs are Caterpillars, and that Caterpillars leave off crawling and get wings, and become Butterflies!—Lark! you are too wise to believe such nonsense yourself, for you know it is impossible."

"I know no such thing," said the Lark, warmly. "Whether I hover over the corn-fields of earth, or go up into the depths of the sky, I see so many wonderful things, I know no reason why there should not be more. Oh, Caterpillar! it is because you crawl, because you never get beyond your cabbage-leaf, that you call *any* thing *impossible*."

"Nonsense!" shouted the Caterpillar, "I know what's possible, and what's not possible, according to my experience and capacity, as well as you do. Look at my long green body and these endless legs, and then talk to me about having wings and a painted feathery coat! Fool!—"

"And fool you!" cried the indignant Lark. "Fool, to attempt to reason about what you cannot understand! Do you not hear how my song swells with rejoicing as I soar upwards to the mysterious wonder-world above? Oh, Caterpillar; what comes to you from thence, receive, as *I* do, upon trust."

"That is what you call—"

"*Faith*," interrupted the Lark.

“How am I to learn Faith?” asked the Caterpillar.

At that moment she felt something at her side. She looked round—eight or ten little green Caterpillars were moving about, and had already made a show of a hole in the cabbage-leaf. They had broken from the Butterfly’s eggs!

Shame and amazement filled our green friend’s heart, but joy soon followed; for, as the first wonder was possible, the second might be so too. “Teach me your lesson, Lark!” she would say; and the Lark sang to her of the wonders of the earth below and of the heaven above. And the Caterpillar talked all the rest of her life to her relations of the time when she should be a Butterfly.

But none of them believed her. She nevertheless had learnt the Lark’s lesson of faith, and when she was going into her chrysalis grave, she said—

“I shall be a Butterfly some day!”

But her relations thought her head was wandering, and they said, “Poor thing!”

And when she was a Butterfly, and was going to die again, she said—

“I have known many wonders—I have faith—I can trust even now for what shall come next!”

Source: Shakespearean Tragedy, 1904 (?)

King Lear:

No, no, no, no! Come, let’s away to prison:
We two alone will sing like birds i’ the cage:
When thou dost ask me blessing, I’ll kneel down,
And ask of thee forgiveness: so we’ll live,
And pray, and sing, and tell old tales, and laugh
At gilded butterflies. . . .

C. LEPIDOPTERA POETRY

Source: Poems of Willam Wordsworth, 1964...

TO A BUTTERFLY

I'VE watched you now a full half-hour,
Self-poised upon that yellow flower;
And, little Butterfly! indeed
I know not if you sleep or feed.
How motionless!—not frozen seas

What joy awaits you, when the breeze
Hath found you out among the trees,
And calls you forth again!

This plot of orchard-ground is ours;
My trees they are, my Sister's flowers;
Here rest your wings when they are weary;
Here lodge as in a sanctuary!
Come often to us, fear no wrong;
Sit near us on the bough!
We'll talk of sunshine and of song,
And summer days, when we were young;
Sweet childish days, that were as long
As twenty days are now.

Source: A Flock of Words, 1970

Butterflies

Chu Miao Tiam

The blossoms fall like snowflakes
On the cool, deep, dark-green moss,
They lie in white-heaped fragrant drifts
Before the courtyard gates.

The butterflies, not knowing
That the days of spring are done,
Still pursue the flying petals
Across the garden wall.

*China, 18th century
Trans. Henry H. Hart*



Source: Our Wonder World, The Nature Book Vol. 3, 1918

A golden butterfly, upon whose wings
There must be surely character'd strange things,

Onward it flew, . . . then high it soar'd,
And downward suddenly began to dip,
As if, athirst with so much toil, 't would sip
The crystal spout head; so it did; with touch
Most delicate, as though afraid to smutch
Even with mealy gold the waters clear.

KEATS, *Endymion*.

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WANTED

BUTTERFLIES



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