The Mahonia section of berberis includes among its number some very ornamental kinds, the commonest and withal one of the most valuable being *M. aquifolium*, which is one of the best shrubs for forming undergrowth beneath trees. Besides this, it is extremely handsome as a specimen shrub, that is if a good form be chosen, for where raised from seed in quantity it is possible to pick out some greatly superior to others.

M. fascicularis is even still more showy when in bloom, the clusters of flowers being, as a rule, more numerous. The common Mahonia when in an open position has the foliage more or less suffused with a bronzy hue, and in some specimens it is strongly marked. When in this state it is very useful for cutting, as the leaves last a long time in water, and look well along with chrysanthemums in vases or similar purposes. There are several tall, stately growing species among these pinnate-leaved Mahonias, of which some of the Himalayan kinds are rather tender. The hardiest, and therefore by far the most useful to the planter, is *M. japonica*, whose lemon-colored blossoms will, during mild winters, make their appearance by the end of February, and be succeeded by berries as large as small grapes. At all times the stately character of the plant and the long pinnate leaves, of a stout leathery texture, stamp it as quite distinct from the general run of hardy shrubs.—*T., in the Garden.*

A HOME-MADE INCUBATOR.

P. H. JACOBS.

WITH the aid of the illustrations but little difficulty need be experienced in making an incubator, and as the one here described is in general use, it has been fully tested and found to perform all that may be reasonably expected. Fig. 1 represents the interior of the incubator.

It will be noticed that there are an outer and inner box, with sawdust between them—chaff or any such material will answer. The outer box is 48 inches long, 44 wide, and 36 high. The inner box is 40 inches long, 32 inches wide, 18 inches deep, and holds a tank 32×36

FIG. 1.

inches. The outside measurements are used in measuring boxes. A is the outer box and B the inner. C C are strips one inch wide and one inch thick, with iron rods, $\frac{5}{8}$ of an inch thick (F F), upon which the tank rests. D D are similar strips (but no rods) for supporting the egg drawer. E is a $1\frac{1}{2}$ inch tin tube, two feet long, which admits air into the ventilator (space under egg drawer). The ventilator is five inches deep, and is of the same length and width as the tank. Fig. 2 shows a sectional plan.

A is a tube extending through the incubator into the tank. B is a faucet for draining off water. C is the egg drawer. D is the tin air tube. The egg drawer, Fig. 3, is four inches deep, outside measurement, and should be made of light material. It is 39 inches long and 30 inches wide, containing three movable trays, $1\frac{1}{2}$ inch deep, and of size to fit in the drawer. The bottoms are thin strips (one inch wide and one inch apart, to both drawer and trays), over which muslin is tightly drawn and tacked. The tank is seven inches deep. The faucet is detachable, and screwed in when desired, on a thread. The tube on top is seven inches

FIG. 2.

high. The front of the egg drawer is also boxed off and filled with saw-dust.

It requires about 115 feet of lumber (inch tongued and grooved boards), and the cost of the tank is about \$5. The plan of the tank is shown at the sectional view given. When completed, the incubator is simply a box, having this appearance. See Fig. 4.

In building one may follow any plan that may be preferred, as it is not necessary to conform to any particular design. Have the floor close. All that is necessary is to make a warm room for keeping the eggs at a uniform temperature; but do not attempt to have any

tubes for the escape of air. Opening the drawer to turn the eggs provides sufficient ventilation.

DIRECTIONS FOR OPERATING.

Each tray holds about 80 eggs, laid in promiscuously, the same as in a nest, making the total number for incubator 240 eggs. First fill the tank with boiling water, but never allow it to remain in the tube on top, as it thus increases pressure; hence, when the tank is full to top of tube, draw off a gallon of water. Fill it

FIG. 3.

48 hours before putting eggs in, and have heat up to 115° before they are put in. As the eggs will cool down the heat, do not open the drawer for six hours, when the heat should be 103°, and kept as near to that degree as possible, until the end of the hatch. It is best to run it a few days without eggs, to learn it thoroughly. Place incubator in a place where the temperature does not fall below 60°. As the heat will come up slowly, it will also cool off slowly. Should the heat be difficult to bring up, or the eggs be too cool, you can raise or lower the trays, using small strips under them. You can also stop up or open the air tube in the front opening of the ventilator whenever you desire. When the eggs are put in, the drawer will cool down some. All that is required then is to add about a bucket or so of water once or twice a day, in the morning and at night, but be careful about endeavoring to get up heat suddenly, as the heat does not rise for five hours after the additional bucket of water is added. The cool air comes from the ventilator pipe, passing through the

muslin bottom of the egg drawer to the eggs. Avoid opening the egg drawer frequently, as it allows too much escape of heat, and be careful not to open it when chicks are hatching, unless compelled, as it causes loss of heat and moisture at a critical time. Cold draughts on the chicks at that time are fatal. Do not oblige visitors. Be sure your thermometer records correctly, as half the failures are due to incorrect thermometers, and not one in twenty is correct. Place the bulb of the thermometer even with the top of the eggs, that is, when the thermometer is lying down in the drawer, with the upper end slightly raised, so as to allow the mercury to rise, but the bulb and eggs should be of the same heat, as the figures record the heat in the bulb, and not in the tube.

