This form should be used for all taxonomic proposals. Please complete all those modules that are applicable (and then delete the unwanted sections). For guidance, see the notes written in blue and the separate document "Help with completing a taxonomic proposal"

Please try to keep related proposals within a single document; you can copy the modules to create more than one genus within a new family, for example.

MODULE 1: **TITLE, AUTHORS, etc**

Code assigned:	***2012.008a-qqV***	(to be completed by ICTV officers)

Short title: Creation of 26 new species and 9 new genera in the family *Papillomaviridae*

Modules attached (modules 1 and 9 are required)	**1** ☒	**2** ☒	**3** ☒	**4** ☐	**5** ☐
	6 ☐	**7** ☐	**8** ☒	**9** ☒	

Author(s) with e-mail address(es) of the proposer:

Robert D. Burk robert.burk@einstein.yu.edu
and the Papillomaviridae Study Group

List the ICTV study group(s) that have seen this proposal:

A list of study groups and contacts is provided at http://www.ictvonline.org/subcommittees.asp . If in doubt, contact the appropriate subcommittee chair (fungal, invertebrate, plant, prokaryote or vertebrate viruses)	*Papillomaviridae*

ICTV-EC or Study Group comments and response of the proposer:

2013 ICTV Proposal for NEW Papillomavirus Genera and Species
FROM the Papillomavirus Working Group

ITEMS in this document:

1. ICTV executive committee decision and comments to papillomavirus (PV) proposal of 2012 with our response.
2. Review of recent ICTV accepted and official current PV nomenclature based on 2010 Papillomavirus proposal.
3. Revised proposal for PV assignment of NEW species and genera within *Papillomaviridae* for ICTV consideration in their upcoming meeting in July 2013.
4. Notes on the Bernard et al., 2010 Virology paper on PV nomenclature.

The comments below incorporate the response to a request made by the Executive Committee on 16 July 2013 that the position of *Lambdapapillomavirus 5* be clarified in the final table (p32). This was achieved by adding a proposal to create this new species. Minor changes were also made to this document and the text of the proposals to accommodate the increase in proposed species numbers from 25 to 26.

1. ICTV EXECUTIVE COMMITTEE RESPONSE TO PAPILLOMAVIRUS PROPOSAL OF 2012

2012.008a-mmV.N.v1: Creation of 21 new species and 8 new genera in the family Papillomaviridae.
Presented by AJD. Decision: Ud. The EC is concerned not to be placed in the position of supporting classification based on metagenomic sequence data without this being made clear. Add information on the provenances of the biological material analysed in relation to each proposed species. In instances (if any) where sequence data were metagenomic, provide arguments that support classification of a virus rather than just a sequence. Make sure that all cited GenBank accessions are publicly available. Make sure that genera are not specified as new when they already exist. Module 8 is not necessary as isolate names are not in ICTV's remit. If this is retained, isolate names should not be italicized or capitalized. Add a legend to the phylogenetic tree to indicate the type of tree. Add selected information on bootstrap values (e.g. at the base of each species), improving legibility if necessary by presenting the tree in a different format or splitting it into sections.

RESPONSE: (1) NO METAGENOMIC SEQUENCES WERE PROPOSED IN 2012, WE HAVE CLARIFIED THIS POINT.
(2) MODULE 8 HAS BEEN REMOVED.
(3) A FIGURE LEGEND TO THE PHYLOGENETIC TREE HAS BEEN ADDED.
(4) BOOTSTRAP VALUES HAVE BEEN ADDED TO THE TREE

2. Review of recent ICTV accepted and official, current PV nomenclature based on 2010 proposal

SUMMARY OF THE ICTV ACTIONS

The ICTV accepted the proposal from the 2010-2011 PV working group, kindly aided by Andrew Davison of the ICTV. The ICTV PV nomenclature kept the same nomenclature for the previously existing 16 genera, and added 14 NEW genera using the Greek alphabet. Since the genera were extended to the end of the Greek alphabet (*Alphapapillomavirus* – *Omegapapillomavirus*), additional PV genera were named using the prefix *Dyo* from *Dyodeltapapillomavirus* onward. *Alphapapillomavirus*, *Betapapillomavirus, and Gammapapillomavirus* names were not amended with the *Dyo* prefix to avoid confusion with the main genera containing the majority of medically important HPVs.

The ICTV ratified a NEW nomenclature system for the PV species (i.e., genus name + number). Each genus must contain at least one species. For example, the genus *Alphapapillomavirus* contains 14 species named as *Alphapapillomavirus* 1 to 14. Accordingly, the old species name "*Human papillomavirus 16*" has been officially renamed "*Alphapapillomavirus 9*". This species includes HPV16, 31, 33, 35, 52, 58 and 67 types.

Among the 26 newly added species by ICTV, 16 represent 14 new genera (2 are in the same genera); the other 10 are within 6 previously designated genera.

The existing species "*Human papillomavirus 71*" was removed and merged into "*Alphapapillomavirus 14"* (prior species "*Human papillomavirus cand90*").

PV nomenclature overview:

Classification	ICTV old (number)	ICTV 2012** (number)	Removed/Combined (number)	The 2013 Proposal* (number)
Genera	16	14		9
Species	44	26	1	26

**The ratified and approved ICTV PV nomenclature is based on 189 Papillomaviruses published in Bernard et al., Virology 2010.

*The recommendation from the PV working group for consideration is for the ICTV to approve 9 NEW genera and 26 NEW species (i.e., this represents PV types not in the Bernard et al., Virology 2010 paper) (see below). To be explicit, **NO PAPILLOMAVIRUS GENOMES IDENTIFIED BY METAGENOMIC ANALYSES ARE INCLUDED**.

3. Recommendation by the PV working group to the ICTV for consideration in their upcoming meeting in July 2013

Based on our searching PubMed, personal communications and searching nucleotide databases, we identified 83 novel PV types (excluding unnamed HPVs and PVs identified by metagenomics) characterized since 2010 (through June 1st 2013). These include 40 HPVs and 43 non-human PVs. Hence, our proposed nomenclature will be based on 271 Papillomavirus (160 HPVs and 111 non-human PVs, see the complete PV list). **ONLY THOSE PAPILLOMAVIRUSES CONSTITUTING NEW GENERA AND/OR SPECIES ARE PROPOSED IN THE ATTACHED APPLICATION.**

Papillomaviruses identified by metagenomic analyses ARE NOT PROPOSED FOR INCLUSION.

****

Criteria for Papillomavirus Species and Genera

Excerpted from the 9th ICTV Report: “Two principal pillars for papillomavirus taxonomy emerged. (1) All known papillomaviruses are strictly host species-specific, and this restriction needs to be reflected in the taxonomy. (2) DNA sequence comparisons led to refined phylogenetic studies, which show that all papillomavirus genomes are monophyletic in origin, that they evolve more slowly than virtually any other group of viruses, and that they do not recombine. The topology of phylogenetic trees is an indispensable criterion for taxonomic evaluation of this virus family.”

From Bernard et al. (2010): PV taxa are defined based on L1 nucleotide sequence identities and their topological position within PV phylogenetic trees. Based on global multiple sequence alignment and a matrix of pairwise comparisons, the distribution of L1 identities shows a bimodal pattern consistent with the genus (< 60% identity) and species (60% - 70% identity) nomenclature. Thus, most types within a PV genus show less than 60% sequence identity to types of other genera based on global multiple sequence or pairwise alignments of the L1 genes. Nevertheless, the suggested percentage identities that define PV genera have to be taken as general, but not absolute criteria for a number of reasons. For instance, there is overlap between the intergeneric and interspecies PV L1 percent identities (see Fig. 2, Bernard et al, (2010)). Thus, assignment of PV types to species and genera cannot be relegated to a computer algorithm, but requires curation (i.e. interpretation based on phylogeny, genome organization, biology and pathogenicity).

