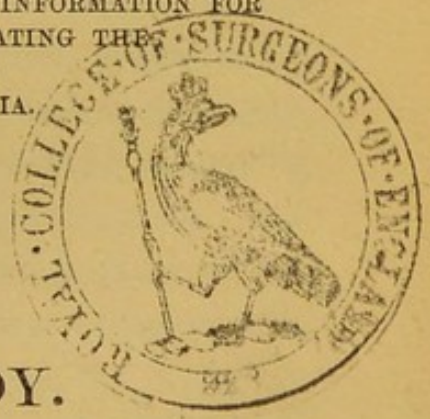
The ailant silkworm : observations on its habit, management, food, and value : made during the introduction, naturalization, and rearing of the first stock in Queensland and New South Wales, and affording some elementary information for the benefit of persons contemplating the commercial growth of ailant cocoons in Australia / contributed by Charles Brady.

THE AILANT SILKWORM:

OBSERVATIONS ON ITS

HABIT, MANAGEMENT, FOOD, AND VALUE,

MADE DURING THE INTRODUCTION, NATURALIZATION, AND REARING OF THE FIRST STOCK IN QUEENSLAND AND NEW SOUTH WALES, AND AFFORDING SOME ELEMENTARY INFORMATION FOR THE BENEFIT OF PERSONS CONTEMPLATING THE COMMERCIAL GROWTH OF AILANT COCOONS IN AUSTRALIA.



CONTRIBUTED BY

CHARLES BRADY.

"No amount of failure can destroy the effect of a single instance of success; for "where one experiment has succeeded there is every reason to believe that further "investigation must lead to the discovery of the elements which will render success "certain."—*Report of the Acclimatization Society of London*, 1862.

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THE AILANT SILKWORM.

The ailant silkworm is of a very different nature to the well-known mulberry silkworm; in fact, the two have little in common but that part of their names which implies that both produce a commodity which everyone recognizes as silk, by its appearance. The two products are quite distinct articles, are grown in different modes, and prepared by different processes, are manufactured for such various purposes that the two materials may be contrasted as having some such relation to each other as linen has to cotton; and there are especial qualities in ailantine (the produce of the ailant silkworm) which distinguish it from common silk. Thus, common mulberry silk is more lustrous, but it will not bear washing, and soon frays and wears through the creases; while the ailant silk, cleansed with cold water and soap, improves in lustre, and comfort in wear, every time it is washed, for years, and is much more durable; ailantine, besides, takes no permanent injury from oil or grease, but the fabric made from it must never be boiled nor washed in hot water.

Silk generally is a material obtained from a sort of pod or purse—that remarkable envelope which very many kinds of caterpillars make, of more or less value and quantity, and within which they enfold, or rather weave around themselves, preparatory to undergoing the greatest of several transformations peculiar to this class of animals. This pod, when of a superior kind, and especially such as is obtained from domesticated worms, is distinctively termed a cocoon.

The caterpillar during its growth, acquires, and gradually accumulates in two long bags in its inside (mostly during the latter part of its last stage, that is, after the last moult) the liquid silky matter, which in process of building the cocoon, the animal emits or trails out from two minute holes or orifices in the head, and lays up and down, backwards and forwards, in short zigzags (but in one continuous double thread) forming a web, until, in the instances of the mulberry and ailant silkworms, the caterpillar is completely closed in, hid from view, and thus protected from the intrusion of any other insect, as well as from injury by weather or other vicissitudes. This double fibre joins as it issues from the orifices, which are very close together, and becomes one strand, and very quickly hardens.

When a number of these strands, say 15, 20, 25, or even perhaps as many as 60, are wound off or reeled off together at one operation by a particular method which lays them straight, and binds them all at the first hanselling of the cocoons into one even solid thread, the whole is called a "single." Singles vary in bulk and quality, according to the peculiar nature of the cocoons, their lustre and fineness, and the use for which they are designed ; a quantity of cocoons must be reeled so as to form one homogeneous continuous line,—that is to say, of uniform substance, stoutness, or solidity and quality all along, without the ends or joints being perceptible, and so managed that a portion of the natural glue or gum of the cocoon being deterged in the operation of reeling, the remainder binds the whole of the strands into a perfectly round warp, with the strands laid straight along, not twisted like a cable. The silk of cocoons varies very much in coarseness, color, and brightness, according to the food, management, health, season of the year &c., when reared, as well as the special kinds or races of the worms, and are suitably sorted ; but the fibre or strand of every sort at the commencement of unwinding the cocoons is much stouter and better than the middle portion, and the

middle than the latter part or extremity last emitted from the worm, therefore in the process of reeling, the strands off fresh cocoons are added from time to time, so that the bulk of some makes up for the tenuity or deficiency of others partially or wholly wound off—the number of individual cocoons used to make up the bulk of a single is ordinarily from 25 to 45, according to the special quality of the silk, and the technical size which is desired. Singles when wound off in lengths or reels full, of about a pound weight, and properly made up into hanks, constitute the "raw silk" of commerce. In this shape raw silk is saleable to the merchants and to the throwsters, who recombine the singles yet further, and prepare the raw silk as a staple ready for the manufacturer. Imperfect and spoilt cocoons, and also the waste and floss from both good and bad, are assorted and then carded. The operations comprehended in the term "carding" render valuable weak and inferior, as well as broken and damaged silks, which are unsuitable for the reeling process; and the staple obtained (which is analogous to the "yarns" formed in a similar manner from wool, flax, cotton, &c.) is applicable to very many useful purposes, such as sewing-silk, cords, felts, shawls, &c. Carded silk is often worked up together with wool, cotton, and other materials, or spun alone, and woven by itself into various textile fabrics.

As the silky matter becomes expended in forming the cocoon, the animal of necessity shrinks in size, and alters in shape; it collapses, so to speak, from the last skin which served it as a caterpillar, and inside another new sort of skin or husk becomes a chrysalis or grub. The liquid and solid matters which remain of the caterpillar now encased within the husk are rearranged, undergo a truly wonderful transformation, and in time, shorter or longer according to circumstances, these constituent matters resolve themselves into an entirely new creature. Its body, with eighteen breathing holes, eight feet, six arms or hands,

besides the head in front, and grippers or claspers behind each one, and all with their several sets of nerves, muscles, &c., merge and disappear. Instead of the crawling caterpillar, a new form is organized, and forth comes a moth or butterfly, furnished with four wings and six legs. Instead of a body naked, or partially covered with hairs or tubercles and a coating of wax, more or less complete, which erewhile served for its convenience or defence, the new creature is clothed all over, both wings and body, with the finest down or feathers, resplendent with various colors, quite different to those in any former stage.