Turn the eggs twice a day at regular intervals—six o'clock in the morning and six o'clock at night. Do not let them cool lower than 70°. Turn them by taking a row of eggs from the end of the tray and placing them at the other end, turning the eggs by rolling them over with your hand. By removing only one row you can roll all the rest easily. Give no moist-

FIG. 4.

ure the first week, very little the second, and plenty the third week. Do not sprinkle the eggs. For moisture, put a wet sponge, the size of an egg (placed in a flat cup), in each tray, the second week, and two sponges in each tray the third week. Do not put in sponges until you are about to shut up the drawer, after turning. Wet the sponges by dipping in hot water. After the first ten days the animal heat of the chicks will partially assist in keeping the temperature. Be careful, as heat always drops when chicks are taken out. You can have a small glass door in front of the egg drawer, to observe thermometer, if desired.

Always change position of trays when the eggs are turned, putting the front one at the rear. After the fourteenth day spray the eggs twice a day with water warmed to 110 degrees, using an atomizer, and do it quickly.—*Rural New-Yorker.*

OBSERVATIONS ON THE FEMALE FORM OF PHENGODES LATICOLLIS HORN.

ENTOMOLOGISTS will remember the interest taken about one year ago, in the discovery that the female form of a Lampyrid* (*Zorhipis riversi*) was larva-like, and that the three stages—larva, pupa, and adult—differed but little. On the night of September 27, 1886, a larviform luminous beetle was collected on one of the walks of the campus of the University of North Carolina.

Pupa State.—As the insect cast its skin only once—in the spring of 1887—after coming into my possession, this must represent its pupa state.

Description.—Length when crawling, two and three-fourths inches; width, three-eighths inch. Flattened, larviform, luminous; composed of twelve segments (exclusive of the head), tapering gently behind, and more decidedly on the three anterior segments. Chitinous plates on dorsum blackish brown, the second to eleventh inclusive with a pair of large, light brown, oval spots. Anal plate light brown, except a median band of blackish brown, convex behind. First plate light brown, except a median irregular and two lateral blackish brown spots. Below each stigmata, on the fourth to the eleventh segments inclusive, are two longitudinal folds, the anterior half of each fold blackish brown, shading into light brown in the middle, and becoming yellowish white, with an olive tinge on the posterior half. Posterior edge of each dorsal plate dark olive brown; the posterior angles of the pro-, meso-, and meta-thoracic plate and the anterior third of the pro-thoracic plate yellowish white, tinged with olive. On the fifth to ninth segments inclusive (ventral surface) are one pair each of small, elongated, black dots, corresponding very nearly in position with the pairs of luminous organs of the ventral surface. Anal proleg blackish brown above, yellowish white below.

Besides the stigmata on the fourth to the eleventh segments, there is one on the ventral surface of each

PHENGODES LATICOLLIS, SHOWING LUMINOSITY.

anterior corner of the meso-thoracic segment; also two pairs of small dorsal spiracles, one each between the fourth and fifth and fifth and sixth segments.

Thoracic legs brown, suffused with yellowish olive. Tarsus two-jointed; single claw curved. Anterior edge of femur with a row of short hairs; under edge of tibia and first joint of tarsus with a similar row of hairs; under edge of last joint of tarsus with small, short papillae. Head black, $2\frac{1}{2}$ mm. in width, retractile. Mandibles curved, sickle-shaped, black. Antennae four-jointed; labial palpi two-jointed (or three-jointed? Those of a larva collected in July appear three-jointed); maxillary palpi four-jointed.

The location and form of the phosphorescent lights are as follows: On each side is a row of circular ones, one on each segment from the second to the twelfth inclusive. Each of these is nearly one-eighth inch in diameter, and situated in the posterior end of the upper longitudinal fold. The posterior edge of each segment, from the second to the twelfth inclusive, emits a band of light. On the under surface are five pairs, mere points, one pair each on the fifth to ninth segments.

The general appearance is that of a worm beautifully illuminated with bluish white lights, which are disposed in a longitudinal row on each side, and in transverse bands.

The insect was placed in a small, elongated vial, so that I might easily observe and exhibit the display of lights. The light was brilliant until 11 P. M. on the night of September 27. At 2 A. M., the 28th, the phosphorescence had disappeared. It did not appear again until the night of the 30th, when, by disturbing the insect, the lights began to glow, but continued only for a few hours. For a few nights within the space of a week I observed that the insect glowed only when disturbed. After that the phosphorescence reappeared, and I do not believe once disappeared again until it was placed in alcohol, June 16, 1887.

October 1, 1886, I placed it in a glass jar of earth. It made a cell in the earth next the side of the jar, where I could observe the phosphorescence, and where it remained (excepting one warm day in February, 1887, when it came to the surface, and returned at night, when I placed the jar in a cooler place in my room) coiled up until the 15th of April. At that time the luminosity was becoming more brilliant and the brown color was disappearing, to be replaced by a uniform cream color.

I removed the earth from above the cell and took the

*Am. Nat., xi., 648. See also Ent. Am., iii., 208.