

Template for Taxonomic Proposal to the ICTV Executive Committee

Creating Species in an existing genus

Code † To designate the following viruses as species in the genus:

belonging to the family[°] :

† Assigned by ICTV officers

° leave blank if inappropriate or in the case of an unassigned genus

Author(s) with email address(es) of the Taxonomic Proposal

Houssam Attoui (Reoviridae study group member)

h-attoui-ets-ap@gulliver.fr

Peter Mertens, (SG chair Reoviridae)

peter.mertens@bbsrc.ac.uk

New Taxonomic Order

Order

Family

Reoviridae

Genus

Seadornavirus (previously proposed)

Type Species

Banna seadornavirus

List of Species in the genus

Banna Seadornavirus

Kadipiro Seadornavirus

Liao ning seadornavirus (proposed)

List of Tentative Species in the Genus

Seadornaviruses have been isolated in many provinces in China including Beijing, Gansu, Yuannan, Hainan, Henan, Shanshi, Xinjiang and recently from Liao ning.

Viruses other than Banna, Kadipiro, and Liao-ning seadornaviruses are still uncharacterized. The uncharacterized isolates have been designated :

ACH, HN59, HN131, HN191, HN295, LY1, LY2, LY3, M14, TRT2, TRT5, WX1, WX2, WX3 and WX8. Their serological relationship to Banna seadornavirus was only poorly explored.

These isolates are probably distinct from BASV and at least some may represent new species within genus .

List of Unassigned Species in the Family

Rosellina necatrix mycoreovirus (proposed)

Argumentation to justify the designation of new species in the genus

Species demarcation criteria in the genus

- 1) An ability to exchange genetic material by genome segment reassortment during dual infections, thereby producing viable progeny virus strains.
- 2) RNA cross hybridization assays (Northern or dot blots, with probes made from viral RNA or cDNA). Within a single species, the amount of RNA sequence similarity is higher than 74% under hybridization conditions of T_m (RNA) -36°C .
- 3) Serological comparisons by neutralization assays. Hyperimmune ascitic fluids against genotype A viruses of BASV, do not cross neutralise efficiently those of genotype B. Within a single genotype, isolates show high levels of cross neutralization. There is no cross-neutralisation nor any cross reactivity between species BASV and KDSV.
- 4) RNA sequence analysis (e.g. segments 1 to 12). Within a single species, high levels of sequence similarities are observed in conserved segments, e.g. segment 12 shows less than 11% sequence variation within a single virus species.
- 5) Comparisons of amino acid sequences (for example those of the translation products of genome segment 1 to 12) indicate that different species will contain less than 50 % amino acid identity within the polymerase sequence.
- 6) The analysis of electropherotypes by agarose gel electrophoresis. Within a single species the electropherotype is relatively uniform. However, deletions or additions can occur (as in segments 7 and 9 of the BAV species) resulting in variations in electropherotype.
- 7) Analysis of conserved RNA terminal sequences. These sequences show conservation within species isolates. Sequences at the 3'-terminus may be similar on at least some segments in different species (e.g. BAV and KDV)(Table 1).

Argumentation to justify the designation of new species in the genus

- 1- Liao ning virus was isolated in the north-eastern China by the virologists of the Chinese Centers for Disease Control and Prevention from *Aedes dorsalis* mosquitoes (Chinese Journal of Experimental Clinical Virology, vol 13, 1999).
- 2- Liao ning virus genome is composed of 12 segments of dsRNA. From its physical and biochemical properties it appears to be a member of the (proposed) genus *Seadornavirus*.
- 3-The virus has been isolated from a distinct vector species:
While Banna and Kadipiro viruses (representing the two established virus species, *Banna seadornavirus* and *Kadipiro seadornavirus* within the genus *Seadornavirus* (proposed)) were isolated from *Culex* and *Anopheles* mosquitoes, Liao ning virus was isolated from *Aedes dorsalis* mosquitoes.
- 4-The use of anti-Banna virus antibodies have shown that there is no significant cross neutralization of Liao ning virus (both isolates NE97-31 and NE97-12).
- 5-Sequence analysis have shown that genetically Liao ning virus is only distantly related to Banna virus and Kadipiro virus. Genetic distances on segments 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12 between either Banna or Kadipiro viruses and Liao ning virus (24 to 35%) are equivalent to those existing between Banna or Kadipiro sedornaviruses on the same segments (24-33%). This level of difference is typical of some of the more distantly related virus species within other genera of the *Reoviridae*, for example within the genus *Orbivirus*
- 6-The virus shows a distinct electropherotype (6-2-3-1), which is different from both Banna virus (6-6) and Kadipiro virus (6-5-1) electropherotypes.
- 7-The terminal sequences of Liao ning virus are different (but show some similarities) from those of Banna and Kadipiro seadornaviruses (table 1).