****

For the next ICTV meeting, we propose the creation of 9 new genera and 26 new species. Among the 26 proposed species, 9 of the proposed species will also create 9 new genera; the other 17 are within 8 previously designated genera.

We have created a DRAFT ICTV PV nomenclature Proposal. This document proposes 9 new genera and 26 new species (see attached proposal file):

MODULE 2: 17 NEW SPECIES for 8 existing genera

MODULE 2: 9 NEW SPECIES for 9 proposed NEW genera

MODULE 3: CREATION OF 9 NEW GENERA

MODULE 8: REMOVED

MODULE 9: APPENDIX with PV tree based on 95 Papillomavirus L1 nucleotide sequences, limited to the proposed existing AND new species and genera proposed in the current application.

4. Notes on the Bernard et al., 2010 Virology paper on PV nomenclature

The 2010 Virology paper by Bernard et al., is a common reference for PV nomenclature and we suggest a few corrections/changes that we note below.

As an FYI, we noted a few items that should be corrected in Table 2 of Bernard et al., 2010 Virology paper:

> Change NCBI accession number of the following 3 types:
> *Canis familiaris papillomavirus 5* should be FJ492743 (not FJ492742).
> *Canis familiaris papillomavirus 6* should be FJ492744.
> *Canis familiaris papillomavirus 7* should be FJ492742.
>
> Change the names of FdPV1 and FdPV2 (*Felis domesticus papillomavirus*) to FcaPV1 and FcaPV2 (*Felis catus papillomavirus*), respectively, since the official host scientific name is *Felis catus.*
>
> MaPV1 should be assigned to species Pi-1 (not Pi-2, as in the Virology paper; it is correct in the 2012 ICTV accepted nomenclature).
>
> McPV2, MmiPV1 and RnPV1 should be assigned to species Pi-2.

As an FYI, we noted an omission in Table 3 of the Bernard et al., 2010 Virology paper:

> "*Omikronpapillomavirus* Omikron-1 *Phocoena spinipinnis papillomavirus 1*" should be added between *Xipapillomavirus* and *Pipapillomavirus* (it was included in the tree shown in Figure 3).

As an FYI in Figure 3 of Bernard et al., Virology 2010 there were some errors/corrections to be consistent with the nomenclature (see updated tree - Model 9 Appendix PV L1 PhyML tree):

- HPV48 is should be assigned to species Gamma-2 (not Gamma-3).
- HPV50 should be to species Gamma-3 (not Gamma-2).
- MaPV1 should be assigned to species Pi-1.
- McPV2, MmiPV1 and RnPV1 should be assigned to species Pi-2.
- FdPV1 and FdPV2 are suggested to be renamed FcaPV1 and FcaPV2, respectively.

Date first submitted to ICTV:	June 29, 2012
Dates of this revision (if different to above):	June 21 and July 28, 2013

MODULE 2: **NEW SPECIES**

creating and naming one or more new species.
If more than one, they should be a group of related species belonging to the same genus. All new species must be placed in a higher taxon. This is usually a genus although it is also permissible for species to be "unassigned" within a subfamily or family. Wherever possible, provide sequence accession number(s) for one isolate of each new species proposed.

Code	**2012.008aV**	(assigned by ICTV officers)

To create 10 new species within:

Genus:	***Gammapapillomavirus***
Subfamily:	***Unassigned***
Family:	***Papillomaviridae***
Order:	***Unassigned***

Fill in all that apply.
- If the higher taxon has yet to be created (in a later module, below) write "**(new)**" after its proposed name.
- If no genus is specified, enter "**unassigned**" in the genus box.

And name the new species:	**GenBank sequence accession number(s) of reference isolate:**
Gammapapillomavirus 11 *Gammapapillomavirus 12* *Gammapapillomavirus 13* *Gammapapillomavirus 14* *Gammapapillomavirus 15* *Gammapapillomavirus 16* *Gammapapillomavirus 17* *Gammapapillomavirus 18* *Gammapapillomavirus 19* *Gammapapillomavirus 20*	

Reasons to justify the creation and assignment of the new species:
- Explain how the proposed species differ(s) from all existing species.
  - If species demarcation criteria (see module 3) have previously been defined for the genus, **explain how the new species meet these criteria**.
  - If criteria for demarcating species need to be defined (because there will now be more than one species in the genus), please state the proposed criteria.
- Further material in support of this proposal may be presented in the Appendix, Module 9

Human papillomavirus 126 (AB646346), human papillomavirus 127 (HM011570), human papillomavirus 128 (GU225708), human papillomavirus 131 (GU117631), human papillomavirus 135 (HM999987), human papillomavirus 137 (HM999989), human papillomavirus 144 (HM999996), human papillomavirus 156 (JX429973), human papillomavirus 161 (JX413109), human papillomavirus 163 (JX413107), respectively. See Module 9.

MODULE 2: **NEW SPECIES**

creating and naming one or more new species.

If more than one, they should be a group of related species belonging to the same genus. All new species must be placed in a higher taxon. This is usually a genus although it is also permissible for species to be "unassigned" within a subfamily or family. Wherever possible, provide sequence accession number(s) for one isolate of each new species proposed.

Code	**2012.008bV**	(assigned by ICTV officers)

To create 1 new species within:

Genus:	***Deltapapillomavirus***
Subfamily:	***Unassigned***
Family:	***Papillomaviridae***
Order:	***Unassigned***

Fill in all that apply.

- If the higher taxon has yet to be created (in a later module, below) write "**(new)**" after its proposed name.
- If no genus is specified, enter "**unassigned**" in the genus box.

And name the new species:	**GenBank sequence accession number(s) of reference isolate:**
Deltapapillomavirus 6	

Reasons to justify the creation and assignment of the new species:

- Explain how the proposed species differ(s) from all existing species.
  - If species demarcation criteria (see module 3) have previously been defined for the genus, **explain how the new species meet these criteria**.
  - If criteria for demarcating species need to be defined (because there will now be more than one species in the genus), please state the proposed criteria.
- Further material in support of this proposal may be presented in the Appendix, Module 9

Camelus dromedarius papillomavirus 1 (HQ912790). See Module 9.

MODULE 2: **NEW SPECIES**

creating and naming one or more new species.

If more than one, they should be a group of related species belonging to the same genus. All new species must be placed in a higher taxon. This is usually a genus although it is also permissible for species to be "unassigned" within a subfamily or family. Wherever possible, provide sequence accession number(s) for one isolate of each new species proposed.

Code	**2012.008cV**	(assigned by ICTV officers)

To create 1 new species within:

Genus:	***Lambdapapillomavirus***
Subfamily:	***Unassigned***
Family:	***Papillomaviridae***
Order:	***Unassigned***

Fill in all that apply.

- If the higher taxon has yet to be created (in a later module, below) write "**(new)**" after its proposed name.
- If no genus is specified, enter "**unassigned**" in the genus box.