When mature, the ailant grub or chrysalis, or, as we may now call it, the embryo moth, warned by instinct, or enticed by a consciousness that the weather, or season, food, and other circumstances are favourable for its exit, by a sudden effort bursts the husk first about the head, thus disengaging the antennæ. These antennæ are two long moustache-like limbs in the front of the head, shaped and with teeth similar to flat double combs, or like the frame bones of a flat fish, but having the middle teeth longest, so that the outline is more or less arched, and the end teeth so short that the antennæ appear to end in a point. In the males the teeth of the antennæ are longer, but the antennæ themselves shorter as well as apparently stronger than in the females, while the teeth of the antennæ of the females are shorter and more even, but the antennæ longer, straighter, and more slender. The teeth of these antennæ exactly correspond with the zigzag layers of the fibre of the cocoon, and in the case of the ailant, the antennæ themselves fit the peculiar loose longitudinal layers and loops which form a sort of neck or collar, and effectually close the opening left for exit in the original construction of the cocoon. Wriggling about from side to side, the yet unborn moth, by plying its antennæ all round, gradually removes the fibres aside, and as it does so and struggles forward, both back and front teeth of the combs, right and left,

come into action, and help or drag the body forward until the head reaches the outside, when one leg is thrust out; squeezing and swaying, still with the help of the antennæ, the forepart of the body from side to side, an opposite leg and one wing are advanced, then the next leg behind the first—these help the rest well forward; now, the moth makes safe hold on the outside with the front legs, and exerting them and the other legs and antennæ together, drags the whole body through the neck of the cocoon (which being tight, peels off and retains the husk), and at last drops the limp wings and almost jelly-like body out over clear of the cocoon. For a few moments the new-born clings spasmodically, with eager anxious delight, about its now vacant birth-place, clambers here and there a little way, and adjusts itself as soon as possible, clutching hold on the empty cocoon itself, or on some near object, in such a position as to allow both body and wings to hang down clear of each other, and free of contact with any other matter. The wings, fully expanded, measure from four to nearly six inches across, and two and a half deep, yet, while in the cocoon, are so closely packed as to lie together with the body included, in a space only one and a quarter inch long (often much less) and not half an inch wide. Hence will be seen the absolute necessity of the wings and body while yet wet and slack, having space to unfold and extend to their fullest proportions before setting. By hanging as described, their natural weight gradually and gently draws them down, helps to stretch and distend as well as to expand and display them, while the air acts upon their damp surfaces. Presently the imago, as the moth in its perfect state is correctly termed, gently waves its wings, as if to court admiration and salute the looker on. This action completes the drying and arrangement of its downy feathers, and also commences the fluttering movement which perfects the condition of the body, and at the same time both renders it capable and manifests its desire of pursuing its natural functions.

Many people fancy that the moth eats through the cocoon. This is an error, or at any rate a most inappropriate term, for neither the ailant nor the mulberry moth is furnished with that general yet troublesome convenience, a mouth, nor other channels for food, and therefore cannot be said to eat in any correct sense of the term; besides, these animals only take food in one (the caterpillar) stage of their existence. In the case of the mulberry worm, the cocoon is what is called whole or closed, that is, the fibres are so arranged equally all over as to leave no outlet to facilitate its escape. The mulberry moth is provided with a tiny bladder, like a very small pearl or bead, on the forehead. This bladder is filled with a liquid which possesses the property of dissolving the glue that binds the fibres of the cocoon to each other. When the husk of the chrysalis is split about the head, this bead is protruded against the cocoon and is burst and smeared about the end, the fibres are thereby loosened and the antennæ easily remove them aside. In good cocoons, very seldom is even one single fibre broken—the thread remains continuous, though it requires a different method of reeling to that which answers with cocoons not perforated. The ailant chrysalis, after its cocoon is built, and as the animal collapses from the last skin of the caterpillar, diffuses a curious liquor which spreads all over the inside of the cocoon, and being quickly absorbed, fills up the interstices—in a word, varnishes, and thus renders the inner surface hard, smooth, and polished, like the inside of a nutshell. But, as has been already hinted, the ailant caterpillar, when weaving the cocoon, did not make it whole, but left a sort of neck, formed by arranging a certain number of fibres longways at that part, rather than crosswise, as in the rest of the interior, the ends of these fibres of course cannot take up varnish so freely as the flat web, and therefore the neck is not affected by the varnish to the same extent as the rest of the cocoon, but remains almost loose and pervious. The ailant cocoon is formed in layers, and one of these layers at the neck is fashioned in gathers

with the loops on the outside of the openingsomewhat like a welt or collar with a frill. This welt is stretchable, and so masks the opening that it is not readily perceived, therefore other insects can very seldom get in to molest the chrysalis during the critical time while maturing for the great change. The ailant moth, therefore, does not require, and is not provided with the pearly drop in the forehead, but probably the wetness from the body may, in some degree, slacken the fibres about the opening and facilitate egress. Moreover, the glue of the mulberry cocoon softens in cold, and very quickly melts away in hot water, while neither hot nor cold water have any effect on the glue or varnish which consolidates the ailant cocoon; hence will be understood an essential difference in the products of the two animals, and also the necessity of quite different treatment in the processes of unfolding the fibres and making them into raw silk. The ailant, and other varieties similarly constituted, are termed open or flask-shaped cocoons.

Now, what to do with the moths or imagos:—In this state of their existence they are what is termed nocturnal, that is, naturally active only at night; during the day they remain quiet, when they can be easily handled—left for a few hours if dark, or as soon as dusk commences, they will exercise their wings, and if neglected, the males especially, may fly off and be lost; the females do not so readily move about, and if properly attended do not roam away; but if they once depart they never return, though the males not unfrequently do come back in search of their mates left behind; it is, therefore, necessary to secure all the moths before evening. On a large scale, and for economic considerations, it is obviously best to let the imagos pair naturally of their own accord. To manage this, hang selected cocoons threaded together in fifties or hundreds, by running a needle and fine strong line across through the rough outer part of the middle of the body of each cocoon,

enough to hold but not pierce it ; suspend the lines horizontally so as to keep them tightly stretched about three inches apart ; the cocoons on their own several lines may touch or nearly so, and a good many thousands may thus be kept in low flat square perforated zinc cases, or in a closed room. At first it may be sufficient to have the strings of cocoons hung anywhere convenient about the house, and to make use of cages or cylinders of the same cheap and durable material. These cylinders should be made in two sets of four or five, say in all, eight or ten, and they may be obtained at little cost, by having the common perforated sheet zinc cut into slips 10 or $10\frac{1}{2}$ inches wide, and sufficiently long that when bent round and the lips soldered, each one will be 8 or $8\frac{1}{2}$ inches or a little more in diameter, one slightly larger than the next, but all of the same height, so that those of each set will pack close one inside another for convenience when not in actual use. The zinc must be thoroughly scoured with hot water, soap, and soda, to take off the grease and dirt, and well rinsed afterwards in pure water. To complete them, the cylinders may be furnished with loose tops and bottoms ; the bottoms of inch wood planed, and the tops of perforated zinc (properly cleansed) 10 inches square, stout glass $\frac{3}{16}$ or $\frac{1}{4}$ inch plate may do as well or better for either top or bottom. If cases are used, they might be made of the same materials, the sides each about 3 feet long, of the same depth as the cylinders, or rather less, in separate pieces, with a bend at each end, cut and fashioned like a hinge, so that a pin stuck through at each corner will hold all together.