Table 1: Conserved terminal sequences of seadornavirus genome segments

Virus species (strain)	Conserved RNA terminal sequences (+ve strand)
BASV (CTFV-In6423)	5'-GUAU ^A /U ^A /UAA ^A /U ^A /UU..... ^A /cC ^C /UGAC-3'
KDSV (KDSV-Ja7075)	5'-GUAGAA ^A /U ^A /U ^A /UU..... ^A /c ^C /UGAC-3'
LNSV (LNSV-NE97-31)	5'-GUUAU ^A /U ^A /U ^A /U..... ^A /cU/cCGAC-3'

List of created Species in the genus

Banna seadornavirus
Kadipiro seadornavirus
Liao ning seadornavirus

References

- Attoui, H., Charrel, N., Billoir, F., Cantaloube, J.-F., de Micco P. and de Lamballerie, X. (1998). Comparative sequence analysis of American, European and Asian isolates of genus *Coltivirus*. *J. Gen. Virol.*, 79, 2481-2489.
- Attoui, H, Billoir, F, Biagini P, de Micco P, de Lamballerie X. (2000). Complete sequence determination and genetic analysis of Banna virus and Kadipiro virus: proposal for assignment to a new genus (*Seadornavirus*) within the family *Reoviridae*. *Journal of General Virology* 81: 1507-1515.
- Mohd-Jaafar, F., Attoui, H., Belhouchet, M., Tao, S., Chen, B., de Micco, P., de Lamballerie, X. (2003). Complete sequence characterisation of the genome of the Liao ning seadornavirus, a new seadornavirus species isolated from *Aedes dorsalis* mosquitoes in North-Eastern China. *Journal of General Virology* : in preparation.
- Brown, S.E., Gorman, B.M., Tesh, R.B. and Knudson D.L. (1993). Coltiviruses isolated from mosquitoes collected in Indonesia. *Virology*, 196, 363-367.
- Chen, B. and Tao, S. (1996). Arbovirus survey in China in recent ten years. *Chin. Med. J.*, 109, 13-15.
- Tao S, Cai Z, Yang D.(1999). New subtype of coltivirus isolated from mosquitoes in the northeast part of China. *Chinese Journal of Experimental Clinical Virology*, 13(3), 228-30.

Annexes:

Virus Species	Isolate names	Accession numbers	Abbreviations
<i>Banna seadornavirus</i> { <i>Culex</i> and <i>Anopheles</i> mosquitoes: Humans}	Banna virus (China)	Seg1: [AF134525] Seg2: [AF13526] Seg6: AF13527[] Seg7: [AF052035] Seg8: [AF052034] Seg9: [AF0520333] Seg10: [AF052032] Seg11: [AF052031] Seg12: [AF052030]	(BASV) (BASV-Ch)
	Banna virus (Indonesia-6423)	Seg1: [AF133430] Seg2: [AF134514] Seg3: [AF134515] Seg4: [AF134516] Seg5: [AF134517] Seg6: [AF134518] Seg7: [AF052018] Seg8: [AF052017] Seg9: [AF052016] Seg10: [AF052015] Seg11: [AF052014] Seg12: [AF019908]	 (BASV-In6423)
	Banna virus (Indonesia-6969)	Seg1: [AF134522] Seg2: [AF134523] Seg6: [AF134524] Seg7: [AF052013]	 (BASV-In6969)

	Banna virus (Indonesia-7043)	Seg8: [AF052012] Seg9: [AF052011] Seg10: [AF052010] Seg11: [AF052009] Seg12: [AF052008] Seg1: [AF134519] Seg2: [AF134520] Seg6: [AF134521] Seg7: [AF052029] Seg8: [AF052028] Seg9: [AF052027] Seg10: [AF052026] Seg11: [AF052025] Seg12: [AF052024]	(BASV-In7043)
<i>Kadipiro seadornavirus</i> { <i>Culex</i> mosquitoes}	Kadipiro virus (Java-7075)	Seg1: [AF133429] Seg2: [AF134509] Seg3: [AF134510] Seg4: [AF134511] Seg5: [AF134512] Seg6: [AF134513] Seg7: [AF052023] Seg8: [AF052022] Seg9: [AF052021] Seg10: [AF052020] Seg11: [AF052019] Seg12: [AF019909]	(KDSV) (KDV-Ja7075)
<i>Liao ning seadornavirus</i> { <i>Aedes</i> mosquitoes}	Liao ning virus Isolates NE97-31 and NE97-12		(LNSV) (LNV)