

## Discovery of New Nucleo Cytoplasmic Large Deoxiriboviruses by Transmission Electron Microscopy

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The nucleo cytoplasmic large DNA virus (NCLDV) superfamily encompasses a diverse group of large DNA viruses that infect a wide range of eukaryotic hosts [1] and is believed to be monophyletic [2]. Most of these viruses were discovered by electron microscopic detection of the particles in the infected hosts, and were once included in the now abandoned Icosahedral cytoplasmic deoxyribovirus group (ICDV), whose definition depended strongly on the ultrastructural features of the virions [3]. Although several of these viruses could be characterized at the molecular level, many of the particles observed by TEM still defy molecular characterization and may conceal important information regarding the biology of these viruses.

Furthermore, many of the viruses once thought to be only weakly pathogenic turned out to be highly pathogenic for susceptible hosts, but well adapted to their natural hosts. Several well known examples can be found in the smallpox virus, African swine fever virus or the ranaviruses [4].

In this presentation we report on our experience with the identification of new viruses from the NCLDVs, demonstrating the value of transmission electron microscopy for virus discovery.

Our work detected NCLDVs infecting erythrocytes in 14 new species of heterothermic vertebrates and suggested the group as new genus within the *Iridoviridae* family [5,6]. New European ranaviruses infecting lizards and amphibians were discovered, disclosing their potential danger to aquaculture facilities [6,7]. A new mimivirus-like particle was observed in amoebae from a Lisbon hospital.

### References

[1] J Filée, *Current Opinion in Virology* **3** (2013), p. 595.

[2] LM Iyer *et al*, *Virus Res* **117** (2006), p. 156.

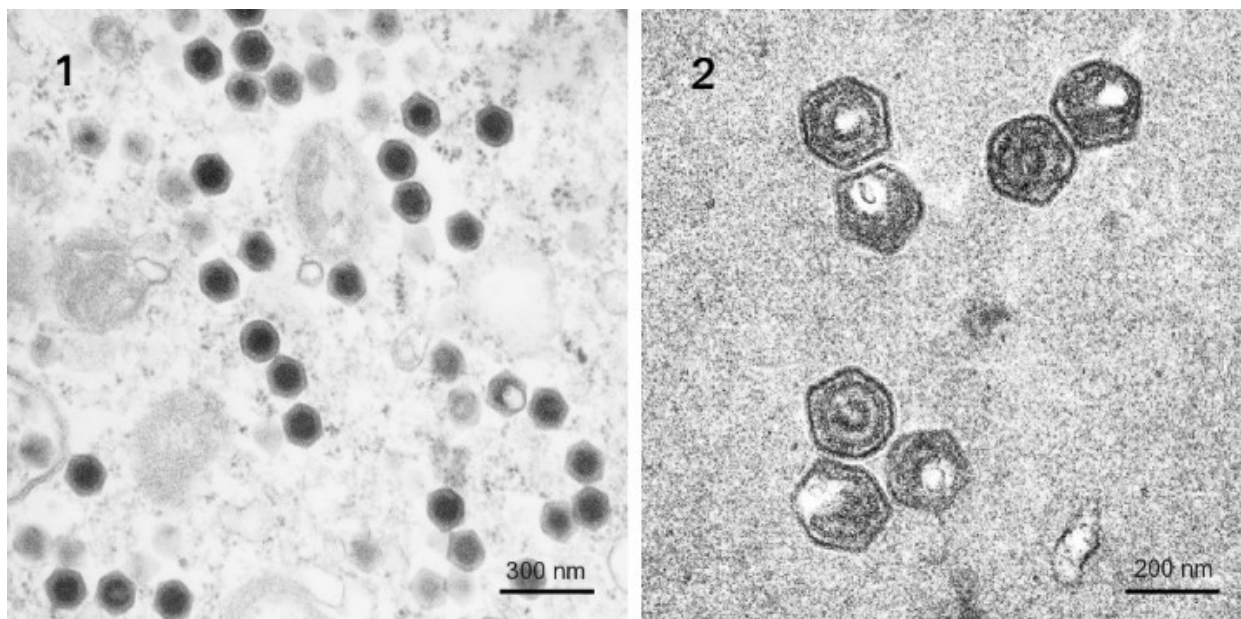
[3] G Devauchelle, DB Stoltz and F Darcy-Tripier, *Curr Top Microbiol Immunol* **116** (1985) p. 1.

[4] T Williams, V Barbosa-Solomieu and VG Chinchar, *Advances in Virus Research*, **65** (2005) p. 173.

[5] AP Alves de Matos and I Paperna, *Ann Parasitol Hum Comp* **68** (1993) p. 24.

[6] AP Alves de Matos *et al*, *Microsc Microanal* **17** (2011) p. 101.

[7] C Soares *et al*, *Froglog* **56** (2003) p. 1.



**Figure 1.** Ranaviruses of *Testudo hermanni* ranavirus, Switzerland.

**Figure 2.** Lizard erythrocytic viruses of *Lacerta Monticola*, Serra da Estrela, Portugal.