One special advantage in the use of perforated zinc is, that the metal takes very little of the mucus or glutinous matter with which the eggs are covered ; the metallic surface just holds the clots of eggs (which are not unfrequently laid in and through the perforations and stick on the outside), yet they can be rubbed off with great facility without breaking the eggs, and without wasting the grume or

mucus. This is important, for the grume is very beneficial to aid incubation, as well as to make the egg adhere to slips of paper or linen, and to the leaflets afterwards, when placed upon the bush; besides, the holes or perforations are very convenient for the moth to hold on by—they let in the air (which can be easily damped, if needful, by hanging a wet rag over or round the cylinder), and admit of examination at all times, without interference with the occupants—altogether, the moths seem to entertain a sense of security and content, somewhat as cattle, sheep, &c., feel within an efficient enclosure, which releases them, to a great extent, from the fear of intrusion, as well as keeps them in safety. The cylinders of course stand upright. The life of the moth is from three to eight or nine days; but if they do not pair within about thirty-four hours after emerging, they seldom are of any service.

The moths seldom or never pair except at night, and most generally at the quietest and most dewy time the same night, or between the day and the morning next following their emerging. It will be well, and make an essential difference, if a large number is kept, to let them pair of their own accord. At all times it is best to avoid handling, as the less they are interfered with, much larger and more numerous are the eggs obtained, and they are also of a superior quality. In the morning, open the place where the cocoons are suspended, and with a pair of scissors clip the tip of one wing of all the females that are coupled. This can be easily done without disturbing either male or female; and it may be here mentioned that the females are almost invariably the uppermost. Then remove all that are not paired, and, if required, place them, both males and females, together in one or more cylinders, as there may be room. Those left coupled will separate towards dusk, and as the female commences laying immediately, the males should be at once removed. The females may be left in the cases, or may be carefully collected and

placed where they are required to lay their eggs. For this purpose the cylinders are admirably adapted, and twenty, thirty, or even more may be placed (of course now without the males, which are best destroyed) in each, and during the first night every female will probably lay from sixty to sometimes even over two hundred eggs, and the first-laid eggs are generally the finest. The moths, as already notified, rest during the daylight; and it will be convenient to take occasion during the morning or day to collect the eggs. To do this, if there are more than a very few in the cylinders or cases, remove the moths into others, taking them gently by the shoulders or two wings held together a little way above the base, and setting them one by one on the sides of the fresh cylinder; rub off the eggs with the finger, place them aside, and the cylinder is ready for another batch. The eggs are very hard and tough, and there is little risk of injuring them. Keep all one day's laying together, in a cup, glass, or any convenient dish or phial, with a note of the date of laying. The stale and surplus males should be destroyed and given to the fowls, and also all the females not wanted, or considered not fine enough to maintain or improve the quality of the stock.

The sexes are recognized by the evidently larger and plumper body of the females—by the lower pair of wings being both rounder and larger than in the male—by the curves of the upper wings being less deep in the females than in the males—by the form of the hinder part of the body, which in the females is bent or peaked down, as if ready to deposit the eggs—and by the difference in the antennæ already alluded to. The two last are the most ready signs, but even they may not always make the case quite obvious, for sometimes when the males are peculiarly fine, they seem in shape and bulk so like the females as not to be readily distinguished at first glance; generally the females appear the finest.

If only a few are expected, it may be best to collect the imagos soon after they are dry. Three hours is ordinarily enough after emerging, but they must on no account be touched until the development is thoroughly complete and the limbs and body quite set, for the moths would be rendered worthless if meddled with prematurely. Place them in a cylinder to couple, and then proceed as before recommended.

In dry weather, before a change, and during rough evenings or nights, the moths keep back or but few emerge, but the day or evening or night after rain, and while the atmosphere is yet moist and quiet, they come out freely as they mature; this circumstance will often assist the observer and enable him to make arrangements, two, three, or even more days beforehand. Cripples and imperfectly developed moths of either sex seldom or never breed, and this should be a caution not to handle cocoons set apart for stock too roughly. Moths, more especially the males, become of little value from over excitement, if they do not pair before the expiration of the second night after emerging.

The females continue laying for three or more consecutive nights, but it is advisable to dispense with more than the first and second nights' laying, as the later eggs are seldom so fine as the early ones from the same female. In all, one female effectually fecundated will lay from 160 to 360 or more eggs.

About the eggs:—It will be noted that the writer has always insisted not only on the advantage but on the positive necessity of a certain degree of moisture or humidity in the atmosphere, to obtain the best results with all sorts of animals which pass through the egg state. The air of Australia is sultry—sometimes parching; and if eggs of any kind are kept very dry, the yet immature animal in the shell is impoverished or withered, by its own proper liquid elements being too largely drawn upon to make good the absorption outwards through the pores of the shell, and either perishes

unborn or becomes poor, attenuated, weazened, and lives a spiritless and profitless existence. It will be seen that ailant eggs, especially the fine ones of good females copiously fecundated by the male, have a considerable amount of a viscid substance, grume, or mucus about them. This mucus serves several purposes; first, it plumps out the egg, making it fertile, then it is useful to secure the eggs to some solid substance, which will prevent their being washed or blown away or otherwise lost. The mucus also nourishes the after-growth and development of the contents of the egg, by its own inherent moisture, and by what it collects and perhaps modifies and passes in through the pores of the shell. If the ailant egg is always kept in one position, it is very noticeable how much better the germ settles in posture, and how singularly well the yet unborn little caterpillar selects the most appropriate spot at which to eat through the shell and get at its future food. It is recommended that each day after the eggs are collected they be placed on little slips of damp, stout, unsized paper, (thick blotting-paper is good for the purpose, as it can be used time after time without waste), say from 50 to 200 eggs sprinkled on each slip, which may be three inches by four in size, so that each egg is separate, or not too close to its neighbour, but about half a hundred is a convenient number, on a slip $2\frac{1}{2}$ or 3 inches by $3\frac{1}{2}$. These slips may be best of paper tinted the same colour as the leaflet, to partially avoid attracting the attention of birds and flying ants, which are very quick to observe, and who having once noticed a novelty on the bushes, do not fail to find out that there is something for them to eat there. Either damp them once a day, at evening, which is preferable, as allowing them to become nearly dry and damp alternately; or, to save trouble, place the papers, with a wet cloth underneath, on a sheet of glass, or the like, which will maintain the the moisture for several days, especially if the whole is covered over with a close frame and glass, so as to prevent

evaporation. Eggs should not be kept in too dark a place, but certainly not in the sun, and rather in the shade than in very much light.