And name the new species:	**GenBank sequence accession number(s) of reference isolate:**
Lambdapapillomavirus 5	

Reasons to justify the creation and assignment of the new species:

- Explain how the proposed species differ(s) from all existing species.
  - If species demarcation criteria (see module 3) have previously been defined for the genus, **explain how the new species meet these criteria**.
  - If criteria for demarcating species need to be defined (because there will now be more than one species in the genus), please state the proposed criteria.
- Further material in support of this proposal may be presented in the Appendix, Module 9

Crocuta crocuta papillomavirus 1 (HQ585856). See Module 9.

MODULE 2: **NEW SPECIES**

creating and naming one or more new species.

If more than one, they should be a group of related species belonging to the same genus. All new species must be placed in a higher taxon. This is usually a genus although it is also permissible for species to be "unassigned" within a subfamily or family. Wherever possible, provide sequence accession number(s) for one isolate of each new species proposed.

Code	**2012.008dV**	(assigned by ICTV officers)

To create 1 new species within:

Genus:	***Xipapillomavirus***
Subfamily:	***Unassigned***
Family:	***Papillomaviridae***
Order:	***Unassigned***

Fill in all that apply.

- If the higher taxon has yet to be created (in a later module, below) write "**(new)**" after its proposed name.
- If no genus is specified, enter "**unassigned**" in the genus box.

And name the new species:	**GenBank sequence accession number(s) of reference isolate:**
Xipapillomavirus 2	

Reasons to justify the creation and assignment of the new species:

- Explain how the proposed species differ(s) from all existing species.
  - If species demarcation criteria (see module 3) have previously been defined for the genus, **explain how the new species meet these criteria**.
  - If criteria for demarcating species need to be defined (because there will now be more than one species in the genus), please state the proposed criteria.
- Further material in support of this proposal may be presented in the Appendix, Module 9

Bos taurus papillomavirus 12 (JF834523). See Module 9.

MODULE 2: **NEW SPECIES**

creating and naming one or more new species.

If more than one, they should be a group of related species belonging to the same genus. All new species must be placed in a higher taxon. This is usually a genus although it is also permissible for species to be "unassigned" within a subfamily or family. Wherever possible, provide sequence accession number(s) for one isolate of each new species proposed.

Code	**2012.008eV**	(assigned by ICTV officers)

To create 1 new species within:

Genus:	***Taupapillomavirus***
Subfamily:	***Unassigned***
Family:	***Papillomaviridae***
Order:	***Unassigned***

Fill in all that apply.

- If the higher taxon has yet to be created (in a later module, below) write "**(new)**" after its proposed name.
- If no genus is specified, enter "**unassigned**" in the genus box.

And name the new species:	**GenBank sequence accession number(s) of reference isolate:**
Taupapillomavirus 2	

Reasons to justify the creation and assignment of the new species:

- Explain how the proposed species differ(s) from all existing species.
  - If species demarcation criteria (see module 3) have previously been defined for the genus, **explain how the new species meet these criteria**.
  - If criteria for demarcating species need to be defined (because there will now be more than one species in the genus), please state the proposed criteria.
- Further material in support of this proposal may be presented in the Appendix, Module 9

Canis familiaris papillomavirus 13 (JX141478). See Module 9.

MODULE 2: **NEW SPECIES**

creating and naming one or more new species.

If more than one, they should be a group of related species belonging to the same genus. All new species must be placed in a higher taxon. This is usually a genus although it is also permissible for species to be "unassigned" within a subfamily or family. Wherever possible, provide sequence accession number(s) for one isolate of each new species proposed.

Code	**2012.008fV**	(assigned by ICTV officers)

To create 1 new species within:

Genus:	***Upsilonpapillomavirus***
Subfamily:	***Unassigned***
Family:	***Papillomaviridae***
Order:	***Unassigned***

Fill in all that apply.

- If the higher taxon has yet to be created (in a later module, below) write "**(new)**" after its proposed name.
- If no genus is specified, enter "**unassigned**" in the genus box.

And name the new species:	**GenBank sequence accession number(s) of reference isolate:**
Upsilonpapillomavirus 3	

Reasons to justify the creation and assignment of the new species:

- Explain how the proposed species differ(s) from all existing species.
  - If species demarcation criteria (see module 3) have previously been defined for the genus, **explain how the new species meet these criteria**.
  - If criteria for demarcating species need to be defined (because there will now be more than one species in the genus), please state the proposed criteria.
- Further material in support of this proposal may be presented in the Appendix, Module 9

Phocoena phocoena papillomavirus 2 (GU117622). See Module 9.

MODULE 2: **NEW SPECIES**

creating and naming one or more new species.
If more than one, they should be a group of related species belonging to the same genus. All new species must be placed in a higher taxon. This is usually a genus although it is also permissible for species to be "unassigned" within a subfamily or family. Wherever possible, provide sequence accession number(s) for one isolate of each new species proposed.

Code	**2012.008gV**	(assigned by ICTV officers)

To create 1 new species within:

Genus:	***Chipapillomavirus***
Subfamily:	***Unassigned***
Family:	***Papillomaviridae***
Order:	***Unassigned***

Fill in all that apply.
- If the higher taxon has yet to be created (in a later module, below) write "**(new)**" after its proposed name.
- If no genus is specified, enter "**unassigned**" in the genus box.

And name the new species:	**GenBank sequence accession number(s) of reference isolate:**
Chipapillomavirus 3	

Reasons to justify the creation and assignment of the new species:
- Explain how the proposed species differ(s) from all existing species.
  - If species demarcation criteria (see module 3) have previously been defined for the genus, **explain how the new species meet these criteria**.
  - If criteria for demarcating species need to be defined (because there will now be more than one species in the genus), please state the proposed criteria.
- Further material in support of this proposal may be presented in the Appendix, Module 9

Canis familiaris papillomavirus 8 (HQ262536). See Module 9.

MODULE 2: **NEW SPECIES**

creating and naming one or more new species.

If more than one, they should be a group of related species belonging to the same genus. All new species must be placed in a higher taxon. This is usually a genus although it is also permissible for species to be "unassigned" within a subfamily or family. Wherever possible, provide sequence accession number(s) for one isolate of each new species proposed.

Code	**2012.008hV**	(assigned by ICTV officers)

To create 1 new species within:

Genus:	***Dyoiotapapillomavirus***
Subfamily:	***Unassigned***
Family:	***Papillomaviridae***
Order:	***Unassigned***

Fill in all that apply.

- If the higher taxon has yet to be created (in a later module, below) write "**(new)**" after its proposed name.
- If no genus is specified, enter "**unassigned**" in the genus box.

And name the new species:	**GenBank sequence accession number(s) of reference isolate:**
Dyoiotapapillomavirus 2	

Reasons to justify the creation and assignment of the new species:

- Explain how the proposed species differ(s) from all existing species.
  - If species demarcation criteria (see module 3) have previously been defined for the genus, **explain how the new species meet these criteria**.
  - If criteria for demarcating species need to be defined (because there will now be more than one species in the genus), please state the proposed criteria.
- Further material in support of this proposal may be presented in the Appendix, Module 9

Equus caballus papillomavirus 4 (JQ031032). See Module 9.

MODULE 2: **NEW SPECIES**

creating and naming one or more new species.

If more than one, they should be a group of related species belonging to the same genus. All new species must be placed in a higher taxon. This is usually a genus although it is also permissible for species to be "unassigned" within a subfamily or family. Wherever possible, provide sequence accession number(s) for one isolate of each new species proposed.

Code	**2012.008iV**	(assigned by ICTV officers)

To create 1 new species within:

Genus:	***Dyokappapapillomavirus (new)***
Subfamily:	***Unassigned***
Family:	***Papillomaviridae***
Order:	***Unassigned***

Fill in all that apply.

