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No. 6

## DESCRIPTION OF A NEW GENUS AND SPECIES OF RUGOSE CORALS FROM THE SILURIAN ROCKS OF MANITOBA.

By J. F. WHITEAVES.

APHYLLOSTYLUS, gen. nov.

Corallum consisting of slender, contiguous, subcylindrical corallites, that are circular or nearly circular in transverse section, and that seem to have formed part of a compound, branched, fasciculate, ascending and somewhat spreading colony, essentially as in *Pycnostylus*. Surface markings of the exterior of the corallites unknown.

The structure of the interior of the corallites consists of conspicuous transverse tabulæ, and of numerous, very minute, spiniform septa. The tabulæ, though irregular in their disposition and in their distances apart, are for the most part complete and continuous. The spiniform septa consist of both longitudinal and transverse rows of close-set, very short, straight and inwardly directed, minute spinules, not very unlike those of a Silurian Favosite, but much smaller and shorter. Where the tabulæ are comparatively far apart, the longitudinal arrangement of the rows of spinules is very obvious, and there are from four to seven spinules in each longitudinal row, between two of the tabulæ. But, in places where the tabulæ are close together, the transverse arrangement of the rows of spinules is more apparent, and there are either one or two transverse rows of spinules between two tabulæ.

The general shape of the corallites in this genus, their mode of growth and their internal tabulæ, appear to be essentially similar to those of *Pycnostylus*, but in the latter the septa are marginal, well developed, and consist of thin, continuous, longitudinal ridges.

*Pycnostylus* seems to be most nearly related to *Amplexus*, which is usually referred to the Zaphrentidæ, and it may be that *Aphylostylus* should also be included in that family.

APHYLLOSTYLUS GRACILIS, sp. nov.

Corallites slender, averaging about two or three millimetres in diameter; septal spinules very minute, scarcely visible to the naked eye.

This genus and species are based upon fragments of colonies, in six small pieces of limestone of Silurian (Upper Silurian) age, from Stonewall, about thirty-one miles west of East Selkirk, collected by Mr. J. B. Tyrrell in 1897. Each of these pieces of limestone shows both longitudinal and transverse sections of a few contiguous corallites, upon one or more of its recently broken surfaces. The internal structure of most of these corallites is well preserved, but their mode of branching is nowhere very clearly seen. Two or three similar specimens had previously been collected by the writer in 1888 from loose masses of limestone on the banks of the Fairford River, about six or seven miles below the Hudson Bay post at Fairford, Manitoba.

Ottawa, August 4th, 1904.

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## THE FLORA OF THE PEACE RIVER REGION.

By JAMES M. MACOUN.

There is perhaps no part of Canada in which a greater diversity of plants is to be found than in the Peace River region. Though the number of species is surprisingly small, yet plants characteristic of an arid climate may be found within a few miles of those requiring wet, almost boreal, conditions and a wonderful display of gorgeous prairie flowers may be seen within a few yards of the typical flora of the sub-arctic forest.

For the purposes of this short paper the words "Peace River Region" will refer only to the district drained by about one hundred miles of the Peace River, that is, the country north and south of that river between Peace River Landing and a point about forty miles above Dunvegan. In other words the region bounded on the south and north by Lat.  $55^{\circ}$  and Lat.  $57^{\circ}$ , and on the east and west by Long.  $117^{\circ}$  and Long.  $119^{\circ}$ . This includes the whole of the area usually meant when the "Peace River Region" is spoken of. Westward from this district the country rises gradually to the Rocky Mountains, the Peace River taking its rise far to the northwest in British Columbia. From Peace River Landing the river flows northeasterly to Lake Athabasca, passing through what is known as the "Vermilion country."