Slips of linen or grass-cloth may be employed with advantage instead of paper, but it is not expedient to use fabric made of cotton. It is a curious fact that all silk-yielding caterpillars have an innate aversion to hemp and flax, and to textures woven from them or from similar fibrous materials; they have a partiality for cotton and some other substances, and this partly explains why grass-cloth and linen in the management of the eggs answer better than paper, which is most frequently made of cotton stuff; the little caterpillars are too contented and pleased, if perchance, as many do, they get out of the egg-shells on to the cotton slips or paper instead of on to the leaf; they remain too long fasting on the cotton, and thus become weak before starting in search of food, but with linen and grass-cloth their antipathy sets them at once to the leaflet; at least, such is the conjecture formed by the writer from his own observation, which induces him to prefer and adopt the use of grass-cloth.

The writer would impress upon the reader's attention his experience that care in the management of the eggs in this simple particular, namely, the nurturing the embryo or germ while yet in the shell is, in this climate at any rate, a matter of considerable importance. He has observed that the caterpillars hatched from judiciously tended eggs are always fuller sized and more active, from, and even at the moment of birth; the little fellows set to at once, and from the very first, feed vigorously, and thus distend and strengthen their frames at a period of essential consequence. This power of eating, well begun, is maintained, or perhaps improved during the whole time of the caterpillar's short life, in direct proportion according as the first hours immediately after hatching are well employed. The

caterpillar is less dainty or capricious, and thrives better under all vicissitudes, whether of drought or of continued rain; it acquires a bigger bulk, and completes its utmost growth in a shorter time. It may, therefore, be easily comprehended why the ailant do better in the open on the trees than nursed in-doors. The fresh food, cool, crisp, and succulent, perhaps damp with morning dew, is clearly better than any half dry, tough, flavourless substitute grown in a house or conservatory, or gathered beforehand. It is very plain that, the greater the bulk of the animal, the larger the cocoon; but, to comprehend the case, add to this the well-established fact, that with the ailant, as well as with all varieties of mulberry and of other silkworms, the shorter the period of feeding up, in an increasing and accumulating ratio of proportion as the period is more or less brief, superior in quality as well as in quantity is the silk obtained. It is a well-ascertained principle of old, that if a certain number of mulberry caterpillars fed up and progressed according to unaided nature, will yield (say) 100 grains of silk, if matured, in thirty-two to thirty-five days, the same will yield 150 to 180 grains, if laid up in twenty-seven or twenty-eight days while, if the worms complete a healthy feeding up, which they very well may do, if skilfully treated, in twenty-four days, the result is a yield of 250 grains from the identical number of worms. These figures speak largely in favour of discrimination in management, and the benefits of fore-thought, and of knowledge of what to aim at. In the case of mulberry silkworms, this fact has long borne the character of almost mathematical precision as to its results, and may well be a source of amazement or mystery to those not familar with the subject. The ailant is not, as is the mulberry worm, a thorough creature of domestication, but experience of the writer tends, as far as it goes, to instance the same characteristics in the ailant, though in a much inferior degree; and we must bear in mind that the ailant, feeding out of doors, is yet in some sort wild or only partially

domesticated. To sum up:—A fine egg means a fine caterpillar, a fine caterpillar means a fine cocoon, or, in other words, fine silk, and plenty of it, as well as a fine imago, and a fine imago implies fine eggs, and abundance of them; therefore, let the reader understand the value in this climate of attention to a due amount of moisture. According to the degree of judgment and skill devoted to this point, equal to it will be the amount of success in obtaining fine cocoons; and not only this main consideration, but success as well in obviating disappointments and degeneration of stock, and in multiplying numbers and improving the breed. It should not be omitted, that this matter of a slight degree of moisture or damp (not wet) affects likewise the moths, which emerge larger and develop more fully in a suitable atmosphere, than in one where the animal dries too quickly. Besides, as has been hinted before, the pairs couple more readily, and with less loss of animal energy and vital matter, in dewy nights than dry.

The increase from one fertile pair of moths may be at something like this rate:—Say the pair may yield, along with others, an average of 150 eggs. If these should arrive (which is extremely improbable) safely at maturity, and all become imagos in due time, they might become seventy-five pairs; but instead of seventy-five pairs, let us assume that we begin the second generation with twenty-five couples. These couples, at the average of 150, should give 3,750 eggs. If these (which is again exceedingly improbable) all escape casualty, and become moths, the number of pairs would be 1,875; but let us once more take only a third part, or less, and call the stock to commence the third generation 600 pairs. These, giving the same average as before, would furnish the ailantery with not less than 90,000 worms.

Now let us suppose that one pair give an average of 200 eggs. These 200 eggs, without losses, would become 100 pairs of moths, and these 100 pairs, at the same rate of

increase, would give 20,000 eggs, or, without losses, 10,000 pairs of moths; and these, in like manner, at 200 eggs per pair, would make the number of the third generation 2,000,000. This will shew the absurdity of calculations founded on theory only, and the nonsense of computations of this kind; but at the same time it will speak to the intelligent mind rather forcibly that something can be done with food so cheap to grow, and so easily, abundantly, and permanently reproductive, where once planted, as the ailantus, if even a very small value can be attached to the cocoons of caterpillars, which multiply at the rate at which the animals in question are known to propagate.

Thus far the average increase in Australia of such moths, as paired, was over 200 eggs per pair; the highest score in the first season (January to June, 1867) was 365; the highest noticed in the present season (commencing with September, 1867), 413 eggs laid byone female. It should be noted as a general rule that the more numerous the batch the finer is each egg individually. Let the reader, however, at once disabuse his mind that he can begin breeding ailants with any chance of success with a small number. If he has but a slight stock, the chapter of accidents must be dead against him. If he has only a few, it will be a very great chance if they emerge in pairs male and female at the same time or sufficiently near, and if they do come in pairs he may fail to get them to couple, or some accident or oversight occur to spoil the opportunity. He should have enough, at first, to override all mishaps, and while his attention is awake, season and food propitious, obtain a few couples with which to continue. After having once mastered the knack, he need never fear having a short supply of fertile eggs at all times to stock the ailantery.