- If the higher taxon has yet to be created (in a later module, below) write "**(new)**" after its proposed name.
- If no genus is specified, enter "**unassigned**" in the genus box.

And name the new species:	**GenBank sequence accession number(s) of reference isolate:**
Dyokappapapillomavirus 1	

Reasons to justify the creation and assignment of the new species:

- Explain how the proposed species differ(s) from all existing species.
  - If species demarcation criteria (see module 3) have previously been defined for the genus, **explain how the new species meet these criteria**.
  - If criteria for demarcating species need to be defined (because there will now be more than one species in the genus), please state the proposed criteria.
- Further material in support of this proposal may be presented in the Appendix, Module 9

Ovis aries papillomavirus 3 (FJ796965). See Module 9.

MODULE 2: **NEW SPECIES**

creating and naming one or more new species.

If more than one, they should be a group of related species belonging to the same genus. All new species must be placed in a higher taxon. This is usually a genus although it is also permissible for species to be "unassigned" within a subfamily or family. Wherever possible, provide sequence accession number(s) for one isolate of each new species proposed.

Code	**2012.008jV**	(assigned by ICTV officers)

To create 1 new species within:

Genus:	***Dyolambdapapillomavirus (new)***
Subfamily:	***Unassigned***
Family:	***Papillomaviridae***
Order:	***Unassigned***

Fill in all that apply.

- If the higher taxon has yet to be created (in a later module, below) write "**(new)**" after its proposed name.
- If no genus is specified, enter "**unassigned**" in the genus box.

And name the new species:	**GenBank sequence accession number(s) of reference isolate:**
Dyolambdapapillomavirus 1	

Reasons to justify the creation and assignment of the new species:

- Explain how the proposed species differ(s) from all existing species.
  - If species demarcation criteria (see module 3) have previously been defined for the genus, **explain how the new species meet these criteria**.
  - If criteria for demarcating species need to be defined (because there will now be more than one species in the genus), please state the proposed criteria.
- Further material in support of this proposal may be presented in the Appendix, Module 9

Bettongia penicillata papillomavirus 1 (GU220391). See Module 9.

MODULE 2: **NEW SPECIES**

creating and naming one or more new species.

If more than one, they should be a group of related species belonging to the same genus. All new species must be placed in a higher taxon. This is usually a genus although it is also permissible for species to be "unassigned" within a subfamily or family. Wherever possible, provide sequence accession number(s) for one isolate of each new species proposed.

Code	**2012.008kV**	(assigned by ICTV officers)

To create 1 new species within:

Genus:	***Dyomupapillomavirus (new)***
Subfamily:	***Unassigned***
Family:	***Papillomaviridae***
Order:	***Unassigned***

Fill in all that apply.

- If the higher taxon has yet to be created (in a later module, below) write "**(new)**" after its proposed name.
- If no genus is specified, enter "**unassigned**" in the genus box.

And name the new species:	**GenBank sequence accession number(s) of reference isolate:**
Dyomupapillomavirus 1	

Reasons to justify the creation and assignment of the new species:

- Explain how the proposed species differ(s) from all existing species.
  - If species demarcation criteria (see module 3) have previously been defined for the genus, **explain how the new species meet these criteria**.
  - If criteria for demarcating species need to be defined (because there will now be more than one species in the genus), please state the proposed criteria.
- Further material in support of this proposal may be presented in the Appendix, Module 9

Morelia spilota papillomavirus 1 (HQ262535). See Module 9.

MODULE 2: **NEW SPECIES**

creating and naming one or more new species.

If more than one, they should be a group of related species belonging to the same genus. All new species must be placed in a higher taxon. This is usually a genus although it is also permissible for species to be "unassigned" within a subfamily or family. Wherever possible, provide sequence accession number(s) for one isolate of each new species proposed.

Code	**2012.008lV**	(assigned by ICTV officers)

To create 1 new species within:

Genus:	***Dyonupapillomavirus (new)***
Subfamily:	***Unassigned***
Family:	***Papillomaviridae***
Order:	***Unassigned***

Fill in all that apply.

- If the higher taxon has yet to be created (in a later module, below) write "**(new)**" after its proposed name.
- If no genus is specified, enter "**unassigned**" in the genus box.

And name the new species:	**GenBank sequence accession number(s) of reference isolate:**
Dyonupapillomavirus 1	

Reasons to justify the creation and assignment of the new species:

- Explain how the proposed species differ(s) from all existing species.
  - If species demarcation criteria (see module 3) have previously been defined for the genus, **explain how the new species meet these criteria**.
  - If criteria for demarcating species need to be defined (because there will now be more than one species in the genus), please state the proposed criteria.
- Further material in support of this proposal may be presented in the Appendix, Module 9

Zalophus californianus papillomavirus 1 (HQ293213). See Module 9.

MODULE 2: **NEW SPECIES**

creating and naming one or more new species.

If more than one, they should be a group of related species belonging to the same genus. All new species must be placed in a higher taxon. This is usually a genus although it is also permissible for species to be "unassigned" within a subfamily or family. Wherever possible, provide sequence accession number(s) for one isolate of each new species proposed.

Code	**2012.008mV**	(assigned by ICTV officers)

To create 1 new species within:

Genus:	***Dyoxipapillomavirus (new)***
Subfamily:	***Unassigned***
Family:	***Papillomaviridae***
Order:	***Unassigned***

Fill in all that apply.

- If the higher taxon has yet to be created (in a later module, below) write "**(new)**" after its proposed name.
- If no genus is specified, enter "**unassigned**" in the genus box.

And name the new species:	**GenBank sequence accession number(s) of reference isolate:**
Dyoxipapillomavirus 1	

Reasons to justify the creation and assignment of the new species:

- Explain how the proposed species differ(s) from all existing species.
  - If species demarcation criteria (see module 3) have previously been defined for the genus, **explain how the new species meet these criteria**.
  - If criteria for demarcating species need to be defined (because there will now be more than one species in the genus), please state the proposed criteria.
- Further material in support of this proposal may be presented in the Appendix, Module 9

Bos taurus papillomavirus 7 (DQ217793). See Module 9.

MODULE 2: **NEW SPECIES**

creating and naming one or more new species.

If more than one, they should be a group of related species belonging to the same genus. All new species must be placed in a higher taxon. This is usually a genus although it is also permissible for species to be "unassigned" within a subfamily or family. Wherever possible, provide sequence accession number(s) for one isolate of each new species proposed.

Code	**2012.008nV**	(assigned by ICTV officers)

To create 1 new species within:

Genus:	***Dyoomikronpapillomavirus (new)***
Subfamily:	***Unassigned***
Family:	***Papillomaviridae***
Order:	***Unassigned***

Fill in all that apply.

- If the higher taxon has yet to be created (in a later module, below) write "**(new)**" after its proposed name.
- If no genus is specified, enter "**unassigned**" in the genus box.

And name the new species:	**GenBank sequence accession number(s) of reference isolate:**
Dyoomikronpapillomavirus 1	

Reasons to justify the creation and assignment of the new species:

- Explain how the proposed species differ(s) from all existing species.
  - If species demarcation criteria (see module 3) have previously been defined for the genus, **explain how the new species meet these criteria**.
  - If criteria for demarcating species need to be defined (because there will now be more than one species in the genus), please state the proposed criteria.
- Further material in support of this proposal may be presented in the Appendix, Module 9

Saimiri sciureus papillomavirus 1 (JF304765). See Module 9.

MODULE 2: **NEW SPECIES**

creating and naming one or more new species.