The Peace River flows through the district under discussion in a deep valley, the bottom of which is from 700 to 1,000 feet, or even more below the plateau. The valley itself averages about three miles in width from rim to rim, the river flowing in sweeping bends from one side of the valley to the other cutting into the straight bank on one side while on the other a broad alluvial flat is formed, as is usual with all western rivers. The north bank of the valley is naturally warmer and drier than the south, as the full force of the sun strikes it, and this fact and the presence of a well-travelled trail on the north side accounts for the great difference between the two sides of the river. Repeated fires have almost wholly removed the forest, and the country between Peace River Landing and Dunvegan is almost all prairie, about 400,000 acres in all, while the south side is still clothed with forest. The extent of agricultural land in the valley is not great as the plateau is

reached by a series of slopes and "benches," the level land at the bottom never reaching a mile in width and seldom half a mile. It is on these slopes with a southern aspect that plants characteristic of an arid climate are found, chief among them a cactus, (*Opuntia Missouriensis?*) which is quite common. The grasses are those of the driest parts of the southern prairie region,

The prairie on the plateau above would delight the eye of those who admire large masses of one color, for abundant as individual flowers are the number of species is strangely small. Hundreds of acres will be seen on which a single species predominates to such a degree that it colors the whole landscape. To the writer this seems conclusive proof of two things, the first being the comparatively recent origin of these prairies, and the second, that only a small number of the prairie plants of the south can withstand the climate of the Peace River region. The most natural explanation of the occurrence of these prairie species there is that many of the seeds were brought from the south, attached to the buffalo which formerly were very abundant, and the forest having been destroyed by repeated fires the conditions were more suitable to prairie species than those of the forest. Those which first made themselves at home soon spread and occupied large areas, making it more difficult from year to year for new species to establish themselves. On the other hand, the seeds of many species must have been brought there, which if they germinated at all, were unsuited to the climate and soon disappeared. But whatever hypothesis be adopted to account for the prairie in the first place, or the introduction of suitable plants later on, the paucity of species is very evident. *Castilleia miniata* is perhaps the most conspicuous and the most abundant, and not being relished by cattle seriously interferes with the cutting of hay on the open prairie. Several species of leguminous plants are also common, the best of these for forage purposes being *Lathyrus ochroleucus*, *Vicia Americana* and *Hedysarum boreale*. The latter is among the most beautiful plants growing on the prairie, and to see masses covering many acres is a sight not soon forgotten by anyone. Though not usually a conspicuous plant, *Astragalus hypoglottis*, is on the Peace River prairies one of the most valuable forage plants, and it is not uncommon to see the ground covered with this species

for hundreds of yards in every direction. No species rare in Canada were seen on the prairie, or indeed anywhere with the exception of *Caltha natans*, which abundant enough in that region in brooks and natural ditches, is very restricted in its range. The same might be said of *Adoxa Moschatellina*, usually found among moss around the roots of trees.

The flora of the woodlands is that of the sub-arctic forest though even here the number of species is not very large. Impinging as it does on the prairie the border of the poplar and spruce woods, shows a very curious mixture of prairie and forest species more noticeable here than further south, where the boundaries of the prairie are constantly changing, and in the poplar bluffs prairie species are often common. In the Peace River region, however, the prairie often ends suddenly at the edge of the virgin forest into which the characteristic prairie plants do not penetrate, while the plants of the forest of course, do not thrive on the open prairie, so that one may walk a few yards from the prairie to the forest or *vice versa* and find floras in which there is not a species common to both. It gives one a strange feeling to leave the bright prairie covered with masses of the most brilliantly colored flowers, and after walking for five minutes through the forest, to find oneself on the borders of a bleak moor, on which the vegetation is scanty, and willows and dwarf birches the only shrubs. In such places one may collect *Astragalus alpinus*, *Pedicularis Groenlandica* and *P. euphrasioides*, *Parnassia parviflora* and other species characteristic of cold, wet, poor soil. It is hard to believe when among such plants that a few hundred yards away the prairie is blazing with bloom, and only a mile or two further the bluffs along the river are covered with cactus.

As regards the rarity of the plants and the number of species the Peace River region is not an interesting one, but it affords a splendid field for the study of many interesting points in connection with the distribution of plants. The most important lesson taught is that whatever the climatic conditions or the character of the soil Nature may be depended upon to cover up the earth with verdure of some kind, if the forest is permanently removed plants peculiar to meadows or prairies will somehow or other make their appearance and when by means of drainage or other causes a wet

area becomes dry plants suitable to the new conditions immediately appear. In the Peace River region a great variety of conditions exist in a very restricted area but even if the patch of alkali soil is only a few yards in extent or the dry hillside rises from among marshes and bogs the plants found are those characteristic of these conditions.

