Open Peer Review on Qeios

Polydnaviridae (Polydnaviriformidae)

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Polydnaviridae is a family of viruses that infect parasitoid wasps from the Ichneumonidae and Braconidae families. *Polydnaviruses* have this name due to the segmented double-stranded DNA genome they possess, an unusual feature among dsDNA viruses.

In biological control, these pathogens have been acting as regulators of pest populations and have been developed for use as biological insecticides in integrated pest management systems. These viruses are increasingly important Increasing use of healthier and more sustainable products, these biological control agents have become an attractive alternative use when compared. to chemical insecticides in various agricultural and forestry systems. In most cases, baculoviruses are quite efficient because they are highly virulent and specific for their hosts, as well as being safe for human health and the environment (Figure 1).

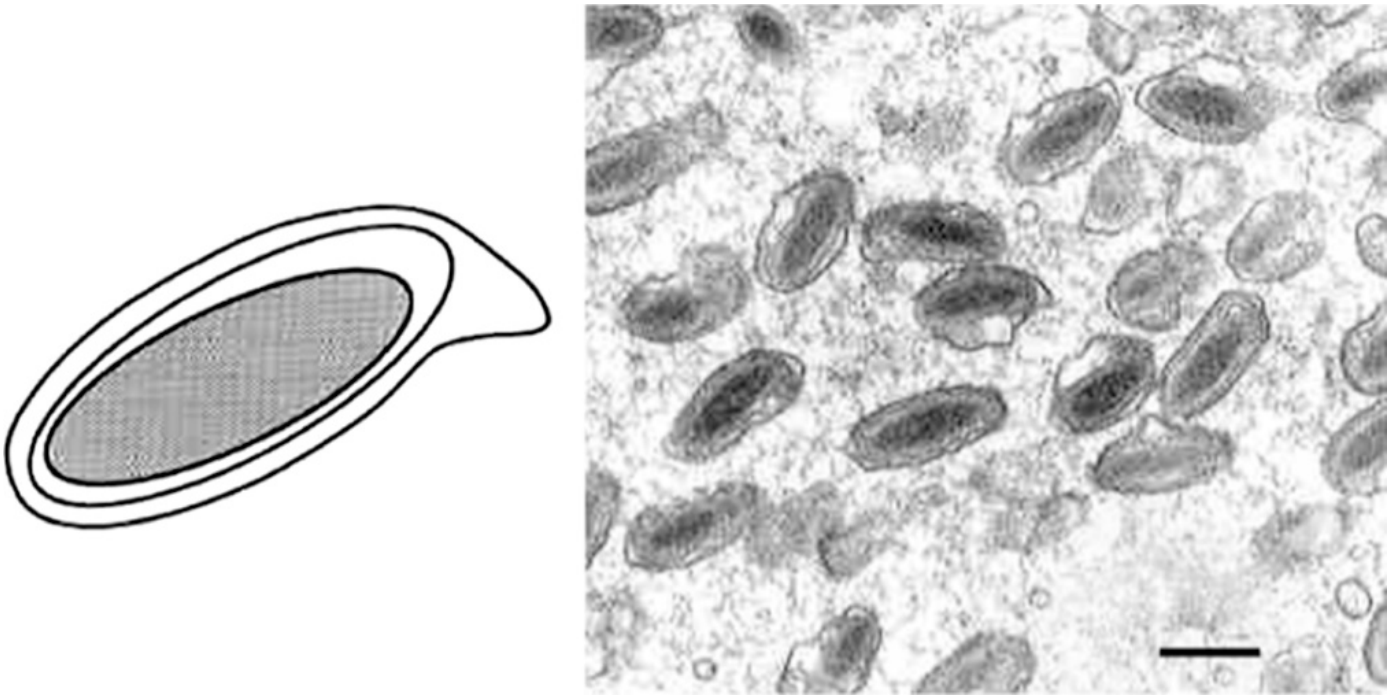

Figure 1. Ichnovirus virions.

Sources: Strand, MR ND Drezen, J.-M. and https://ictv.global/report_9th/dsDNA/Polydnaviridae

Among the families or groups of described invertebrate viruses, baculoviruses are the most documented and recognized

as pathogenic for insects. The name baculovirus is derived from the morphology of the rod-shaped nucleocapsids. Baculoviruses are genetically and morphologically distinct from other families of invertebrate viruses and constitute the largest group of viruses known to attack insects, predominantly those of the order Lepidoptera [1-10].

Parasitoid wasps from the Braconidae family lay their eggs inside immature individuals of other insects. The host's immune system normally forms an encapsulation structure, which prevents this egg from developing. However, the female wasp also inserts polydnavirus virions present in its body into its host's body. These carry some of the wasp's genes that will suppress the host's response [1-10].

Polidnavirus (Polydnaviridae) lives in symbiosis with parasitoid wasps, in a remarkable evolutionary association, guaranteeing the success of parasitism in host caterpillars. The virus replicates in the wasp's ovaries, where it accumulates in the liquid in which the eggs are immersed, before being injected into the caterpillar during parasitization. With the ovipositor, at the time of injecting the egg/eggs, the virus is injected together into the host. The viral gene products will be expressed to alter the host's immune defenses and thus optimize the conditions for the development of the wasp larvae [1-10].

