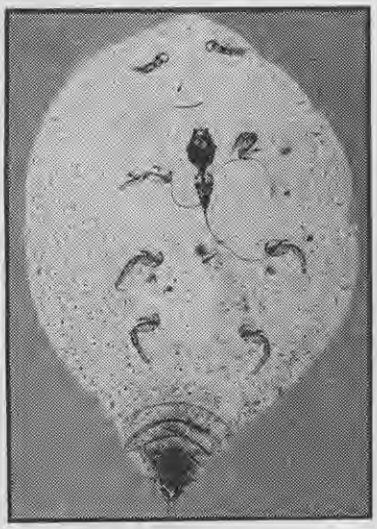
an area of 100,000 acres near Raglan and another of 10,000 acres at Kawhia. These figures do not imply that the whole of these areas is occupied by manuka, but within these districts it is difficult to find a stand of any size which is not carrying the insect.

Taken together these areas represent approximately 11 per cent. of the land area of the main islands. Other areas from which *Eriococcus* sp. has been recorded are shown in Fig. 2. In the areas indicated by a dot on the map the infestation is not yet extensive, though in some places the rate of spread is increasing rapidly. The only large tract of manuka in the North Island from which the insect has not been recorded lies between Lake Taupo and the coast at Opotiki. The distribution shown on the map is by no means complete, but it does show that the insect is capable of establishing under a wide range of climate.

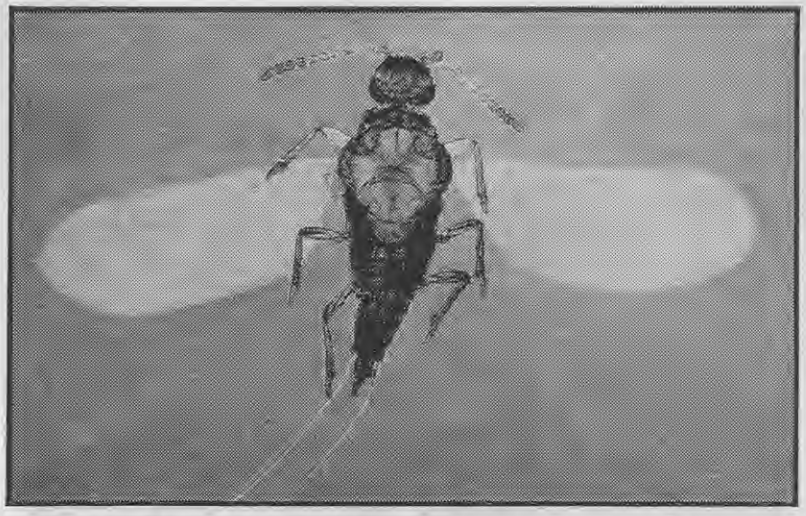
A second species of *Eriococcus* (*leptospermi* Mask.) was recorded by Hoy (1953). Its distribution is still relatively confined in the area between Hanmer, the mouth of the Conway River, and Kaikoura (Fig. 1). This species was described by Maskell (1890) from red manuka and *Leptospermum laevigatum* in Australia. Its occurrence in an isolated locality in New Zealand is difficult to explain. *E. leptospermi* is apparently capable of killing red manuka in New Zealand. Unfortunately the locality in which it occurs has been overrun by the other eriococcid species (*Eriococcus* sp.), which makes the study of *E. leptospermi* as a separate entity rather difficult.

Appearance and Habits of *Eriococcus* sp. and *E. leptospermi*

Plants of both red and white manuka infested with *Eriococcus* sp. show a heavy coating of a black fungus on the lower leaves and stems. This fungus, which was identified as *Capnodium walteri* Sacc. by Mulcock (1954), does not penetrate the plant tissue and is dependent on the continued production of honey dew by the insect. Scattered on the surface



Female of *Eriococcus* sp. (highly magnified).



Above—Male of *Eriococcus* sp. (highly magnified). Below—Crawlers of *Eriococcus* sp. (highly magnified).

of this "mould" are small white flecks, the cocoons of the male puparia. When the outer covering of fungus and loose bark is removed, the females and immature stages of the insect can be seen.

The female is sheltered within a greyish white sac; once fixed to the plant by its rostrum the female remains in one position. The female is about 1/25in. long and is discernible to the naked eye. The male is the only winged stage, small and inconspicuous apart from its two ample iridescent wings and a pair of long waxen caudal filaments. The nymphal stage or "crawler" is somewhat like the female in appearance, but is smaller and moves about.

The female and crawler of *E. leptospermi* resemble those of *Eriococcus* sp., but the two insects may be separated on the host plant, as the sac of the female of *E. leptospermi* is always exposed, whereas that of *Eriococcus* sp. is hidden beneath the exfoliated bark.

Eriococcus sp. has one generation per year under Canterbury conditions, crawlers being found free on the plant in maximum numbers during the 6 weeks from mid-April. Dispersion of the insect occurs during the nymphal period. Under natural conditions the most active spread is by wind-borne crawlers. Spread is therefore more rapid with the prevailing wind than against it. Numerous examples of the effect of wind on the rate of spread may be seen in the Wairoa area.

The establishment of this insect appears to be little affected by either altitude or climate. Scattered manuka plants in the high valleys of the Southern Alps are heavily infested, as are small heath-like plants growing on exposed ridges at altitudes of approximately 3000ft. In the North Island plants have been infested at altitudes higher than 2500ft. Where the degree of exposure is severe the rate of build-up of the insect is slowed down and plants survive longer from initial infection.

Place of Origin

The origin of *Eriococcus* sp. remains obscure. The insect is not known to entomological institutions overseas and though Australian authorities place it close to *E. leptospermi*, it differs from that species in a sufficient number of characters to warrant specific status. *E. leptospermi* appears to be an introduction which can be traced back to its original habitat, but it is difficult to explain its occurrence in an isolated