If more than one, they should be a group of related species belonging to the same genus. All new species must be placed in a higher taxon. This is usually a genus although it is also permissible for species to be "unassigned" within a subfamily or family. Wherever possible, provide sequence accession number(s) for one isolate of each new species proposed.

Code	**2012.008oV**	(assigned by ICTV officers)

To create 1 new species within:

Genus:	***Dyopipapillomavirus (new)***
Subfamily:	***Unassigned***
Family:	***Papillomaviridae***
Order:	***Unassigned***

Fill in all that apply.

- If the higher taxon has yet to be created (in a later module, below) write "**(new)**" after its proposed name.
- If no genus is specified, enter "**unassigned**" in the genus box.

And name the new species:	**GenBank sequence accession number(s) of reference isolate:**
Dyopipapillomavirus 1	

Reasons to justify the creation and assignment of the new species:

- Explain how the proposed species differ(s) from all existing species.
  - If species demarcation criteria (see module 3) have previously been defined for the genus, **explain how the new species meet these criteria**.
  - If criteria for demarcating species need to be defined (because there will now be more than one species in the genus), please state the proposed criteria.
- Further material in support of this proposal may be presented in the Appendix, Module 9

Phocoena phocoena papillomavirus 4 (GU117623). See Module 9.

MODULE 2: **NEW SPECIES**

creating and naming one or more new species.

If more than one, they should be a group of related species belonging to the same genus. All new species must be placed in a higher taxon. This is usually a genus although it is also permissible for species to be "unassigned" within a subfamily or family. Wherever possible, provide sequence accession number(s) for one isolate of each new species proposed.

Code	**2012.008pV**	(assigned by ICTV officers)

To create 1 new species within:

Genus:	***Dyorhopapillomavirus (new)***
Subfamily:	***Unassigned***
Family:	***Papillomaviridae***
Order:	***Unassigned***

Fill in all that apply.

- If the higher taxon has yet to be created (in a later module, below) write "**(new)**" after its proposed name.
- If no genus is specified, enter "**unassigned**" in the genus box.

And name the new species:	**GenBank sequence accession number(s) of reference isolate:**
Dyorhopapillomavirus 1	

Reasons to justify the creation and assignment of the new species:

- Explain how the proposed species differ(s) from all existing species.
  - If species demarcation criteria (see module 3) have previously been defined for the genus, **explain how the new species meet these criteria**.
  - If criteria for demarcating species need to be defined (because there will now be more than one species in the genus), please state the proposed criteria.
- Further material in support of this proposal may be presented in the Appendix, Module 9

Equus caballus papillomavirus 3 (GU384895). See Module 9.

MODULE 2: **NEW SPECIES**

creating and naming one or more new species.

If more than one, they should be a group of related species belonging to the same genus. All new species must be placed in a higher taxon. This is usually a genus although it is also permissible for species to be "unassigned" within a subfamily or family. Wherever possible, provide sequence accession number(s) for one isolate of each new species proposed.

Code	**2012.008qV**	(assigned by ICTV officers)

To create 1 new species within:

Genus:	***Dyosigmapapillomavirus (new)***
Subfamily:	***Unassigned***
Family:	***Papillomaviridae***
Order:	***Unassigned***

Fill in all that apply.

- If the higher taxon has yet to be created (in a later module, below) write "**(new)**" after its proposed name.
- If no genus is specified, enter "**unassigned**" in the genus box.

And name the new species:	**GenBank sequence accession number(s) of reference isolate:**
Dyosigmapapillomavirus 1	

Reasons to justify the creation and assignment of the new species:

- Explain how the proposed species differ(s) from all existing species.
  - If species demarcation criteria (see module 3) have previously been defined for the genus, **explain how the new species meet these criteria**.
  - If criteria for demarcating species need to be defined (because there will now be more than one species in the genus), please state the proposed criteria.
- Further material in support of this proposal may be presented in the Appendix, Module 9

Castor canadensis papillomavirus 1 (KC020689). See Module 9.

MODULE 3: **NEW GENUS**

creating a new genus

Ideally, a genus should be placed within a higher taxon.

Code	***2012.008rV***	(assigned by ICTV officers)

To create a new genus within:

Subfamily:	***Unassigned***
Family:	***Papillomaviridae***
Order:	***Unassigned***

Fill in all that apply.

- If the higher taxon has yet to be created (in a later module, below) write "**(new)**" after its proposed name.
- If no family is specified, enter "**unassigned**" in the family box

naming a new genus

Code	***2012.008sV***	(assigned by ICTV officers)

To name the new genus: *Dyokappapapillomavirus*

Assigning the type species and other species to a new genus

Code	***2012.008tV***	(assigned by ICTV officers)

To designate the following as the type species of the new genus

Dyokappapapillomavirus 1	Every genus must have a type species. This should be a well characterized species although not necessarily the first to be discovered

The new genus will also contain any other new species created and assigned to it (Module 2) and any that are being moved from elsewhere (Module 7b). **Please enter here the TOTAL number of species (including the type species) that the genus will contain:**

1

Reasons to justify the creation of a new genus:

Additional material in support of this proposal may be presented in the Appendix, Module 9

See Module 9

Origin of the new genus name:

Progression of Greek alphabetic prefix

Reasons to justify the choice of type species:

Single species in genus

Species demarcation criteria in the new genus:

If there will be more than one species in the new genus, list the criteria being used for species demarcation and explain how the proposed members meet these criteria.

MODULE 3: **NEW GENUS**

creating a new genus

Ideally, a genus should be placed within a higher taxon.

Code	***2012.008uV***	(assigned by ICTV officers)

To create a new genus within:

Subfamily:	***Unassigned***
Family:	***Papillomaviridae***
Order:	***Unassigned***

Fill in all that apply.

- If the higher taxon has yet to be created (in a later module, below) write "**(new)**" after its proposed name.
- If no family is specified, enter "**unassigned**" in the family box

naming a new genus

Code	***2012.008vV***	(assigned by ICTV officers)

To name the new genus: *Dyolambdapapillomavirus*

Assigning the type species and other species to a new genus

Code	***2012.008wV***	(assigned by ICTV officers)

To designate the following as the type species of the new genus

Dyolambdapapillomavirus 1	Every genus must have a type species. This should be a well characterized species although not necessarily the first to be discovered

The new genus will also contain any other new species created and assigned to it (Module 2) and any that are being moved from elsewhere (Module 7b). **Please enter here the TOTAL number of species (including the type species) that the genus will contain:**

1

Reasons to justify the creation of a new genus:

Additional material in support of this proposal may be presented in the Appendix, Module 9

See Module 9

Origin of the new genus name:

Progression of Greek alphabetic prefix

Reasons to justify the choice of type species:

Single species in genus

Species demarcation criteria in the new genus:

If there will be more than one species in the new genus, list the criteria being used for species demarcation and explain how the proposed members meet these criteria.

MODULE 3: **NEW GENUS**

creating a new genus

Ideally, a genus should be placed within a higher taxon.

Code	***2012.008xV***	(assigned by ICTV officers)

To create a new genus within:

Subfamily:	***Unassigned***
Family:	***Papillomaviridae***
Order:	***Unassigned***

Fill in all that apply.

