MOTHS OF THE LIMBERLOST

GENE STRATTON-PORTER

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Chapter I Moths of the Limberlost

All diamonded with panes of quaint device

To me the Limberlost is a word with which to conjure; a spot wherein to revel. The swamp lies in north-eastern Indiana, nearly one hundred miles south of the Michigan line and ten west of the Ohio. In its day it covered a large area. When I arrived; there were miles of unbroken forest, lakes provided with boats for navigation, streams of

running water, the roads around the edges corduroy, made by felling and sinking large trees in the muck. Then the Winter Swamp had all the lacy exquisite beauty of such locations when snow and frost draped, while from May until October it was practically tropical jungle. From it I have sent to scientists flowers and vines not then classified and illustrated in our botanies.

It was a piece of forethought to work unceasingly at that time, for soon commerce attacked the swamp and began its usual process of devastation. Canadian lumbermen came seeking tall straight timber for ship masts and tough heavy trees for beams. Grand Rapids followed and stripped the forest of hard wood for fine furniture, and through my experience with the lumber men "Freckles"' story was written. Afterward hoop and stave men and local mills took the best of the soft wood. Then a ditch, in reality a canal, was dredged across the north end through, my best territory, and that carried the water to the Wabash River until oil men could enter the swamp. From that time the wealth they drew to the surface constantly materialized in macadamized roads, cosy homes, and big farms of unsurpassed richness, suitable for growing onions, celery, sugar beets, corn and potatoes, as repeatedly has been explained in everything I have written of the place. Now, the Limberlost exists only in ragged spots and patches, but so rich was it in the beginning that there is yet a wealth of work for a lifetime remaining to me in these, and river thickets. I ask no better hunting grounds for birds, moths, and flowers. The fine roads are a convenience, and settled farms a protection, to be taken into consideration, when bewailing its dismantling.

It is quite true that "One man's meat is another's poison." When poor Limber, lost and starving in the fastnesses of the swamp, gave to it a name, afterward to be on the lips of millions; to him it was deadly poison. To me it has been of unspeakable interest, unceasing work of joyous nature, and

meat in full measure, with occasional sweetbreads by way of a treat.

Primarily, I went to the swamp to study and reproduce the birds. I never thought they could have a rival in my heart. But these fragile night wanderers, these moonflowers of June's darkness, literally "thrust themselves upon me." When my cameras were placed before the home of a pair of birds, the bushes parted to admit light, and clinging to them I found a creature, often having the bird's sweep of wing, of colour pale green with decorations of lavender and yellow or running the gamut from palest tans darkest browns, with markings, of pink or dozens of other irresistible combinations of colour, the feathered folk found a competitor that often outdistanced them in my affections, for I am captivated easily by colour, and beauty of form.

At first, these moths made studies of exquisite beauty, I merely stopped a few seconds to reproduce them, before proceeding with my work. Soon I found myself filling the waiting time, when birds were slow in coming before the cameras, when clouds obscured the light too much for fast exposures, or on grey days, by searching for moths. Then in collecting abandoned nests, cocoons were found on limbs, inside stumps, among leaves when gathering nuts, or queer shining pupae-cases came to light as I lifted wild flowers in the fall. All these were carried to my little conservatory, placed in as natural conditions as possible, and studies were made from the moths that emerged the following spring. I am not sure but that "Moths of Limberlost Cabin" would be the most appropriate title for this book.

Sometimes, before I had finished with them, they paired, mated, and dotted everything with fertile eggs, from which tiny caterpillars soon would emerge. It became a matter of intense interest to provide their natural foods and raise them. That started me to watching for caterpillars and eggs out of doors, and friends of my work began carrying them to me. Repeatedly, I have gone through the entire life

process, from mating newly emerged moths, the egg period, caterpillar life, with its complicated moults and changes, the spinning of the cocoons, the miraculous winter sleep, to the spring appearance; and with my cameras recorded each stage of development. Then on platinum paper, printed so lightly from these negatives as to give only an exact reproduction of forms, and with water colour medium copied each mark, line and colour gradation in most cases from the living moth at its prime. Never was the study of birds so interesting.

