

## CORRESPONDENCE.

Written for this Paper

## FROM EGG TO COCOON.

In a former article I gave something of the life history of the silkworm, gleaned from several writers on the subject. From the same authors we summarize the following in regard to the wintering and hatching of the eggs, and the rearing of the silkworms;

The success of silkworm rearing depends largely on the treatment the eggs have been subjected to after being laid. When the eggs are first laid, they breathe with activity, the oxidation causing them to change in color from yellow to purple. This absorption of oxygen is very active. At this stage the forced suspension of vitality by the application of cold is hurtful, but after a period of three weeks or a month the egg enters into a state of rest, and can then be subjected without harm to cold, which is necessary for starting the further development of the embryo, the temperature required to accomplish this being from 32 to 40 degrees Fahr. When once the eggs have been through or kept at this temperature for a certain period, the development of the embryo proceeds regularly, and any attempt to retard hatching will end in possible failure.

The great object to be attained is to have the eggs hatch uniformly, hence those laid at one and the same time should be kept together. The eggs should be kept in perforated boxes in thin layers, in a cool, dry cellar, or any cool room. When the winter has passed, the eggs should be brought into a well-aired room, and, if loose, spread out evenly on trays. The temperature of the room should average about 75 deg. Fahr. Eggs should never be exposed to the sun.

As the hatching period arrives, if the weather be very dry, water should be sprinkled about the room to keep the atmosphere moist. This enables the tiny worm to eat through the shell readily.

It is necessary that the eggs should be kept below the hatching temperature until the period when the leaves on the mulberry trees are ready for gathering. The eggs should be placed out of the reach of ants, mice or other vermin, which are very destructive, and should not be kept in a room which becomes cold at night. If the eggs have been uniformly kept during the winter in a very cold place, it will take from two to three weeks before they hatch out. If the winter has not been severe, they will hatch out in five or six days, when placed in a room having the proper temperature.

Artificial hatching can also be resorted to, if necessary, by means of an incubator. But if the eggs are placed in a cool place from the period when laid till the close of the winter, and then brought into an airy room having the proper temperature, no further trouble need be taken in the matter; the hatching will proceed naturally.

The chief conditions of success in silk-raising are (1) the use of good eggs, (2) proper care of the worms. The eggs when about to hatch should be

brought into a cool, airy room, and spread out evenly on a sheet of paper and placed on one of the trays, or if the eggs are already adhering to a piece of paper or cloth, this has only to be spread out on the tray. Over them place a piece of coarse mosquito netting, and on the netting some finely cut-up mulberry leaves. The tiny little worms will come up through the netting and settle on the leaves. The reason why these leaves should be cut up very fine for the first moult is to give the worm more edges to feed on, and to lessen its work at the start. It is not absolutely necessary to cut up the leaves, if buds and tender young leaves are supplied, as nature has provided the young worm a pair of strong horny mandibles for this very purpose, but it would be necessary in case the leaves were large and coarse. After the worms are through, the netting should be carefully lifted by the four corners, and the contents tumbled out on to another tray. The netting is again put on the egg tray, and the same operation gone through, placing the worms on a second tray, and so on till all the worms hatched out are recovered.

Experience only will teach what amount of food is wanted. The leaves should be renewed when they become in the least dry. A feed should be given in the early morning and the last thing at night always, additional meals being given during the day as it is seen the leaves are eaten. Do not heap too much food on the worms, otherwise they get buried and are lost; besides, the leaves ferment and induce disease. As the fifth day approaches the worm begins to lose its appetite—the first sign of its sickness. When the first worms show signs of moulting, leaves should be sparingly given, and must stop altogether as the first ones get all right again, until the others in the same tray get right also. But some are sure to be weakly, and should be thrown away or kept on separate trays. During the period of moulting no food is required. As soon as the majority are again active, feed them well, as they grow rapidly after every moult. Give them plenty of room, and here the use of the transfer tray with larger mesh, before mentioned, comes in. Place this tray over the one from which the worms are to be removed, sprinkle some leaves on it, and, after the worms come through, remove to another tray. The worms should be handled as little as possible. The second and third moultings take place in due time, and with little difficulty; but the fourth and last moult is more laborious, and the worms take longer in going through it and often die. At this moult it would be wise to give the ones that recover first a light feed. After the last moult give as much as the worms can eat, for they will eat voraciously just before the time for spinning their cocoons. As the worms increase in age and size, feed them with maturer leaves, as these contain more nutritive material.

Give the worms plenty of room, and one rule never to be forgotten is to clean up the litter before and after each

moult. Cleanliness is absolutely necessary for the development of healthy silk worms. The spinning period follows eight or ten days after the last moult, and the worms should be kept well supplied with fresh leaves. When the worms are ready to commence spinning, loss of appetite and restlessness will again be observed, with the addition that they will throw out silk threads. They should now be placed in the cocooning tray or Davril ladder, or as practiced in some cocoon-rearing establishments, arches of dried twigs may be built over the trays. The feet of each arch should be about 10 or 12 inches apart, interlaced the arches with well-dried brush of any kind. The cocoon will be finished in about six or eight days, and may be removed from the trays or arches.

When the worms are in the trays or arches they should be watched to prevent two or three of them making a double cocoon, as these would be unfit for reeling, owing to the interlacing of the threads. Care must also be exercised in removing the cocoons not to get them stained. The cocoons should be sorted. The firmer the cocoons feel between the finger and thumb the better they are. The firm ones should be kept separate from the very soft ones, as these latter, if mixed with the firm ones, would be crushed and stain the others.

In most silk-producing countries the parties who raise the cocoons sell them to the reeling establishment before suffocation is necessary, and these establishments have better facilities for this work than are to be found in private families. If, however, the reeling is done by the raiser, or some time must elapse before the cocoons can be sent to a reeling establishment, the cocoon is injured for reeling purposes by the egress of the moth. This can be prevented by stifling them with steam or choking them by dry heat. Steaming is the surest, quickest and best method, if the facilities are at hand; it can be done at any steam mill. The cocoons are laid upon shelves in a tightly sealed box and the steam is turned in. Twenty minutes will suffice to do the required work, and the cocoons are then dried in the sun. A temperature of 200 degrees F. will accomplish the purpose if continued for twenty-four hours.

For those requiring fuller information than it is possible to give in a newspaper article on the subject of silk-culture, we would refer them to bulletin No. 9, division of entomology, department of agriculture, Washington, from which, in the above, I have drawn largely.

It may be interesting to quote the conclusion of the writer of the bulletin referred to in regard to the profitability of silk culture. After giving a number of detailed estimates, he says: "It will be seen by the estimates given above that silk culture is not (and never has been) an exceedingly profitable business, but it adds vast wealth to the nations engaged in it, for the simple reason that it can be pursued by the humblest and poorest, and requires so little outlay. The question of its establishment in the United States is a question of adding to our own productive resources. There are hun-