- If the higher taxon has yet to be created (in a later module, below) write "**(new)**" after its proposed name.
- If no family is specified, enter "**unassigned**" in the family box

naming a new genus

Code	***2012.008yV***	(assigned by ICTV officers)

To name the new genus: *Dyomupapillomavirus*

Assigning the type species and other species to a new genus

Code	***2012.008zV***	(assigned by ICTV officers)

To designate the following as the type species of the new genus

Dyomupapillomavirus 1	Every genus must have a type species. This should be a well characterized species although not necessarily the first to be discovered

The new genus will also contain any other new species created and assigned to it (Module 2) and any that are being moved from elsewhere (Module 7b). **Please enter here the TOTAL number of species (including the type species) that the genus will contain:**

1

Reasons to justify the creation of a new genus:

Additional material in support of this proposal may be presented in the Appendix, Module 9

See Module 9

Origin of the new genus name:

Progression of Greek alphabetic prefix

Reasons to justify the choice of type species:

Single species in genus

Species demarcation criteria in the new genus:

If there will be more than one species in the new genus, list the criteria being used for species demarcation and explain how the proposed members meet these criteria.

MODULE 3: **NEW GENUS**

creating a new genus

Ideally, a genus should be placed within a higher taxon.

Code	***2012.008aaV***	(assigned by ICTV officers)

To create a new genus within:

Subfamily:	***Unassigned***
Family:	***Papillomaviridae***
Order:	***Unassigned***

Fill in all that apply.

- If the higher taxon has yet to be created (in a later module, below) write "**(new)**" after its proposed name.
- If no family is specified, enter "**unassigned**" in the family box

naming a new genus

Code	***2012.008bbV***	(assigned by ICTV officers)

To name the new genus: *Dyonupapillomavirus*

Assigning the type species and other species to a new genus

Code	***2012.008ccV***	(assigned by ICTV officers)

To designate the following as the type species of the new genus

Dyonupapillomavirus 1	Every genus must have a type species. This should be a well characterized species although not necessarily the first to be discovered

The new genus will also contain any other new species created and assigned to it (Module 2) and any that are being moved from elsewhere (Module 7b). **Please enter here the TOTAL number of species (including the type species) that the genus will contain:**

1

Reasons to justify the creation of a new genus:

Additional material in support of this proposal may be presented in the Appendix, Module 9

See Module 9

Origin of the new genus name:

Progression of Greek alphabetic prefix

Reasons to justify the choice of type species:

Single species in genus

Species demarcation criteria in the new genus:

If there will be more than one species in the new genus, list the criteria being used for species demarcation and explain how the proposed members meet these criteria.

MODULE 3: **NEW GENUS**

creating a new genus

Ideally, a genus should be placed within a higher taxon.

Code	***2012.008ddV***	(assigned by ICTV officers)

To create a new genus within:

Subfamily:	***Unassigned***
Family:	***Papillomaviridae***
Order:	***Unassigned***

Fill in all that apply.

- If the higher taxon has yet to be created (in a later module, below) write "**(new)**" after its proposed name.
- If no family is specified, enter "**unassigned**" in the family box

naming a new genus

Code	***2012.008eeV***	(assigned by ICTV officers)

To name the new genus: *Dyoxipapillomavirus*

Assigning the type species and other species to a new genus

Code	***2012.008ffV***	(assigned by ICTV officers)

To designate the following as the type species of the new genus

Dyoxipapillomavirus 1	Every genus must have a type species. This should be a well characterized species although not necessarily the first to be discovered

The new genus will also contain any other new species created and assigned to it (Module 2) and any that are being moved from elsewhere (Module 7b). **Please enter here the TOTAL number of species (including the type species) that the genus will contain:**

1

Reasons to justify the creation of a new genus:

Additional material in support of this proposal may be presented in the Appendix, Module 9

See Module 9

Origin of the new genus name:

Progression of Greek alphabetic prefix

Reasons to justify the choice of type species:

Single species in genus

Species demarcation criteria in the new genus:

If there will be more than one species in the new genus, list the criteria being used for species demarcation and explain how the proposed members meet these criteria.

MODULE 3: **NEW GENUS**

creating a new genus

Ideally, a genus should be placed within a higher taxon.

Code	***2012.008ggV***	(assigned by ICTV officers)

To create a new genus within:

Subfamily:	***Unassigned***
Family:	***Papillomaviridae***
Order:	***Unassigned***

Fill in all that apply.

- If the higher taxon has yet to be created (in a later module, below) write "**(new)**" after its proposed name.
- If no family is specified, enter "**unassigned**" in the family box

naming a new genus

Code	***2012.008hhV***	(assigned by ICTV officers)

To name the new genus: *Dyoomikronpapillomavirus*

Assigning the type species and other species to a new genus

Code	***2012.008iiV***	(assigned by ICTV officers)

To designate the following as the type species of the new genus

Dyoomikronpapillomavirus 1	Every genus must have a type species. This should be a well characterized species although not necessarily the first to be discovered

The new genus will also contain any other new species created and assigned to it (Module 2) and any that are being moved from elsewhere (Module 7b). **Please enter here the TOTAL number of species (including the type species) that the genus will contain:**

1

Reasons to justify the creation of a new genus:

Additional material in support of this proposal may be presented in the Appendix, Module 9

See Module 9

Origin of the new genus name:

Progression of Greek alphabetic prefix

Reasons to justify the choice of type species:

Single species in genus

Species demarcation criteria in the new genus:

If there will be more than one species in the new genus, list the criteria being used for species demarcation and explain how the proposed members meet these criteria.

MODULE 3: **NEW GENUS**

creating a new genus

Ideally, a genus should be placed within a higher taxon.

Code	***2012.008jjV***	(assigned by ICTV officers)

To create a new genus within:

Subfamily:	***Unassigned***
Family:	***Papillomaviridae***
Order:	***Unassigned***

Fill in all that apply.

- If the higher taxon has yet to be created (in a later module, below) write "**(new)**" after its proposed name.
- If no family is specified, enter "**unassigned**" in the family box

naming a new genus

Code	***2012.008kkV***	(assigned by ICTV officers)

To name the new genus: *Dyopipapillomavirus*

Assigning the type species and other species to a new genus

Code	***2012.008llV***	(assigned by ICTV officers)

To designate the following as the type species of the new genus

Dyopipapillomavirus 1	Every genus must have a type species. This should be a well characterized species although not necessarily the first to be discovered

The new genus will also contain any other new species created and assigned to it (Module 2) and any that are being moved from elsewhere (Module 7b). **Please enter here the TOTAL number of species (including the type species) that the genus will contain:**

1

Reasons to justify the creation of a new genus:

Additional material in support of this proposal may be presented in the Appendix, Module 9

See Module 9

Origin of the new genus name:

Progression of Greek alphabetic prefix

Reasons to justify the choice of type species:

Single species in genus

Species demarcation criteria in the new genus:

If there will be more than one species in the new genus, list the criteria being used for species demarcation and explain how the proposed members meet these criteria.

MODULE 3: **NEW GENUS**

creating a new genus

Ideally, a genus should be placed within a higher taxon.

Code	***2012.008mmV***	(assigned by ICTV officers)

To create a new genus within:

Subfamily:	***Unassigned***
Family:	***Papillomaviridae***
Order:	***Unassigned***

Fill in all that apply.

