considerations which are fully discussed later in this series. At this point it is sufficient to say that these aspects are almost as important as the concentration of the oil itself.

During January and February the grower should be continually on the watch for this scale. It is necessary to examine not only the developing fruits, but also the foliage and wood. It may be found that in January and February the fruits, particularly of oranges, still appear clean, but if there is an infestation on the foliage and twigs this is sure to spread by May to the fruits, and it is then too late to clean off the scales satisfactorily with oil sprays.

The Circular Black Scale.

The circular black scale (*Chrysomphalus rossi* (Mask) (Fig. 3) is almost jet black, is circular or almost so, and is pressed more or less flat against the surface of its host. Almost in the centre of the scale there is a small raised "boss," which is usually of a light brownish-grey tinge. The largest scales usually measure about 2 mm. or 3 mm. in diameter, and, unlike the red scale, they are not transparent. The adult male scale is of similar shape to that of the female, but is smaller.

Life-history and Habits.

The young of this scale hatch from eggs laid beneath the scale of the female. Each egg is about 0·15 mm. long, and is dirty white in colour, ornamented with dark reddish-brown patches, these patches being due to colouring matter within the egg. The young larvæ or "crawlers" just after hatching are about as long as the egg, but considerably wider; they are much flattened, and appear yellowish, suffused with dark reddish-brown. The "crawlers" emerge from the parent scale and settle down in a suitable position, where, as in the red scale, they spend the rest of their lives. After settling, the subsequent stages are similar to those of the red scale.

There are no other data available on the life-history of this insect.

The scale infests both upper and lower surfaces of the leaves of its hosts, and in the case of the orange the fruit is also infested. *Elaeagnus japonicus* seems to be a favoured host of this insect, as large numbers can often be found on the foliage of this plant; *Euonymus* is also a common host. Black sooty mould does not seem to be associated with this scale.

Hosts and Distribution.

Among the food plants of this scale are reported citrus, *Euonymus*, *Elaeagnus japonicus*, *Eucalyptus*, orchids, *Nerium oleander*, *Ricinocarpus*, *Xanthorrhea*, and Camellia.

The species was first described from Australia in 1892. It has also been recorded from California, China, Africa, and the Philippines.

Control.

For this scale use summer spraying oil 1 part in 40 parts of water, and where it is troublesome spray in February.

In connection with circular black scale it will often be found that infestation is brought about from an adjoining *Elaeagnus* hedge or some other alternate host which is acting as a reservoir. Unless steps are taken to remove the scale alternate host plants will prove a continual source of trouble.

References.

(1) MILLER, D. (1935): "Garden Pests in New Zealand," p. 40.

(2) SUMMERVILLE, W. A. T. (1934): "Queensland Citrus Scale Insects and their Control," p. 14.