In Australia, ailant eggs most generally hatch on the ninth or tenth morning from the night on which they were laid; the period is seldom less than eight days, and is some-

times fourteen and even more. It will soon be perceived that the sound eggs indicate by their appearance that they are sound; in about a week the eggs have become dark, the shell dryer, thinner, and more crisp; close observation will reveal the young worm curled and cooped up within, and just ready to take the first step in life. The slips of paper or grass-cloth with the eggs on, should be placed on the ailantus trees a day or two before the eggs are likely to hatch. This may be effected in several simple ways—we find this plan most convenient; place a slip with the eggs upon it under one or two leaflets, the best about the middle of the leaf, not the youngest, but full grown or nearly so, clean and tender, and bringing the sides of the slip over, pin with a single pin the two lips of the paper and the enclosed leaflet together, so that the eggs be held in gentle contact both with the paper and the under part of the leaflet, and yet admit of a free passage for the air all through; there is no fear of a single egg being lost in this way, if nattily done, wet or dry the glue will hold them, and when the animals come out, they crawl at once on to the leaf, their next home and food; they can be easily observed, and as soon as they are all right carefully remove the pin and paper, which may be used over and over again; the animals will require no further handling until it is time to take the cocoons and secure the crop.

The natural food proper for the ailant caterpillar is the leaf of the ailantus tree, a tree common in Australia, and very easily propagated. The tree is called *Ailantus glandulosa*. The word ailantus is a latinized term coined by botanists (to serve for both a botanical and the English name) as a translation of the Chinese name, which signifies "tree of heaven," partly because of the beauty of the tree itself and partly on account of its great value, for it supplies now, as it has supplied for centuries, the chief means of support and luxury to many millions of the most wealthy and thriving people in China; and the specific name of

glandulosa is added to distinguish this species from others of the genus, by reason of its having near the base of each leaf one or more swellings or knots in the outer corner which are termed glands. This ailantus is indigenous to India, China, and a great portion of Asia, besides the islands from thence to Australia ; and it is also indigenous to some parts of the continent of Australia itself, though the plants about Sydney and Brisbane have been derived from Europe, where the tree has been in use for ornament for more than a century. The ailantus is readily propagated by seeds, but most quickly from suckers and from cuttings of the root ; plants may be obtained of all the nurserymen in Brisbane and Sydney. The tree itself will grow, if permitted, to a height of from 60 to 100 feet, and the timber is of excellent quality and durability, though of singularly rapid growth ; but for the purposes of producing silk, the ailantus should be kept cut close back, and never allowed to attain a greater height than 5 or 6 feet, which it will do in a single season, and in a few weeks every time as often as it is cut back, yielding a better and more luxuriant foliage as the stump acquires size and the roots extend their hold below. A plantation of ailantus is called an ailantery.

To form an ailantery, an excellent plan is to set the ailantus seeds, seedlings, suckers, or root-cuttings in treble rows, quincunx fashion, so as to have each plant about 30 inches to 4 feet apart ; a lane 10 or 12 feet or wider should be left between every clump or treble row, and across the ends of the rows, according to the quality and nature of the ground. If practicable, let the rows run crosswise to the prevailing or most violent winds, and horizontal rather than up and down the slopes. Each treble row or clump might conveniently comprise an equal number, about 200 plants in all, say about 4,000 plants per acre. The ailantus likes plenty of room, yet thrives in any soil, and in any situation, but the better the soil the better the

plant, and as the tree is deciduous (that is, casts its leaves regularly in autumn, and becomes bare during winter), even if it is not cut back, the falling leaves, &c., decaying, soon accumulate a vegetable mould, and greatly improve the land. The ailantus makes an admirable shelter for cattle, sheep, or horses, as no creature besides the ailant caterpillar, not even a goat will touch it, and it harbours no vermin of any kind. The odour is peculiar and remarkable, in that the same scent is given out by every part of the tree, leaves, root, and stem alike; and this odour is so offensive and repulsive to almost all animals, that very seldom are even insects found on any part of the ailantus, but the scent is only perceptible to human beings when the plant is bruized. The tree is singularly well adapted to sandy and sterile soils, and would be of great value if planted extensively on the wide open plains which are now turned to so little account in these Colonies. Millions of these trees have of late years been planted in Europe as forests, with the objects of enriching the land, and protecting the surface from droughts, in times of scarcity, and, in times of heavy rains, modifying the tendency to disastrous floods. The plan has been found very effective, and now the use of the ailant silkworm would add another powerful motive to all persons interested in land to improve and protect their property, add to the comfort and security of their stock; and yet while doing so, not only immediately repay all cost of planting, but give a money profit besides. The foliage of the ailantus varies a good deal according to the dimensions of the tree; the leaves of the large tree being much fewer in proportion, smaller, and more woody than those of the young bush. The leaves have long leaf-stalks starting direct from the branch or stem, and these leaf-stalks sometimes 3 to 6 feet long and more, have numerous leaflets growing in pairs along their whole length. These leaflets in strong plants, well cut back, are very fine and succulent, and are found in this climate to

suit the ailant silkworm exceedingly well. The finer and firmer the foliage the less silk is expended in securing the leaflet to the footstalk or the footstalk to the branch, therefore more silk (and the best as being the first emitted) is laid up in the cocoon itself, and a more valuable article obtained for sale; the animal's instinct in this particular is a very remarkable characteristic.

Upon these leaflets the eggs are placed as before recommended, and for the most part will be found hatched by 8 o'clock on the morning of the tenth day from that on which they were laid. At birth they are indeed tiny little fellows, and having taken a short run about the leaflet and a nibble, will soon huddle together head and tail and rest till evening, when and during the night and early morning they will take the little food they require and thus go on for about five days, when from a dirty-looking yellow color covered with rows of dark hairs, spines, or tubercles, they will gain a clearer and better appearance. Now, having grown much larger, eaten till they are so distended that they are in fact hide-bound, they find it necessary to leave off eating; this they do, and soon slightly shrink in size, when they literally walk out of their skins. As the period of moulting or sloughing is a most precarious time of their existence, and when they are subject to most mishaps, it is well to explain that when caterpillars cast their outer or scarf skins, so complete is the operation that a coating comes off every part of their body, the eyes, the teeth, even the very nails or claws shed their outer layer. This happens in this wise:—Finding a change necessary and unavoidable, the little animal fastens the claspers with which it grips hold at the extremity, its eight real feet, and six hands, or front feet as they are occasionally called, each with a small but secure band of silk to the leaflet; it remains thus secured, inactive and fasting until the body is shrunk and the outer skin thereby loosened and shrivelled enough; presently the caterpillar, by moving its head about, cracks the dry skin

in front, and as it curls off, the head is liberated and then the feelers or hands; with these it makes a forward movement, and with a little exertion the body and legs all come out, leaving an entire perfect skin adhering to the leaflet.

