

Large larval populations of *Nascioides enysi* are reduced by two other factors, the most significant of which appears to be larval competition in the second stage of development. In population studies, using square-foot bark samples from localized outbreaks, such as that in Hochstetter State Forest in 1957, the greatest number of eggs counted was 319 per square foot, but the greatest number of adults that emerged from the same bark was only 43. Where the number of eggs per square foot was 10, the number of adults that emerged was usually 8 or more. All counts were made on the bark after emergence was completed and represented actual counts of egg cases and adult emergence holes. This evidence indicated a marked effect from larval competition, and the examination of 50 samples of bark from 10 trees in the Hochstetter area, and 70 from 10 trees in areas of low buprestid numbers, supported this view. The average figures for each stage of the life cycle appear in Fig. 5. The greatest loss of population appears to occur at about the ecdysis to the second instar in high populations of *N. enysi*. As natural control factors do not show up until the later stages of development, the early larval mortality is considered to be due to intraspecific competition. Further support for this is indicated by the fact that such a loss of population is not found in small larval populations (Fig. 5). There is no doubt some mortality included here could be due to the early resistance of the tree to insect attack but, at the stage the samples were taken, no real assessment of the occurrence, or otherwise, of prolonged successive attacks on the trees could be made. It is probable, however, that successive attacks by buprestids ultimately weaken the trees concerned and make them susceptible (see subsequent section).

The other mortality factor of significance is a mould fungus belonging to the Family Entomophthoraceae. This fungus is very common in buprestids living in trees with very thick bark and particularly where they occur in cold situations. Reductions of the buprestid population by over 90 per cent have been recorded from square-foot bark samples. In such thick-barked trees the parasite *Doryctes pallida* seldom occurs.

The desiccation and death of larvae are caused by exposure of thin-barked infested trees to the sun. In such trees, only those larvae on the southern or shaded side of the tree survive. Those in the exposed bark die and shrivel within their mines.

Some pupal mortality has been recorded and is apparently due to unsuitable moisture conditions, while the colydiid, *Bothriideres obsoletus*, also kills larvae of *N. enysi*.

Factors Contributing to Increase in Numbers of N. enysi

Nascioides enysi is a secondary insect pest in beech forests, but apparently vigorous pole-type red beech (*N. fusca*) appears to succumb to successive waves of attack from adjacent areas where large numbers of the beetle occur. In general, however, it is necessary to find some other cause for the lack of tree vigour, which permits successful buprestid attack on host trees. *Nascioides enysi* appears to oviposit on any available beech tree, but those trees adjacent to forest areas having large numbers of the beetle present, are more heavily attacked than those further away. The larvae develop up to the end of the first stage, in both susceptible and resistant trees, the latter, apparently, preventing further development. Trees with trunks damaged during the spring and summer seem to attract gravid buprestid females. This damage may be caused by wind or by forest operations.

Tree susceptibility to buprestid attack is probably a major factor in the increase in numbers of *N. enysi*. The causes of tree susceptibility to buprestid attack are probably many, but usually outbreaks of buprestids occur only after many trees