The trees found are those to be met with everywhere in the sub-arctic forest. The rivers are bordered by willows and balsam poplar (*Populus balsamifera*) while black spruce (*Picea nigra*) and tamarac (*Larix Americana*) grow in swamps and wet ground generally. The country as a whole is clothed with white spruce (*Picea alba*) and aspen (*Populus tremuloides*) and an occasional sandy ridge will be covered with Banksian pine, (*Pinus Banksiana*). There is almost no birch in the country except on or near the tops of the highest hills. None of the trees are large, 15 or 18 inches being the usual diameter for the largest spruces but though repeated fires have in many parts almost destroyed the forest there still remains an abundance of material for all the needs of the settler.

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#### SOME BIRD-NOTES OF THE YEAR.

By G. EIFRIG.

A RED-LETTER DAY FOR WARBLERS. —The high-water mark in the spring migration of warblers was this year evidently reached on May 23rd. A perfect wave of warblers together with some thrushes, finches and wrens struck the city the night before this date. These lively and cheerful denizens of the tree-tops were very noticeable in the trees along our streets, in gardens and especially in those along the north side of the Rideau, where the bird army, coming from the low southern bank of the river would naturally strike first. In the afternoon of the above date, at three o'clock, I was in Lt.-Col. White's park, between Wurtemberg street and the Rideau. I have never seen so many birds and such a variety in so small a space before. In a spruce tree not over thirty feet high, I saw within about ten minutes, the following warblers: Blackpoll, Magnolia, parula, Blackburnin, bay-breasted, black-throated blue, black-throated green and the redstart, several



of each, besides some more in the top which I did not recognize quickly enough. Mourning and the rare Tennessee warblers had also been seen in the morning, when the number of birds is said to have been still greater. Together with these warblers had come the white-throated and white-crowned sparrows, and the olive-backed thrush, which seem to prefer the company of warblers during migration. Added to all these the robins, bluebirds and blackbirds which had established their households in the garden long before this date, they certainly made it a very lively picturesque place for a while.

A HERONRY NEAR EGANVILLE.—On the 26th and 27th I had occasion to visit Lake Doré near Eganville, Renfrew County. At one end of this lake there is an extensive swamp area, partly made up of cat-tail growth, impenetrable alike to foot and boat and partly of wooded portions, where there is more firmness underneath. Several so-called spring creeks roll their muddy, dark colored and slowly gliding waters through these swamy woods. On the banks of one of these creeks, several rods from where it enters the lake, is the heronry. It consists of about 100—150 nests, which are from thirty to fifty feet up in the swamp elms, which in this place had at so late a date no leaves whatever. The nests are bulky affairs, made of large sticks in the crotches and forks of branches. They look very insecure and top-heavy, especially when their large proprietors get up on them to survey the surroundings. When our boat noiselessly glided up the creek, the nests could be seen from far, but no herons, but as we drew nearer one loud squeak would sound and then more and the herons would slowly and reluctantly fly out of their nests, some would merely stand up to see what was wrong. If a shot is fired or a paddle splashed flat into the water, the uproar is instantaneous and great. Later on, when the young are out and must be fed, the tumult and uproar especially at night is something awful. At this time most had their four large green eggs in the nest, yet some had one or two of the young out already. That the nests of these ungainly birds, so high up, are not very safe is attested by the number of young and broken eggs lying among the trees. The only species seen was the blue heron (*Ardea herodias*).

SOME MORE LAKE DORÉ BIRDS.—Out on the lake several loons

(*Gavia imber*) could at all times be seen swimming and diving when the boat would approach nearer than about a quarter of a mile. Their floating, nesting locations, right on the edge of the cat-tail areas, could be seen but no eggs as yet. The herring gull (*Larus argentatus*) could be seen drawing its graceful circles over the lake. It certainly is a fine bird, snowy white below and pearly gray above. It nests here also, laying its eggs on some of the large rocks near the shore of Lake Doré and Golden Lake.