It is on such occasions as this that its enemies ply their attentions most assiduously, and the helpless animals suffer most; the ants particularly seem to have the intelligence to understand and watch their opportunity. It should also be mentioned that, if the wind is violent when the sloughing takes place, the caterpillars are often knocked off or miss their hold; if so, they are seldom hurt by the fall, and if not picked up by the ants or other enemies, will, if there be no weed, grass, or other difficulty to impede or perplex them, crawl back on to the bush or rising suckers, and get on all right again.

Upon casting their skins the second time, the worms have a clear golden yellow look, and grow apace, until, in a few days, they again become too big for their clothes, and cast them off for a new suit, which this time is white with little blackish spots, the tubercles like a number of points covered with a white greasy substance, as if they were little frosted knobs. This white is very general over the body, and is more or less due to a sort of sperm or wax which throws off rain or dew, instead of the hairs or spines, which, while the animal was smaller, necessarily lay closer together and served the same purpose before, as well as a partial protection from its foes. Again another moult occurs, and now the color, which here and there before faintly showed through, becomes a stronger tinge of blue and green, the tubercles more developed, and more elegant, lines or rims on head, feet, claspers, &c., edged or tipped with gold and blue. By the time the caterpillar has reached its fourth and last moult it is about an inch and a quarter long. Now indeed they eat in earnest, and may be seen almost hourly to increase in size and beauty. As they grow, the colors become more intense, the brilliant white wax some-

times tinged here and there with a rosy hue, and the whole frame portly and singularly noble in aspect. By the time they are full-grown, they measure 2½ to 3 inches long in their natural position, and even more if displayed. Their appearance is very attractive, and it would be difficult to imagine a more interesting and gratifying sight than a flourishing plantation with hundreds of thousands of these magnificent silkworms ready to yield their stores of treasured wealth. Since the ailant has been naturalized in Australia the caterpillars in every stage appear to thrive, but it is mostly after the last moult that the effect of the climate becomes most manifest. In Europe the caterpillars in the last stage are of an emerald green; here some are green, others of a brilliant cobalt blue, others white and green and white and blue tipped with gold and spotted with black—the whole appearance indicating the perfection of condition and content. The caterpillars, including their four moults, take but four or five weeks to accomplish their full development.

It must be noted that caterpillars hatched on the same day from eggs laid on the same day, and as far as may be similarly placed to all conditions, will not all progress alike; there will be a great difference as to the period of their laying up, the range is from about twenty-seven days to fifty or sixty days, therefore they cannot be expected all to become moths at the same time. Practically the irregularity in the rate of progress in all stages keeps the grower constantly occupied, and on a certain scale this irregularity itself neutralizes the inconvenience, which on a small scale would be a serious difficulty, and establishes an average which enables their attentive and expert hand to do all he desires, at the time most opportune or agreeable to himself.

When the caterpillar has attained its extreme growth, a marked change evidently pervades its system—it appears to be turned into a mass of rich liquid silk. The animal seems

scarcely able to hold in the subtle fluid, peers and moves about uneasily, as if in quest of a place of rest and relief. If molested at this time or handled, the caterpillar will probably be lost, for at this moment the worm is peculiarly sensitive. Like almost all animals, it has an aversion to contact with those of every other kind ; but the delicate, refined organization of this silkworm evinces the revulsion of disgust, if meddled with when just ripe and about to prepare a habitation which is to be the scene of the marvellous transformation already spoken of, and the loathing of interference provoked at this time so overcomes its nervous frame, as to divert or incapacitate the system for healthy action. The result is an abortion.

But, as will always be the case if left alone, the ripe caterpillar soon commences its work. The reader will recollect what has been said about the tree ; the ailantus is deciduous ; in time the leaflets will fall, and the main leaves with the long footstalks will only remain for a while. Now the caterpillar seems to be conscious of this danger, and, to provide against it for so long as its own safety may require, commences operations by making a strong band of fine silk close round the junction of the leaflet and leafstalk, and partly a little way up the leafstalk also, if the leaf is sound, but if weak, or it is one of the small early leaves, then the band is continued right up to the stem, passed round, securing the whole firmly to the main branch. The caterpillar then goes back to the leaflet selected originally, and having coated one side with a film of silk, as the film dries it curls the leaflet, and so enables the caterpillar easily to strap the edges towards each other and wrap itself inside the web, which it very speedily forms, by moving its head about in zigzags and trailing the liquid silk out in an uninterrupted stream ; this very rapidly consolidates, and the caterpillar disappears from view. The silk as it is trailed out is coated with a sort of gum or glue given out by the worm at the same time as the silk ; this

gum joins the double fibre as it issues, rendering it one strand. The powerful glue has the property of withstanding wet, and neither hot nor cold water alone will loosen the fibres.

When just made, the cocoon is always of an agreeable white or grey, but generally soon darkens more or less into different shades of grey, drab, or brown. Some fine cocoons, however, retain externally, and more or less internally, a permanent light silvery complexion, and the judicious cultivator will always select, assort, and place aside the best in form and quality for breeding of these apart, as well as choice ones of the others separate. To allow time for the exhausted caterpillar to pass into its new form and acquire consistence, the cocoons should not be disturbed for a few days, but in about four or five days or a week according to the weather and the leaf they are on after they are completed, the cocoons may be gathered; this is done readily enough by seizing the loose part (the lower end is best), and plucking it off the leaflet. Stripped from the green leaflet, the pod comes away perfectly clean, and as much of the loose silk should be brought away as possible, for this adds to the value of the article. The cocoons not required for breeding should soon be scalded in hot or boiling water, or steamed for a few minutes, to destroy the life within, and when thoroughly dried in the air are ready for market.

If it is desired to wind off or card the cocoons, they must be first slackened by soaking in a ley of wood ashes for an hour or two. From the ley they should be put wet into an earthern pot, and as they become soft (in a few days) they may be wound off or reeled with the common reels. A solution of potash (ley of wood ashes) contains the principle that turns grease into soap, and must be used with discrimination. The art of reeling, &c., to render raw silk as used for manufacture, is a special handicraft and branch of industry quite distinct from the growing of cocoons. It is

considered that for the present, the cultivator will do well to concentrate his attention on the production of the cocoons only.

The fabrics manufactured from ailantine are of many sorts; some are known by such names as "washing silk," "Chinese silk," tussore, corah, foulard, &c.; great quantities are required particularly to supply England and Spain with the silk pocket-handkerchiefs in common use, printed and plain, by gentlemen, and for ladies' aprons; many substances used for ladies' and children's dresses that will wash, and for gentlemen's summer coats, &c. Ailantine is also made into the finest crapes, as well as into a number of exquisite tissues, which are too new to commerce to have yet obtained distinctive European names. This staple has only recently come to light, though many fabrics made from it have been known for a long while. The close of the China war, and the facilities afforded by the treaty rendering access to the interior of that empire practicable, have given us this valuable addition to the resources of the landowner as also of trade and manufacture.