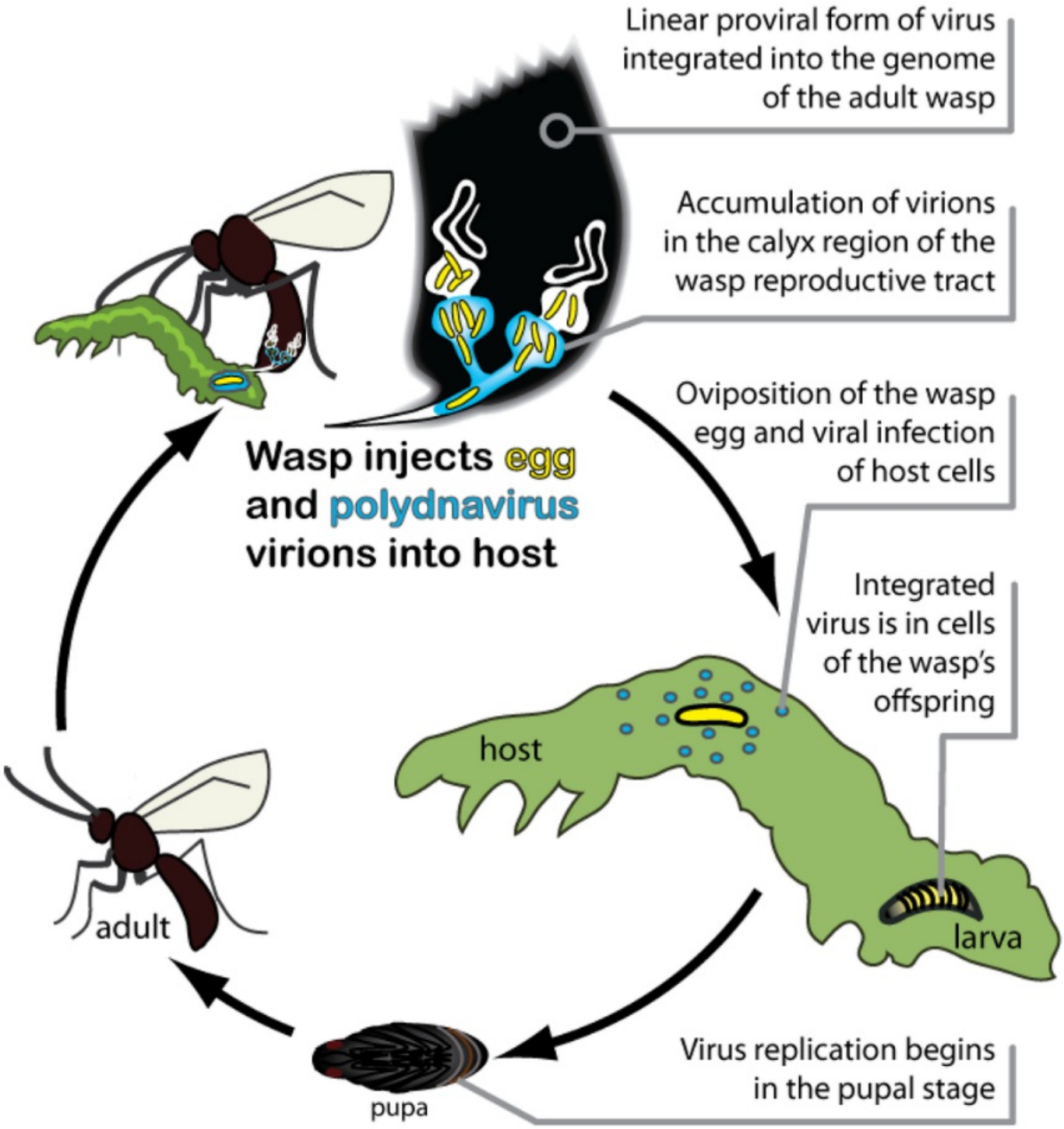

Figure 2. Life cycle of parasitoid wasps and Polydnaviruses (PDVs) parasitizing a lepidopteran larval host.

Sources: https://doi.org/10.3390/insects3010091 and https://www.mdpi.com/2075-4450/3/1/91.

Bracovirus and Ichnovirus constitute the two groups of polydnaviruses symbiotically associated with thousands of species of parasitoid wasps of the superfamily Ichneumonoidea, acting as vectors of virulence genes and allowing the larvae of these wasps to develop in the host. One of the most abundant viral segments of *Cotesia vestalis* (Haliday, 1834), bracovirus contains a gene previously described as a helicase of unknown origin and which is not present in any other

polydnavirus. One of the main, if not the main obstacle to the development of parasitic wasp larvae is the host's immune system [1-10].

Examples of Polydnaviridae.

Lepidoptera (Arthropoda: Insecta): soybean armyworm –*Anticarsia gemmatalis* Hübner, 1818 (AgMNPV), corn armyworm – *Spodoptera frugiperda* (Smith, 1797), (SfMNPV), cassava armyworm –*S. frugiperda*, (ErelGV), cassava caterpillar - poplar – *Condylorrhiza vestigialis* (Guenée, 1854) (Guenée)] (CoveNPV), mosquito caterpillar –*Chrysodeixis* sp. (ChinNPV), cotton bollworm – *Helicoverpa armiger*a (Hübner, 1805) (HearNPV) [1-10].

Tetrastichus howardi (Olliff, 1893) (Hymenoptera: Eulophidae) is a gregarious endoparasitoid, a parasitoid of pupae from several families of Lepidoptera, including Crambidae, in the case of *Diatraea saccharalis* (Fabr., 1794), Noctuidae, with the species Helicoverpa armigera and Plutellidae, especially with *Plutella xylostella* (Linnaeus, 1758) [1-10].

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