Among the remnants of last year's cat-tails could be seen the curious little long-billed marsh wren (*Cistothorus palustris*). They were busily engaged building their nests. These nests are works of art and are also quite large for such tiny birds. Each pair builds several of these nests, which are globular, with a small entrance, well hidden. They are fastened to old cat-tail stalks, 2 and 3 feet over the water and all lined with the down from the old disintegrating cat-tails of the fall before. The nests are 5 to 6 in. in diameter outside, and are very compactly knitted or woven of old and new cat-tail leaves and grass. Why each pair builds several nests when only using one for their eggs, is not known, whether it is to mislead their enemies, or to have places of shelter in different parts of their swampy domain, or for other reason is hard to say.

#### BOTANICAL CLUB OF CANADA.

The last meeting of the Botanical Club of Canada was held in the City of St. John, N.B., on June 23rd, 24th and 25th, 1904, during the meetings of the Royal Society of Canada. There was a good attendance of members and a few visitors, among the latter being Prof. W. F. Ganong, who gave valuable suggestions.

The work of the Club was discussed and it was decided to take up some new lines of work, in addition to the valuable phenological observations which have been so ably edited by Dr. A. H. MacKay for several years. As a means of learning what botanical work has been done in Canada and that the Club might be of use in the advancement of the Science of Botany in the Dominion, it was further decided to ask each of the Local Secretaries living in various parts of Canada, to prepare each year a short report on work that has been done during the season in their respective dis-

tricts, and before the next meeting (May, 1905) send this to the General Secretary, Dr. A. H. MacKay, Halifax, N.S., for incorporation in the annual report of the Club. In addition to the phenological observations it was thought that members of the Club might take up some other kind of definite co-operative work. The members present at the St. John meeting recommended that the special work for this season should be a careful examination of Volume I. of Macoun's Catalogue, and the preparation of a report on such extensions of range, or changes in geographical distribution of Canadian plants as had been discovered since the publication of the three parts forming Volume I. of Macoun's Catalogue of Plants (1883, 1884, 1886). It was agreed that it would be well if each local Secretary when reporting would make suggestions as to any other lines of investigation or special study which he thought would be useful in the development of Botanical science and suitable for the consideration of the Club.

It was further recommended that collections of the local floras of each province be made and kept in some central locality, such as the Normal Schools. The students of these schools during the term could be instructed and guided in the making of proper herbarium specimens of plants; and on their return to the various sections as teachers should be impressed with the advantage of working up the local flora of each section and making additions from these to the herbarium already started in the Normal School. Such collections would be advantageous from many points of view, but chiefly in the stimulus they would give to local botanists. If the grounds around each Normal School were sufficiently large, it would be a good idea to plant in them some native trees, shrubs, field flowers and ferns of the locality. These might well form an adjunct of school gardens, where established, and be an object lesson to show how well some of our native plants are adapted for ornamental purposes.

As the algæ (of our coast and inland waters), the fungi, lichens, mosses and ferns are scarcely known in comparison with our flowering plants, it would be well for students to turn their attention to these, especially as the best time for studying many forms such as lichens, fungi and algæ, is in the early autumn, when the interest in flowering plants has diminished.

## OFFICERS OF THE BOTANICAL CLUB OF CANADA.

Elected on the 24th of June, 1904, at a meeting of the Royal Society of Canada in St. John, New Brunswick.

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Vancouver Island, B.C. :—A. J. Pineo, B.A., High School, Victoria. J. F.

GIANT PUFFBALL —*Lycoperdon giganteum*.

Mr. A. H. Taylor, of the Customs Department, Ottawa, brought into my office this morning a fine example of the edible giant puff ball, *Lycoperdon giganteum*.

This specimen was obtained by Mr. Taylor on his property on Rideau street, Ottawa, where it had come up after the last rain-storm. It measures forty and a half inches in circumference one way and thirty-eight inches in the vertical diameter.

The colour is of an almost snow-white brilliancy and the surface for the most part smooth with shallow and inconspicuous wrinkles due to fissuring in the cortex or outer covering.

