

Coconut rhinoceros beetle – susceptibility to *Oryctes nudivirus*

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The coconut rhinoceros beetle CRB (*Oryctes rhinoceros*) is host to the *Oryctes nudivirus* and virus infection is common in populations of the beetle within its natural endemic range. A number of other dynastine scarab beetles have been reported as susceptible to the virus after being challenged in the laboratory but the virus has not been recovered from field populations of these species nor has it been found to persist in treated populations after attempted biocontrol releases except for those with *O. rhinoceros* and the closely related *Oryctes monoceros*. There has been a recent report of an OrNV in farmed dynastine beetles from Korea.

The pathology of the virus disease was reviewed by Dr A.M. Huger (2005) and is further summarised here. OrNV particles are ingested by the feeding beetles. Both adults and larvae are susceptible. Virus is ingested by the feeding larva from contaminated organic matter. The virus penetrates the cells of the gut epithelium, crosses into the haemocoel and infects fat body cells. In advanced infections the larva becomes glassy and may suffer a prolapse of the rectum. Infected larvae may rise to the substrate surface before death. The adult beetle ingests virus while feeding on sap in the palm crown. The virus will invade the midgut epithelial cells and cause them to swell, proliferate and fill with virus. Infected cells burst releasing virus into the gut which is distributed in the excrement. Infection causes a characteristic swelling and whitening of the midgut which can be used for diagnostic purposes.

For both stages the infection is chronic and the beetles may live for several weeks following primary infection. Viral virulence can be tested using bioassays but these are difficult to carry out due to the chronic status of the disease and the apparent difficulty of maintaining healthy insects in the laboratory. There is a need for good rearing/maintenance systems and standardised bioassays in order to quantify virulence and make comparative studies between virus isolates.

Virus can be monitored using visual analysis and PCR detection after field release. Studies suggest that virus is uncommon in newly emerged beetles but infection levels are high in beetles caught in flight traps suggesting adult to adult infection is common. Populations of CRB-G are usually free of virus, unless they occur in mixed populations with the susceptible CRB. The Guam population of CRB-G has shown no evidence of infection after oral challenge which suggests that at least this population of CRB-G is resistant/tolerant to the virus. Further studies are necessary to characterise the putative resistance of CRB-G to OrNV.