The illustration of every moth book I ever have seen, that attempted coloured reproduction, proved by the shrivelled bodies and unnatural position of the wings, that it had been painted from objects mounted from weeks to years in private collections or museums. A lifeless moth fades rapidly under the most favourable conditions. A moth at eight days of age, in the last stages of decline, is from four to six distinct shades lighter in colour than at six hours from the cocoon, when it is dry, and ready for flight. As soon as circulation stops, and the life juices evaporate from the wings and body, the colour grows many shades paler. If exposed to light, moths soon fade almost beyond recognition.

I make no claim to being an entomologist; I quite agree with the "Autocrat of the Breakfast Table", that "the subject is too vast for any single human intelligence to grasp." If my life depended upon it I could not give the scientific name of every least organ and nerve of a moth, and as for wrestling with the thousands of tiny species of day and night or even attempting all the ramifications of—say the alluringly beautiful Catocalae family—life is too short, unless devoted to this purpose alone. But if I frankly confess my limitations, and offer the book to my nature-loving friends merely as an introduction to the most exquisite creation of the swamp; and the outside history, as it were, of the evolution of these creatures from moth to

moth again, surely no one can feel defrauded. Since the publication of "A Girl of the Limberlost", I have received hundreds of letters asking me to write of my experiences with the lepidoptera of the swamp. This book professes to be nothing more.

Under no restraint

Because so many enemies prey upon the large night moths in all stages, they are nowhere sufficiently numerous to be pests, or common enough to be given local names, as have the birds. I have been compelled to use their scientific

names to assist in identification, and at times I have had to resort to technical terms, because there were no other. Frequently I have written of them under the names by which I knew them in childhood, or that we of Limberlost Cabin have bestowed upon them.

There is a wide gulf between a Naturalist and a Nature Lover. A Naturalist devotes his life to delving into stiff scientific problems concerning everything in nature from her greatest to her most minute forms. A Nature Lover works at any occupation and finds recreation in being out of doors and appreciating the common things of life as they appeal to his senses.

The Naturalist always begins at the beginning and traces family, sub-family, genus and species. He deals in Latin and Greek terms of resounding and disheartening combinations. At his hands anatomy and markings become lost in a scientific jargon of patagia, jugum, discocellulars, phagocytes, and so on to the end of the volume. For one who would be a Naturalist, a rare specimen indeed, there are many volumes on the market. The list of pioneer lepidopterists begins authoritatively with Linnaeus and since his time you can make your selection from the works of Druce, Grote, Strecker, Boisduval, Robinson, Smith, Butler, Fernald, Beutenmuller, Hicks, Rothschild, Hampson, Stretch, Lyman, or any of a dozen others. Possessing such an imposing array of names there should be no necessity to add to them. These men have impaled moths and dissected, magnified and located brain, heart and nerves. After finishing the interior they have given to the most minute exterior organ from two to three inches of Latin name. From them we learn that it requires a coxa, trochanter, femur, tibia, tarsus, ungues, pulvillus, and anterior, medial and posterior spurs to provide a leg for a moth. I dislike to weaken my argument that more work along these lines is not required, by recording that after all this, no one seems to have located the ears definitely. Some believe hearing

lies in the antennae. Hicks has made an especial study of a fluid filled cavity closed by a membrane that he thinks he has demonstrated to be the seat of hearing. Leydig, Gerstaecker, and others believe this same organ to be olfactory. Perhaps, after all, there is room for only one more doctor of science who will permanently settle this and a few other vexing questions for us.