Two very large examples of this species were also observed last week on the Ottawa Golf Club links on the Aylmer road, the circumference of one according to the statement given me being fifty-nine inches.

The specimen presented by Mr. Taylor is now deposited in the Botanical Collection of the National Museum on Sussex street.

H. M. AMI.

Geological Survey Office,  
Ottawa, Canada.

## NATURE STUDY—No. XVII.

## THE COLLECTION AND PRESERVATION OF BUTTERFLIES AND MOTHS.

By ARTHUR GIBSON, Division of Entomology, Central Experimental Farm, Ottawa.

It does not require much experience to collect insects. Some kinds of these interesting creatures can be found at all seasons of the year. Of the Lepidoptera, the moths, which as a rule fly at night, are by far the most numerous, and the months of June, July and August are the best to hunt for them. The first butterflies emerge during the early warm days of spring and continue to appear throughout the summer, some species flying late into the fall. The following directions, owing to limited space, are brief but are included in this Nature Study series in the hope that they may be of use to teachers and students who may care to collect these insects in connection with their work. Insect life is full of intense interest, and in the study of these beautiful creatures many practical Nature Study lessons can be drawn.

THE NET.—Butterfly nets can be bought from any of the dealers in entomological supplies. These range in price from \$1.00 to \$2.50. It is not difficult to make a net, however, and this can be done easily at home. One of the nets the writer uses, consists of a piece of cane 38 inches long, and rather more than  $\frac{1}{4}$  inch thick. This is bent in the shape of a circle (fig. 1), the sides of both ends being shaved off to fit the upper square projections of a ferrule. An easy way of carrying the cane when not in use is to put it under the coat around the waist, placing the ends in the side trouser pockets. A light stick from 2½ to 3 feet long answers as a handle. Any tinsmith for a small sum will make one of these ferrules (fig. 2). The one I generally use is made

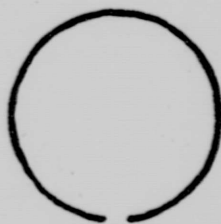


Fig. 1.



Fig. 2.

of tin, and has been in use for over eight years. For the bag of the net, ordinary green leno is serviceable. This should be first soaked in water to remove the stiffness.

When dry again, it can be cut in shape similar to fig. 3, care being taken to see that it is well rounded at the bottom, so as to leave no corners. A piece of strong wide ribbon should be doubled and both edges sewed to the top, so as to make a passage for the cane to slide through to keep the net in shape.

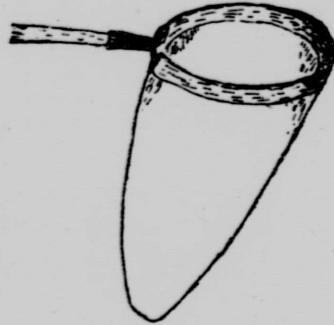


Fig. 3.

**KILLING BOTTLE.**—Any wide-mouthed bottle of convenient size will answer. The old 2 oz. quinine bottles, which may still be had from most druggists for a few cents each, do well for general purposes; the common vaseline bottle is also good. Test tubes can be had cheaply from druggists, and may be used for the smaller butterflies and moths. Cyanide of potassium is the poison used for killing insects. This should be broken into small pieces and put into the bottle. If a vaseline bottle is used, just sufficient should be put in to nearly cover the bottom. On top of this should be poured some liquid plaster of Paris, not more than half an inch. Some collectors put in a layer of sawdust between the cyanide and the plaster of Paris. The bottle should then be left standing for a couple of hours before replacing the cork. The deadly poisonous nature of cyanide of potassium should be kept in mind, and care should be taken in handling it. It is also well to label the bottle **POISON**. Large moths, such as the Emperors and Sphingids, are killed quickest by oxalic acid diluted in water. If with a sharp pen dipped into this liquid the underside of the thorax between the bases of the legs is pierced, some of the acid will find its way into the body and cause almost instant death. Preparatory to this a few

drops of chloroform may be poured over the thorax ; this will stupefy the insect instantly, when it may be pierced with the pen dipped in oxalic acid ; the chloroform will soon evaporate and will not injure the specimen in the least.