The value of and profit to be derived from the cocoons may be stated in a very brief form. The pods full or empty may be worth from ten-pence to thirteen-pence a thousand; at fifty caterpillars or cocoons per bush and four thousand bushes to the acre, the yield of cocoons should be 200,000; these, at one shilling per thousand, equal in money value £10 per acre for one generation.

The period of emerging of the moths is a very difficult matter to understand, and yet more troublesome to forecast. It might be said, and not without substantial truth, that experience indicates that the chrysalis matures or progresses so far as to be ready to assume the moth state, in about twenty-four to forty days under ordinary circumstances, and would, as it frequently does, reproduce several times in a season; but practically this experience is not uniform,

even under what are apparently identical conditions; for instance, it by no means follows that if 1,000 ailant caterpillars lay up upon one and the same day, the whole 1,000 will emerge as imagoes at the same time—in fact they do not so emerge. A number, perhaps a few, will shew out on the 24th, 25th, 26th, and next following days, others, few or many, every day for several days during a protracted period, according to the weather, condition of the atmosphere, unseen or unknown influences, and perhaps not issue from their seclusion, though mature, until the next season; possibly some may even remain dormant for years, and still be alive and sound in the pod. The late cocoons, those completed in autumn, will generally remain dormant during winter, and the moths commence to issue forth rather late in spring—a few about the time the ailantus tree has burst the bud and the leaf begins to enlarge, but the majority afterwards, when the tree shall have gained a sufficiency of foliage, namely, towards the end of September and in October, or later—the ailantus is scarcely in full leaf before November. It must be again noted that the cocoons should not be kept in too dry an atmosphere; though so well protected by the cocoon, the chrysalis may become parched and hard, and thus perish—moderated humidity tends to facilitate a greater and more healthy development of the imago, and promotes its disposition for activity.

It will be very judicious to devote the utmost attention and discrimination to the selection of the finest cocoons for breeding, and whenever practicable, to set apart the handsomest, quietest, most vigorous, and most fully developed moths of both sexes, that may appear from day to day, so as ever to obtain the highest results in the progeny from one generation to another. Perseverance in this course cannot fail with time, to ensure a high degree of excellence, and in all probability surpass the present fair standard, Climate and food, in these Colonies, afford every

encouragement to look for the same success in breeding and improving silkworms, that has rewarded the skill and judgment and enterprise so signally displayed in the management of sheep, and which have redounded so greatly to the personal advantage of the wool-grower individually, as well as to the reputation, honor, and benefit of Australia.

The main drawback and difficulty in growing cocoons out of doors, consists in the very imminent danger of the caterpillars being preyed upon and devoured by birds or other animals and insects. Throughout the whole economy of animated nature the order of Providence appears manifest—that as food is more or less plentiful, so are the mouths to eat it. The abundance of insects or animals of one sort never fails to call forth and multiply those of another, to reduce and keep down a redundance, or the disposition of any one sort to usurp and retain an inordinate preponderance. It is the province of the human mind, by forethought and timely action, to incite, assist, and stimulate the natural tendency of such animals as are of direct value or immediate use to man, to increase, to sustain, and protect them according to their several special habits and peculiarities ; and while so doing, to be not less careful in removing all adverse influences, in subduing, destroying, or preventing the access of other animals which would militate against their prosperity. A constant regard to these considerations, so to influence and adjust the circumstances that may concur to avail and profit him by the dispensation to increase and multiply, so evident and so beneficial in the creatures now under discussion, will be, to the intelligent thinker and doer, the groundwork and measure of his success in cultivating silk in the open air.

To grow ailantus is the easiest of all agri- or horti- cultural operations ; it is easier to grow than grass. Permanent and constantly improving a plantation of this hardy and

most prolifically-reproducing bush furnishes a never-failing, ever-abundant, and seasonable supply to the ailant caterpillar—the only animal which touches this its appropriate food, and which is now naturalized and found to thrive exceedingly well in the climate of Australia.

In a country like this, where insect life teems in such plenty, enemies to the new comer are numerous, and of many kinds; the observations and local knowledge of each person must watch for, and suggest measures for the protection of his stock; but the foremost, probably, and most active and unrelenting destroyers will be the ants of all varieties, on foot and on wing—those universal scavengers alike in town and bush. These pests must be got rid of and permanently exterminated. Besides the ants, birds and beetles, wasps and hornets, spiders and tree frogs, the horned wood-bug, and the elegant and useful insect called the praying mantis (familiarly known as the "native lady") and many others, will be found to make some inroad upon the worms; but their depredations will be insignificant compared to the havoc made by ants, if permitted.

It is a great point, however, that the casualties mostly happen to the caterpillars when very young and small, and that after the third moult but few losses occur. The amount of food consumed by the caterpillars while very young is too insignificant to be worthy of notice, and care will readily make good, if necessary, where wanting, the he number so that each bush will yield the full burden of cocoons it is able to bear. This, however, must be done with circumspection, so as to under rather than overdo the load, to keep the rows or clumps progressing uniformly, to allow of gathering the cocoons quickly and with economy of labour; also, to admit of all the bushes in one clump being rigorously cut back, which should be done immediately, without reference to season, or as soon as possible after the leaves are wholly or partially consumed.

It must be said, as a general caution to the grower of silk out of doors, not less than to the cultivator of domesticated worms, too great attention cannot be paid to cleanliness; slovenliness and neglect will inevitably deprive the ailantery of its best resources and results; the ground should be kept clear of all encumbrance, especially of loose rubbish and of whatever may harbour slugs (which are very fond of caterpillars) and any kind of vermin. Insects of one species bring those of others, and birds and other animals as well to devour both, and these one and all would soon make havock with the young stock. It would be well to have no vegetation besides the ailantus on the ground. The ailants not unfrequently please to change their diet. When this caprice takes them, they quietly drop themselves off the bush or crawl down the stem on to the ground, and travel in quest of another plant the leaf of which may be more agreeable to their appetites. They are never hurt by the tumble, for the tubercles act as springs to break the fall; the friction of the leaves against each other by the wind now and then rubs them off the leaflets, and a sudden jerk while they are caught napping sometimes dislodges the burly, fat, sleepy ones, but few healthy caterpillars if of any size will be lost if the ailantery is kept clean.