But what of the millions of Nature Lovers, who each year snatch only a brief time afield, for rest and recreation? What of the masses of men and women whose daily application to the work of life makes vacation study a burden, or whose business has so broken the habit of study that concentration is distasteful if not impossible? These people number in the ratio of a million to one Naturalist. They would be delighted to learn the simplest name possible for the creatures they or their friends find afield, and the markings, habits, and characteristics by which they can be identified. They do not care in the least for species and minute detail concerning anatomy, couched in resounding Latin and Greek terms they cannot possibly remember.

I never have seen or heard of any person who on being shown any one of ten of our most beautiful moths, did not consider and promptly pronounce it the most exquisite creation he ever had seen, and evince a lively interest in its history. But when he found it necessary to purchase a text-book, devoid of all human interest or literary possibility, and wade through pages of scientific dissertation, all the time having the feeling that perhaps through his lack of experience his identification was not aright, he usually preferred to remain in ignorance. It is in the belief that all Nature Lovers, afield for entertainment or instruction, will be thankful for a simplification of any method now existing for becoming acquainted with moths, that this book is written and illustrated.

In gathering the material used I think it is quite true that I have lost as many good subjects as I have secured, in my efforts to follow the teachings of scientific writers. My complaint against them is that they neglect essential detail and are not always rightly informed. They confuse one with a flood of scientific terms describing minute anatomical parts and fail to explain the simple yet absolutely essential points over which an amateur has trouble, wheat often only a few words would suffice.

For example, any one of half a dozen writers tells us that when a caterpillar finishes eating and is ready to go into winter quarters it crawls rapidly around for a time, empties the intestines, and transformation takes place. Why do not some of them explain further that a caterpillar of, say, six inches in length will shrink to THREE, its skin become loosened, the horns drop limp, and the creature appear dead and disintegrating? Because no one mentioned these things, I concluded that the first caterpillar I found in this state was lost to me and threw it away. A few words would have saved the complete history of a beautiful moth, to secure which no second opportunity was presented for five years.

Several works I consulted united in the simple statement that certain caterpillars pupate in the ground.

In Packard's "Guide", you will find this—"Lepidopterous pupae should be...kept moist in mould until the image appears." I followed this direction, even taking the precaution to bake the earth used, because I was very anxious about some rare moths. When they failed to emerge in season I dug them out, only to find that those not moulded had been held fast by the damp, packed earth, and all were ruined. I learned by investigation that pupation takes place in a hole worked out by the caterpillar, so earth must touch these cases only as they lie upon it. The one word 'hole' would have saved all those moths for me.

One writer stated that the tongue cases of some pupae turn over and fasten on the back between the wing shields, and others were strangely silent on the subject. So for ten months I kept some cases lying on their backs with the feet up and photographed them in that position. I had to discover for myself that caterpillars that pupate in the ground change to the moth form with the feet and legs folded around the under side of the thorax, the wings wrap over them, and the tongue case bends UNDER and is fastened between the wings.

For years I could find nothing on the subject of how a moth from a burrowing caterpillar made its appearance. In two recent works I find the statement that the pupa cases come to the surface before the moths leave them, but how the operation is performed is not described or explained. Pupa cases from earth consist of two principal parts: the blunt head and thorax covering, and the ringed abdominal sections. With many feeders there is a long, fragile tongue shield. The head is rounded and immovable of its own volition. The abdominal part is in rings that can be turned and twisted; on the tip are two tiny, needlesharp points, and on each of three rings of the abdominal shield there are in many cases a pair of tiny hooks, very slight projections, yet enough to be of use. Some lepidopterists think the pupa works head first to the surface, pushing with the abdomen. To me this seems impossible. The more one forced the blunt head against the earth the closer it would pack, and the delicate tongue shield surely would break. There is no projection on the head that would loosen or lift the earth.

One prominent lepidopterist I know, believes the moth emerges underground, and works its way to the surface as it fights to escape a cocoon. I consider this an utter impossibility. Remember the earth-encrusted cicada cases you have seen clinging to the trunks of trees, after the insect has reached the surface and abandoned them. Think

what would happen to the delicate moth head, wings, and downy covering! I am willing to wager all I possess, that no lepidopterist, or any amateur, ever found a freshly emerged moth from an underground case with the faintest trace of soil on its head or feet, or a particle of down missing; as there unquestionably must be, if it forced its way to freedom through the damp spring earth with its mouth and feet.