COLLECTING.—With a little experience the collector will soon become expert in the use of the net. Of course, at first specimens will be missed and, even when caught, spoiled by careless handling ; but practice will soon make perfect. It is impossible to lay down any rules as to where to collect. Butterflies do not all fly in the same places ; some kinds prefer sunny openings in woods, others swamps or the margins of streams, others again are found along railroad tracks, etc. The moths are to be sought for chiefly at night. Many begin to fly during the early evening and can be caught around flowers at that time. The electric lights on the outskirts of towns and cities attract great numbers, and here they can easily be collected. The method called "sugaring" is an interesting and productive way to secure specimens of many kinds of moths. The "sugar" is simply a mixture of molasses thinned with sour beer, which is smeared on the trunks of trees at dusk. These trees are then visited shortly afterwards and the moths there attracted collected. A dark lantern is of course necessary to enable one to find the trees which have been daubed and detect the moths upon them. When starting out, it is well to take some kind of a collecting box in which to pin specimens. An ordinary cigar box with a strip of cork glued to the bottom to receive the pins will answer. Special tin collecting boxes can be bought, but at first it is not necessary to buy these, nor in fact much other apparatus. Entomological pins, however, are a necessity, and these can be purchased in various sizes from the Entomological Society of Ontario, London, Ont.

MOUNTING —After having reached home the specimens should be mounted as soon as possible before they become dry. If they have dried, they may, however, be relaxed, by putting them in a receptacle containing some damp sand. An old vegetable dish does very well for this. For mounting butterflies and moths, spreading boards are used. These can be made by any one ; soft

wood, such as whitewood, or pine, should be chosen. Fig. 4 shows a section of the style we use. As the bodies of Lepidoptera vary much, different sized spreading boards are necessary. Our boards are of two lengths 18 and 12 in. In width they are  $6\frac{1}{2}$ ,  $4\frac{1}{2}$ ,  $3\frac{1}{4}$ , 2 and  $1\frac{1}{2}$  in., with body spaces  $\frac{5}{8}$ ,  $\frac{1}{2}$ ,  $\frac{1}{4}$ ,  $\frac{1}{8}$  and  $\frac{1}{16}$  in. wide respectively. Below the groove a strip of cork should be

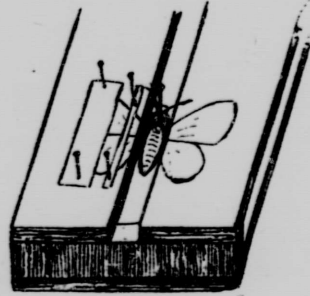


Fig. 4.

glued to hold the pin which has been put through the central portion of the thorax of the insect. When mounted, the insect should be high up on the pin, about one fourth of the pin above the specimen. The wings of butterflies and moths should be arranged as shown in fig. 4, the lower margins of the front wings forming as nearly as possible a straight line. With fine needles the wings can be brought forward and held in place by strips of writing paper or thin cardboard. No. 00 insect pin cut in two and the blunt end forced nearly all the way into half a match, makes a splendid setting needle. These pins are very fine and when used carefully to pierce the wings to hold them in position, the holes made are so small that they are practically invisible afterwards. Specimens should be kept on the spreading board at least a week or ten days, and the boards may be hung in rows on a wall, if a hook of some kind is screwed into the top of each.

If it is not convenient to mount the specimens immediately after their capture, these can be put in envelopes and then stored away in a tin box until the opportunity arrives when they can be relaxed and spread. Fig. 5 shows the pattern of envelope used by entomologists for papering their captures.

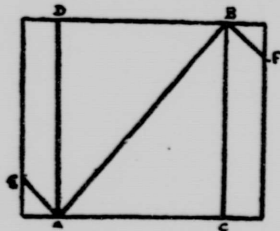


Fig. 5.

Method of folding paper for envelope. First fold on the line A B, then on A D and C B, and then on B F and E A.



These can, of course, be made in any size. The date, locality, and name of collector should always be plainly written on each envelope.

