

Template for Taxonomic Proposal to the ICTV Executive Committee To create a new Genus in an existing Family

Code[†] **2003.080F.01** To create a new genus in the family* ***Phycodnaviridae***

Code[†] **2003.081F.01** To name the new genus* ***Coccolithovirus***

Code[†] **2003.082F.01** To designate the species ***Emiliana huxleyi virus 86 (EhV86)***
As the type species of the new genus*

Code[†] **2003.083F.01** To designate the following viruses as species of the new genus*:
Emiliana huxleyi virus 86 (EhV86)

Code[†] **2003.084F.01** To designate the following viruses as tentative species in the new genus*:

Emiliana huxleyi virus 84 (EhV84)
Emiliana huxleyi virus 88 (EhV88)
Emiliana huxleyi virus 163 (EhV163)
Emiliana huxleyi virus 201 (EhV201)
Emiliana huxleyi virus 202 (EhV202)
Emiliana huxleyi virus 203 (EhV203)
Emiliana huxleyi virus 205 (EhV205)
Emiliana huxleyi virus 207 (EhV207)
Emiliana huxleyi virus 208 (EhV208)
Emiliana huxleyi virus 99B1 (EhV-99B1)
Emiliana huxleyi virus 2KB1 (EhV-2KB1)
Emiliana huxleyi virus 2KB2 (EhV-2KB2)

[†] Assigned by ICTV officers

* repeat these lines and the corresponding arguments for each genus created in the family

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New Taxonomic Order

Order	<i>Caudovirales</i>
Family	<i>Phycodnaviridae</i>
Genus	<i>Coccolithovirus</i>
Type Species	<i>Emiliana huxleyi virus 86 (EhV86)</i>
List of Species in the genus	<i>Emiliana huxleyi virus 86 (EhV86)</i>

List of Tentative Species in the Genus

Emiliana huxleyi virus 84 (EhV84)
Emiliana huxleyi virus 88 (EhV88)
Emiliana huxleyi virus 163 (EhV163)
Emiliana huxleyi virus 201 (EhV201)
Emiliana huxleyi virus 202 (EhV202)
Emiliana huxleyi virus 203 (EhV203)
Emiliana huxleyi virus 205 (EhV205)
Emiliana huxleyi virus 207 (EhV207)
Emiliana huxleyi virus 208 (EhV208)
Emiliana huxleyi virus 99B1 (EhV-99B1)
Emiliana huxleyi virus 2KB1 (EhV-2KB1)
Emiliana huxleyi virus 2KB2 (EhV-2KB2)

Argumentation to choose the type species in the genus

Original isolate which has been most comprehensively characterised compared to the other isolates. The 410kbp genome of the *Emiliana huxleyi virus* 86 (EhV86) type species has been sequenced.

Species demarcation criteria in the genus

Not applicable

List of Species in the created genus

Official virus species names are in italics. Tentative virus names, alternative names (), strains, or serotypes are not italicised. Virus names and assigned abbreviations () are:

Emiliana huxleyi virus 86 (EhV86)

List of Tentative Species in the created genus

Emiliana huxleyi virus 84 (EhV84)
Emiliana huxleyi virus 88 (EhV88)
Emiliana huxleyi virus 163 (EhV163)
Emiliana huxleyi virus 201 (EhV201)
Emiliana huxleyi virus 202 (EhV202)
Emiliana huxleyi virus 203 (EhV203)
Emiliana huxleyi virus 205 (EhV205)
Emiliana huxleyi virus 207 (EhV207)
Emiliana huxleyi virus 208 (EhV208)
Emiliana huxleyi virus 99B1 (EhV-99B1)
Emiliana huxleyi virus 2KB1 (EhV-2KB1)
Emiliana huxleyi virus 2KB2 (EhV-2KB2)

Argumentation to create a new genus:

Phylogenetic analysis of DNA polymerase gene fragments of these viruses suggests that they belong to a new genus within the family of algal viruses, *Phycodnaviridae* (see figure below). Viruses within the proposed new genus, the *Coccolithovirus*, contain large dsDNA genomes all approx. 410 kbp, they have icosohedral symmetry and have sizes ranging between 150 nm and 200 nm; characteristics that suggest they belong to the family *Phycodnaviridae*. Phylogenetic analysis in conjunction with the size of the virus genomes and host range of the virus isolates suggest they do not belong to any of the current four genera within the *Phycodnaviridae*.

QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.

A neighbour-joining tree showing the phylogenetic relationships of *Emiliana huxleyi* virus 86 (EhV86) and the other algal viruses based on sequence analysis of DNA polymerase gene fragments. The Herpes viruses were used as an out-group. The numbers at the nodes indicate bootstrap values ($n = 100$). The scale bar represents 0.1 fixed mutation per nucleotide position (adapted from Schroeder *et al.* 2002).

Coccolithoviruses infect the globally important marine coccolithophorid, *Emiliana huxleyi*, a marine alga which has a world-wide distribution. *E. huxleyi* is well known for forming vast coastal and mid-oceanic blooms. Its production of calcium carbonate coccoliths and its role in CO₂ cycling and dimethyl sulphide (DMS) production makes *E. huxleyi* an important species with respect to past and present marine primary productivity, sediment formation and climate. The *Coccolithoviruses* outlined in this report were isolated from *E. huxleyi* blooms off the coast of Plymouth, UK in July 1999 and July/August 2001, from an *E. huxleyi* bloom induced during a mesocosm experiment in a fjord near Bergen, Norway during June 2000 and from *E. huxleyi* blooms off the coast of Bergen, Norway in June 1999 and June 2000. These viruses are relatively easy to isolate and susceptible host strains usually lyse between 2 and 7 days after the addition of filtered seawater.

Origin of the proposed genus name

These viruses infect the coccolithophorid *Emiliana huxleyi* known for its production of an armoury of calcium carbonate coccoliths. The genus name is derived from this.

References

- Castberg, T., Thyrraug, R., Larsen, A., Sandaa, R-A., Heldal, M., Van Etten, J. L., and Bratbak, G. (2002) Isolation and characterization of a virus that infects *Emiliana huxleyi* (Haptophyta). *Journal of Phycology* **38**:767-774.
- Jacquet, S., Heldal, M., Iglesias-Rodriguez, D., Larsen, A., Wilson, W. H., Bratbak, G. (2002) Flow cytometric analysis of an *Emiliana huxleyi* bloom terminated by viral infection. *Aquatic Microbial Ecology* **27**: 111-124.
- Schroeder, D., Oke, J., Malin, G. & Wilson, W. H. (2002) Coccolithovirus (*Phycodnaviridae*): characterisation of a new large dsDNA algal virus that infects *Emiliana huxleyi*. *Archives of Virology* **147**: 1685-1698
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- Wilson, W.H., Tarran, G. & Zubkov, M.V. (2002) Virus dynamics in a coccolithophore-dominated bloom in the North Sea. *Deep Sea Research II* **49(15)**: 2951-2963.
- Wilson, W.H., Tarran, G.A., Schroeder, D., Cox, M., Oke, J., & Malin, G. (2002) Isolation of viruses responsible for the demise of an *Emiliana huxleyi* bloom in the English Channel. *Journal of the Marine Biological Association of the UK*. **82**: 369-377.

Annexes:

Not applicable.