The point was settled for me when, while working in my garden, one came through the surface within a few inches of my fingers, working with the tip of the abdomen. It turned, twisted, dug away the dirt, fastened the abdominal tip, pulled up the head, and then bored with the tip again. Later I saw several others emerge in the same way, and then made some experiments that forever convinced me that this is the only manner in which ground pupae possibly could emerge.

One writer I had reason to suppose standard authority stated that caterpillars from Citheronia Regalis eggs emerged in sixteen days. So I boxed some eggs deposited on the eleventh, labelled them due to produce caterpillars on the twenty-seventh and put away the box to be attended on that date. Having occasion to move it on the twentyfourth, I peeped in and found half my caterpillars out and starved, proving that they had been hatched at least thirty-six hours or longer; half the others so feeble they soon became inactive, and the remainder survived and pupated. But if the time specified had been allowed to elapse, every caterpillar would have starved.

One of the books I read preparatory to doing this work asserts concerning spinners: "Most caterpillars make some sort of cocoon or shelter, which may be of pure silk neatly wound, or of silk mixed with hair and all manner of external things—such as pieces of leaf, bark, moss, and lichen, and even grains of earth."

I have had caterpillars spin by the hundred, in boxes containing most of these things, have gathered outdoor cocoons by the peck, and microscopically examined dozens of them, and with the exception of leaf, twig, bark, or some other foundation against which it was spun, I never have seen a cocoon with shred, filament, or particle of anything used in its composition that was not drawn from the spinning tube or internal organism of the caterpillar, with the possible exception of a few hairs from the tubercles. I have been told by other workers that they have had captive caterpillars use earth and excrement in their cocoons.

This same work, in an article on protective colouration, lays emphasis on the statement that among pupa cases artificially fastened to different objects out of doors, "the elimination was ninety-two per cent on fences where pupae were conspicuous, as against fifty-two per cent among nettles, where they were inconspicuous." This statement is elaborated and commented upon as making a strong point for colourative protection through inconspicuousness.

Personally, I think the nettles did the work, regardless of colour. I have learned to much experience afield that a patch of nettles or thistles afford splendid protection to any form of life that can survive them. I have seen insects and nesting birds find a safety in their shelter, unknown to their kind that home elsewhere. The test is not fair enough to be worth consideration. If these same pupae had been as conspicuously placed as on the fence, on any EDIBLE GROWTH, in the same location as the fence, and then left to the mercy of playing children, grazing stock, field mice, snakes, bats, birds, insects and parasites, the story of what happened to them would have been different. I doubt very seriously if it would have proved the point those lepidopterists started out to make in these conditions, which are the only fair ones under which such an experiment could be made.

Many people mentioned in connexion with the specimens they brought me have been more than kind in helping to collect the material this volume contains; but its publication scarcely would have been possible to me had it not been for the enthusiasm of one girl who prefers not to be mentioned and the work of a seventeen-year-old boy, Raymond Miller. He has been my sole helper in many difficult days of field work among the birds, and for the moths his interest reached such a pitch that he spent many hours afield in search of eggs, caterpillars, cocoons, and moths, when my work confined me to the cabin. He has carried to me many of my rarest cocoons, and found in their native haunts several moths needed to complete the book. It is to be hoped that these wonderful days afield have brought their own compensation, for kindness such as his I never can reward adequately. The book proves my indebtedness to the Deacon and to Molly-Cotton. I also owe thanks to Bob Burdette Black, the oldest and warmest friend of my bird work, for many fine moths and cocoons, and to Professor R. R. Rowley for the laborious task of scientifically criticizing this book and with unparalleled kindness lending a helping hand where an amateur stumbled.