**PRESERVING SPECIMENS.**—When the specimen is removed from the spreading board, a neat label, bearing the locality, date of capture and name of collector should be put on each pin. Scientifically, a specimen is regarded as useless if it has not this information. If only a small collection is being made, mounted specimens may be arranged in ordinary cigar boxes, or any other kind of shallow box; but it will be necessary to keep examining these constantly, as they are not, as a rule, tight fitting, and museum pests soon find their way into them and destroy the specimens. Insect cases may be bought from dealers and, if only a few are needed, probably would be cheaper in the end. These are of various sizes, and are lined with sheet or pressed cork, to receive the pins. The Schmitt case is recommended by many and is used extensively in the United States. If it is the intention to form a large collection of butterflies and moths, of course, it would be better to have a cabinet made, containing a dozen, or more, drawers, all similar in size and pattern. Most collectors like to have a series of at least four specimens of one kind of butterfly or moth. This is not always possible, as many are too rare; but of the available species it is advisable to have two specimens of each sex, and also a specimen mounted so as to show the underside. Some form of deterrent to museum pests, as naphthaline or camphor, should be put in each case or box. A simple way is to make small bags of cheesecloth and fill these with ordinary flake naphthaline, pinning one in a corner of each box. If at any time fine dust is noticed under a pinned specimen, it is evidence that some pest is at work. In such cases a spoonful of bisulphide of carbon, or benzine, should be poured into the box, then the top closed quickly and left unopened for some hours.

A pair of entomological forceps will be found very useful in handling pinned specimens.

**EARLY STAGES.**—From a teacher's standpoint, collecting the immature forms and keeping them under observation until maturity will prove a most helpful way of arousing interest in insect life. In the fall of the year cocoons of the Emperor Moths

are often seen attached to the limbs of trees. If these are gathered and kept out of doors during the winter, and brought into the school in the early spring, the scholars will be interested in watching for the appearance of the moths. The cocoons of the *Promethea* Emperor Moth are usually to be found each fall on the lilac. Caterpillars of many kinds can be collected all through the season and with a little care, reared to maturity. An easy way to obtain larvæ is to beat the foliage of trees and shrubs over an inverted umbrella. The greatest pleasure in entomology is the study of the life-histories and habits of species. The field is wide, and there is still a vast amount of work to be accomplished. The most useful work can be done in studying the early stages of moths. Only a small percentage of these have been thoroughly worked out, and careful observations recorded are of much importance. Specimens of the mature forms collected in the field, in many cases, are more or less rubbed or damaged, and always inferior to bred material. For few larvæ, ordinary jelly jars with tin lids will answer. Some earth should be put in the bottom of each jar, as many caterpillars pupate in the ground. Fresh food should be fed every day and care taken to keep the jars clean. If a number of the same caterpillars are being reared, larger jars will be necessary.

If at all possible, at least one specimen of each kind should be preserved for future reference and study. This is best done by inflation, and specimens thus prepared are more valuable than those put in liquids. Proper apparatus may be purchased from dealers in entomological supplies, such as : an oven, in which to dry the empty skins while being inflated ; a spirit lamp to furnish heat ; some glass tubes drawn out to different sizes at one end ; some clips made of watch spring and held to the glass tubes by means of a band cut from rubber tubing ; a double rubber bulb with about three feet of tubing attached ; and a pair of fine curved forceps. The process, briefly, is to (1) kill the caterpillar in a cyanide bottle ; (2) place it on a piece of blotting paper, cover it with a strip of the same paper, and gently press out, through the anal orifice, using the pair of fine forceps, all the body contents ; (3) attach the anal segment to one of the glass tubes, fastening it with one or two of the spring clips ; (4) connect the glass tube to the tubing of the double bulb and inflate the larval skin by gently squeezing the outside bulb, at the same, with the other hand, hold the caterpillar in the oven to dry. When perfectly dry, the larva should be carefully removed from the glass tube and mounted with shellac on fine wire, one end of which should be first wound several times around an insect pin. Naturally, at first specimens will be spoiled, but with care good results will soon be obtained. It is best to begin with hairless larvæ.

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