The reader will have gathered, in the course of the foregoing, that the range of life of the ailant is comprised within the brief period of from about nine to thirteen weeks, say in the egg eight or nine to fourteen days, in the caterpillar from twenty-six to forty, in the cocoon twenty-four to forty days, if the emerging be not delayed (as possibly may be most advantageous) until the following season. He will have remarked the number of eggs indicating a progeny equal to a multiplication of the stock (half of 160 to 360) 80 to 180-fold, and occasionally even over 200-fold. Assuming all these to reproduce in like manner only once more or a second time within the year, the increase will be enormous. In reality, however, there are many

impediments and fallings short of what might be the case, were there no failings with the moths and no enemies to devour the caterpillars. The knowledge, tact, and judgment of the cultivator should, therefore, be energetically directed to place his stock, and maintain the conditions under which their wonderful rate of increase will most avail for their prosperity and for his benefit.

It is necessary to be very cautious if occasion should arise to remove the caterpillars, especially when very young, not to injure them. The feet of the ailant are armed with claws or talons as well as with suckers, with which they hold on with such extreme tenacity that any attempt to dislodge them cannot fail to cause injury. If hurt, they may not die immediately, they may feed all right apparently, but they will very seldom get over the next moult. If needful to interfere, it is best to let them get by their own natural progression on to a leaflet, and then pin the leaflet; or, cut off the leaflet, and then pin it to a leafstalk, from whence they will take care of themselves. When large they may be deftly handled and placed lengthwise on the leafstalk, which they will immediately seize and grip with feet and claspers, but the less they are meddled with in any way the better.

Sometimes, and principally in the early part of the season, the moths may emerge very disproportionally as to the sexes, the females at first being not infrequently alone or by far the most numerous; at the latter end the males more generally preponderate, while during the middle season the sexes are for the most part well matched. A little management will always ensure a daily supply of moths and of fertilized eggs throughout the late spring, as well as during summer and autumn, and he can scarcely help having the living stock in every stage of progression at the same time, so the grower can be always employed for months, and can always turn to account whatever food he may have to sustain the worms.

The progress of the silk industry in Australia may, probably, in the commencement, be like that of wool. In its early days it was disparaged, and objected that there was no market for wool in the Colony. How different is now the case! All objections and arguments as to "how it can't be done" of very wise and prudent people are forgotten, or recalled to mind with contemptuous derision. Let it not be supposed that the production of silk can possibly be overdone. Insatiable markets are ready to take all, even as many millions of pounds as can be produced. Country storekeepers and merchants will soon be as eager to purchase cocoons as they now are to secure a clip of wool. Meanwhile, in default of other purchasers, and to afford assistance to cultivators, Messrs. Asselin and Brady, of Brisbane and Sydney, are willing to make arrangements to take either ailant or other cocoons, at a specific price, for cash. It is more easy to overdo the production of wool than of silk, and, paradoxical as it may seem, it is yet true that the lower in money value the raw material, the less probability of a glut, the more uniform the return, and more profitable to the grower, for, as in the case of cotton, a very small reduction in price of a material largely consumed, invariably brings it into request for new purposes. The ailant culture may be advantageously commenced on the farmsteads of settlers, on sheep stations, on unimproved purchased lands, and particularly on the long, bare downs or plains at present so imperfectly utilized. As an adjunct to the growth of wool, the writer has no hesitation in saying that the ailant may be made to pay the station expenses of every run, in fact increase the profit to the squatter from wool by 2d. to 4d. a pound, and thus without involving any extra outlay of capital, enlarge the capabilities of the run for general purposes. To the farmer the ailant may be a great resource, striving women and industrious children may better the circumstances of the family, and bring into the common stock from time to time no inconsiderable amount of ready money.

The writer wishes to impress upon the reader that this sketch is drawn, not to give an irksome detail of minute instructions, but rather a general idea or inkling of the subject, and an explanation as brief as may be of such particular essentials as but few people could be expected to find out and investigate, or possess the means and education, time and opportunity, to ascertain for themselves. Indeed much more might be said, but this paper is already too long; it is thought that all absolutely necessary to say has been said, and the grower must rely in some degree on his own good sense and discernment.

The writer also wishes it to be very distinctly understood, that the Government, in taking the exceptional course of circulating the information contained herein, adopts no responsibility whatever as to its contents or omissions. It may be believed the Government is not prepared to afford any encouragement, inducement, or reward, to Messrs. Asselin and Brady, nor to any person whomsoever in connection with this industry, which it is represented may very well dispense with adventitious aid. The Government, in consideration of the great disadvantage at which the scattered population of the interior is placed, has simply acceded to a proposal to lay some elementary information within reach of such as may desire and seek it.

He would also earnestly advise intending cultivators to fully comprehend, that, even as an experiment, unless the cultivation is commenced at the very first on an adequate scale, nothing but failure and disappointment can possibly ensue. At the first, in all matters, (and the production of silk is assuredly no exception to the general rule) experience must be gained; and to gain the experience contemplated, a certain extent of food must be at hand, and a sufficient number of worms must be reared, in order that enough may escape and survive the large reductions which will inevitably happen in spite of the best pains, even to the most attentive and skilful, during the first essays. The

beginner must not only have a large enough plantation to get into stock, but he must have this ready beforehand, so that as he gets on he will not be stinted for food—have to entertain no misgiving, but that at whatever time he may wholly or partially succeed (and let him not imagine he will succeed without trouble) in the management and increase of the worms, all may be in order. Ten acres of ailantus will not generally cost more laying down than one acre in wheat or maize, therefore an experiment to be real may still be made cheaply enough. Unless carried out to a certain extent, it would be long before any appreciable benefit could be achieved, while with adequate preparation, some return, small perhaps at first, may be looked for within a reasonable time, to encourage the pursuit by a sense of substantial profit, and warrant further effort.

Sydney: Thomas Richards, Government Printer.—1868.

Messrs. Asselin and Brady, *having made a tender to place, by way of gift, at the disposal of the Government, for gratuitous distribution, any number of Ailant Silkworms which may be needed to effect the general dispersion of this valuable animal, of which they are yet the exclusive proprietors, throughout the Colony,—it is notified, for general information, that persons desirous of obtaining the stock, may either address those gentlemen (by letter only) direct, or apply to the Librarian at the Botanical Gardens, Sydney, on Mondays and Thursdays, from* 11 *to* 1 *o'clock. The only restriction as to the distribution is, that provision be made, beforehand, for the sustenance of the Worms in quantity, to be of more than mere nominal value.*

All applications should state—

1. *Name of applicant in full.*

   Occupation.

   Address.

   Nearest post town.

2. *The extent of land in cultivation or prepared to form an Ailantery, which should not be less than* 10 *acres.*

3. *The (approximate) number of ailantus plants actually rooted, in leaf, and growing on the same; the place where the Ailantery is situated.*

And unless the applicant is a Magistrate or Minister of Religion, the name and address of some Magistrate or other respectable person resident in the district, who is able of his own knowledge to authenticate the fact of the Ailantery being in leaf, must be given.