- If the higher taxon has yet to be created (in a later module, below) write "**(new)**" after its proposed name.
- If no family is specified, enter "**unassigned**" in the family box

naming a new genus

Code	***2012.008nnV***	(assigned by ICTV officers)

To name the new genus: *Dyorhopapillomavirus*

Assigning the type species and other species to a new genus

Code	***2012.008ooV***	(assigned by ICTV officers)

To designate the following as the type species of the new genus

Dyorhopapillomavirus 1	Every genus must have a type species. This should be a well characterized species although not necessarily the first to be discovered

The new genus will also contain any other new species created and assigned to it (Module 2) and any that are being moved from elsewhere (Module 7b). **Please enter here the TOTAL number of species (including the type species) that the genus will contain:**

1

Reasons to justify the creation of a new genus:

Additional material in support of this proposal may be presented in the Appendix, Module 9

See Module 9

Origin of the new genus name:

Progression of Greek alphabetic prefix

Reasons to justify the choice of type species:

Single species in genus

Species demarcation criteria in the new genus:

If there will be more than one species in the new genus, list the criteria being used for species demarcation and explain how the proposed members meet these criteria.

MODULE 3: **NEW GENUS**

creating a new genus

Ideally, a genus should be placed within a higher taxon.

Code	***2012.008ppV***	(assigned by ICTV officers)

To create a new genus within:

Subfamily:	***Unassigned***
Family:	***Papillomaviridae***
Order:	***Unassigned***

Fill in all that apply.

- If the higher taxon has yet to be created (in a later module, below) write "**(new)**" after its proposed name.
- If no family is specified, enter "**unassigned**" in the family box

naming a new genus

Code	***2012.008qqV***	(assigned by ICTV officers)

To name the new genus: *Dyosigmapapillomavirus*

Assigning the type species and other species to a new genus

Code	***2012.008rrV***	(assigned by ICTV officers)

To designate the following as the type species of the new genus

Dyosigmapapillomavirus 1

Every genus must have a type species. This should be a well characterized species although not necessarily the first to be discovered

The new genus will also contain any other new species created and assigned to it (Module 2) and any that are being moved from elsewhere (Module 7b). **Please enter here the TOTAL number of species (including the type species) that the genus will contain:**

1

Reasons to justify the creation of a new genus:

Additional material in support of this proposal may be presented in the Appendix, Module 9

See Module 9

Origin of the new genus name:

Progression of Greek alphabetic prefix

Reasons to justify the choice of type species:

Single species in genus

Species demarcation criteria in the new genus:

If there will be more than one species in the new genus, list the criteria being used for species demarcation and explain how the proposed members meet these criteria.

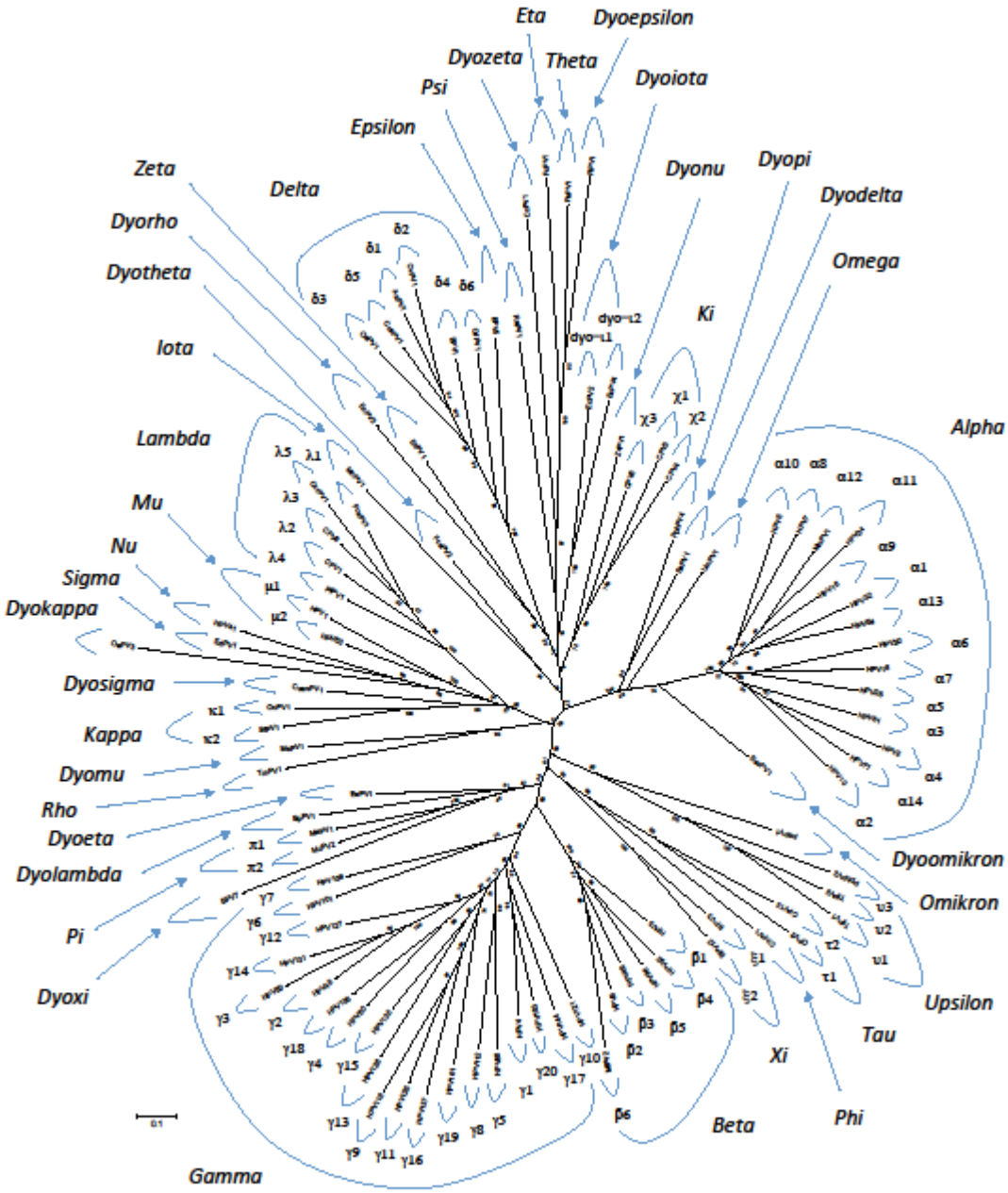

Figure Legend

Phylogenetic tree showing papillomavirus species and genera. A maximum likelihood (ML) tree was constructed using RAxML v7.2.8.27 (*1*) with GTR substitution model based on the aligned L1 ORF nucleotide sequences of 95 papillomavirus types representing species and genera. Numbers on or near branches indicate ML bootstrap percentages based on 752 replicates with autoMRE-based Bootstopping criterion in RAxML. The bar indicates the nucleotide substitution of 0.1 changes per site. (See Stamatakis, 2006).

