The mouth parts consist of a long thin sucking tube which can penetrate into the plant tissues and withdraw sap. This is important, as mealy bugs cannot be poisoned unless the poison is in the sap stream.

Beneath their waxy covering the bugs vary in colour from flesh pink to grey.

Life History

In Hawke's Bay mealy bugs emerge from their winter dormancy toward the end of October and start feeding. When the female is about to lay eggs she moves to some part of the tree where she will be well protected. Early in the season this is likely to be under the bark or in crevices of branches. Later in the season females will also choose to hide beneath the calyx of fruit, particularly on pears.

The female deposits her eggs in a loose cottony sac of waxy threads. As this egg laying occupies several days and the eggs do not all hatch at once, it is difficult to determine for how long they are incubated. However, under New Zealand summer conditions the period appears to vary between two and three weeks. As each female may deposit up to 500 eggs, mealy bugs can increase rapidly under favourable conditions.

Shortly after hatching, the young bugs or "crawlers" make their way to young shoots, leaves, or fruit, where they settle down and begin to feed on soft tissue. At this stage, when their food reserves are low and their covering of protective wax is very light, they are most vulnerable to attack.

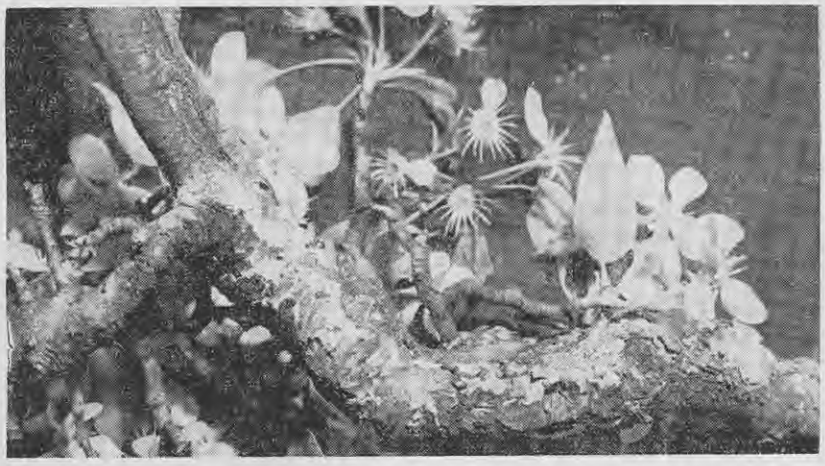
In the next four weeks the crawlers moult twice. Before moulting for the second time the male spins a cocoon, from which it emerges as a small winged insect. These males have no functional mouth parts and therefore can live for a few days only. During this time they mate with the females, though these are only about one-third grown.

Under favourable conditions *P. maritimus* can complete its life cycle in about 60 days. Later in the season, when the weather is cooler, more time is required, sometimes up to five months. As the time required for development is shorter during summer, the numbers of mealy bugs increase rapidly then and they are usually most abundant in late summer and autumn.

Overwintering

Overseas the bug is reported as frequently overwintering as eggs which have been deposited in a secluded spot, such as under rough bark, cracks, crevices, or at contact points between branches. Incubation of these eggs takes months. On hatching, the crawlers may continue under the protection of the ovisacs (egg cases) for some days.

Alternatively, partially mature but fertile females may move off the aerial parts of deciduous trees and overwinter under the protection of stakes, ties, labels, and litter. This is so in New Zealand, but also in Hawke's Bay all stages from eggs to adults have been found in mid winter on trees and round birds' nests. Vast numbers could also be found right in the centre of the tree if the old "sprags", which are common on some pear trees, were broken apart.



Overwintering egg masses under loose bark of pear wood, which affords ideal protection. Young crawlers emerge from these sites at the end of October and in early November.

Where water sprouts are cut back rather than cut off, it takes only a few seasons for these stumps to form a network of crevices providing very good protection for the bugs. No sprays can reach them and as long as this cover is not pruned off a constant source of reinfection remains throughout the year.

Spread

Mealy bugs may be spread by various methods. One of the most important is the transfer of infested plants, fruits, and containers and on the clothing of workers who brush against infested material. Animals may also spread the bugs through contact. Overseas, birds are considered to be important vectors, as they may pick up the young crawlers on their legs and feet when settling on infested trees.

Insects, especially winged species, may spread the pests in the same way, bees particularly, as they are attracted to the honey dew the bugs secrete.

In South Africa wind is thought to be an important factor. Immature stages can be blown about, and a gale will break off and scatter infested leaves and twigs. Floods and irrigation water are other means of spread. Females and ovisacs can float on water for days without damage, as the wax on the eggs and adults protects them. Furthermore, the delicate wax threads round the egg sacs will stick to any object touching them. When the object moves, threads and some eggs go with it.

Enemies

Natural enemies may be placed in two groups according to their method of attacking the host:

Internal parasites, those feeding and developing within the body of the host: One, a chalcid wasp, was introduced into New Zealand in 1923-24, but has had little effect.

Predacious enemies, those completely devouring the host: The chief of these is the ladybird beetle *Cryptolaemus montrouzieri*, or mealy bug destroyer. This black and orange-ended beetle, only 1/16 in. long, is a native of Australia. It lays its eggs among the mealy bug eggs. The young of both hatch about the same time; then the ladybird larvae proceed to eat the young bugs. These ladybirds were first liberated in New Zealand in 1897. Four years later mealy bugs were reported to be under control, but subsequently more beetles had to be imported and were liberated in 1924. The beetles are now scarce, probably because our climate is unsuitable for them. In California these ladybirds are raised under artificial conditions during winter, but that is not practicable here.

Minor predators include other beetles, lacewings, and some flies.

Control

Control measures fall into three categories, biological, cultural, and chemical.

Biological

This has been briefly discussed above.

Cultural

(a) **Clean cultivation**, especially round the bases of trees: Not only does litter at the base of a tree provide