Genus	Proposed Species name	Greek alphabet	Papillomavirus type	PV type	NCBI #
Alphapapillomavirus	*Alphapapillomavirus 1*	α1	Human papillomavirus 32 *	HPV32	X74475
Alphapapillomavirus	*Alphapapillomavirus 2*	α2	Human papillomavirus 10 *	HPV10	X74465
Alphapapillomavirus	*Alphapapillomavirus 3*	α3	Human papillomavirus 61 *	HPV61	U31793
Alphapapillomavirus	*Alphapapillomavirus 4*	α4	Human papillomavirus 2 *	HPV2	X55964
Alphapapillomavirus	*Alphapapillomavirus 5*	α5	Human papillomavirus 26 *	HPV26	X74472
Alphapapillomavirus	*Alphapapillomavirus 6*	α6	Human papillomavirus 30 *	HPV30	X74474
Alphapapillomavirus	*Alphapapillomavirus 7*	α7	Human papillomavirus 18 *	HPV18	AY262282
Alphapapillomavirus	*Alphapapillomavirus 8*	α8	Human papillomavirus 7 *	HPV7	X74463
Alphapapillomavirus	*Alphapapillomavirus 9*	α9	Human papillomavirus 16 *	HPV16	K02718
Alphapapillomavirus	*Alphapapillomavirus 10*	α10	Human papillomavirus 6 *	HPV6	X00203
Alphapapillomavirus	*Alphapapillomavirus 11*	α11	Human papillomavirus 34 *	HPV34	X74476
Alphapapillomavirus	*Alphapapillomavirus 12*	α12	Macaca mulata papillomavirus 1 *	MmPV1	M60184
Alphapapillomavirus	*Alphapapillomavirus 13*	α13	Human papillomavirus 54 *	HPV54	U37488
Alphapapillomavirus	*Alphapapillomavirus 14*	α14	Human papillomavirus 71 *	HPV71	AB040456
Betapapillomavirus	*Betapapillomavirus 1*	β1	Human papillomavirus 5 *	HPV5	M17463
Betapapillomavirus	*Betapapillomavirus 2*	β2	Human papillomavirus 9 *	HPV9	X74464
Betapapillomavirus	*Betapapillomavirus 3*	β3	Human papillomavirus 49 *	HPV49	X74480
Betapapillomavirus	*Betapapillomavirus 4*	β4	Human papillomavirus 92 *	HPV92	AF531420
Betapapillomavirus	*Betapapillomavirus 5*	β5	Human papillomavirus 96 *	HPV96	AY382779
Betapapillomavirus	*Betapapillomavirus 6*	β6	Macaca fascicularis papillomavirus 2 *	MfPV2	GU014531
Gammapapillomavirus	*Gammapapillomavirus 1*	γ1	Human papillomavirus 4 *	HPV4	X70827
Gammapapillomavirus	*Gammapapillomavirus 2*	γ2	Human papillomavirus 48 *	HPV48	U31789
Gammapapillomavirus	*Gammapapillomavirus 3*	γ3	Human papillomavirus 50 *	HPV50	U31790
Gammapapillomavirus	*Gammapapillomavirus 4*	γ4	Human papillomavirus 60 *	HPV60	U31792
Gammapapillomavirus	*Gammapapillomavirus 5*	γ5	Human papillomavirus 88 *	HPV88	EF467176
Gammapapillomavirus	*Gammapapillomavirus 6*	γ6	Human papillomavirus 101 *	HPV101	DQ080081
Gammapapillomavirus	*Gammapapillomavirus 7*	γ7	Human papillomavirus 109 *	HPV109	EU541441
Gammapapillomavirus	*Gammapapillomavirus 8*	γ8	Human papillomavirus 112 *	HPV112	EU541442
Gammapapillomavirus	*Gammapapillomavirus 9*	γ9	Human papillomavirus 116 *	HPV116	FJ804072
Gammapapillomavirus	*Gammapapillomavirus 10*	γ10	Human papillomavirus 121 *	HPV121	GQ845443
Gammapapillomavirus	*Gammapapillomavirus 11*	γ11	Human papillomavirus 126 *	HPV126	AB646346
Gammapapillomavirus	*Gammapapillomavirus 12*	γ12	Human papillomavirus 127 *	HPV127	HM011570
Gammapapillomavirus	*Gammapapillomavirus 13*	γ13	Human papillomavirus 128 *	HPV128	GU225708
Gammapapillomavirus	*Gammapapillomavirus 14*	γ14	Human papillomavirus 131 *	HPV131	GU117631
Gammapapillomavirus	*Gammapapillomavirus 15*	γ15	Human papillomavirus 135 *	HPV135	HM999987

Gammapapillomavirus	*Gammapapillomavirus 16*	γ16	Human papillomavirus 137 *	HPV137	HM999989
Gammapapillomavirus	*Gammapapillomavirus 17*	γ17	Human papillomavirus 144 *	HPV144	HM999996
Gammapapillomavirus	*Gammapapillomavirus 18*	γ18	Human papillomavirus 156 *	HPV156	JX429973
Gammapapillomavirus	*Gammapapillomavirus 19*	γ19	Human papillomavirus 161 *	HPV161	JX413109
Gammapapillomavirus	*Gammapapillomavirus 20*	γ20	Human papillomavirus 163 *	HPV163	JX413107
Deltapapillomavirus	*Deltapapillomavirus 1*	δ1	Alces alces papillomavirus 1 *	AaPV1	M15953
Deltapapillomavirus	*Deltapapillomavirus 2*	δ2	Odocoileus virginianus papillomavirus 1 *	OvPV1	M11910
Deltapapillomavirus	*Deltapapillomavirus 3*	δ3	Ovis aries papillomavirus 1 *	OaPV1	U83594
Deltapapillomavirus	*Deltapapillomavirus 4*	δ4	Bos taurus papillomavirus 1 *	BPV1	X02346
Deltapapillomavirus	*Deltapapillomavirus 5*	δ5	Capreolus capreolus papillomavirus 1 *	CcaPV1	EF680235
Deltapapillomavirus	*Deltapapillomavirus 6*	δ6	Camelus dromedarius papillomavirus 1*	CdPV1	HQ912790
Epsilonpapillomavirus	*Epsilonpapillomavirus 1*	ε1	Bos taurus papillomavirus 5 *	BPV5	AF457465
Zetapapillomavirus	*Zetapapillomavirus 1*	ζ1	Equus caballus papillomavirus 1 *	EcPV1	AF498323
Etapapillomavirus	*Etapapillomavirus 1*	η1	Fringilla coelebs papillomavirus 1 *	FcPV1	AY057109
Thetapapillomavirus	*Thetapapillomavirus 1*	θ1	Psittacus erithacus papillomavirus 1 *	PePV1	AF420235
Iotapapillomavirus	*Iotapapillomavirus 1*	ι1	Mastomys natalensis papillomavirus 1 *	MnPV1	U01834
Kappapapillomavirus	*Kappapapillomavirus 1*	κ1	Oryctolagus cuniculus papillomavirus 1 *	OcPV1	AF227240
Kappapapillomavirus	*Kappapapillomavirus 2*	κ2	Sylvilagus floridanus papillomavirus 1 *	SfPV1	K02708
Lambdapapillomavirus	*Lambdapapillomavirus 1*	λ1	Felis catus papillomavirus 1 *	FcaPV1	AF480454
Lambdapapillomavirus	*Lambdapapillomavirus 2*	λ2	Canis familiaris oral papillomavirus 1 *	CPV1	D55633
Lambdapapillomavirus	*Lambdapapillomavirus 3*	λ3	Canis familiaris papillomavirus 6 *	CPV6	FJ492744
Lambdapapillomavirus	*Lambdapapillomavirus 4*	λ4	Procyon lotor papillomavirus 1 *	PlPV1	AY763115
Lambdapapillomavirus	*Lambdapapillomavirus 5*	λ5	Crocuta crocuta papillomavirus 1 *	CcrPV1	HQ585856
Mupapillomavirus	*Mupapillomavirus 1*	μ1	Human papillomavirus 1 *	HPV1	V01116
Mupapillomavirus	*Mupapillomavirus 2*	μ2	Human papillomavirus 63 *	HPV63	X70828
Nupapillomavirus	*Nupapillomavirus 1*	ν1	Human papillomavirus 41 *	HPV41	X56147
Xipapillomavirus	*Xipapillomavirus 1*	ξ1	Bos taurus papillomavirus 3 *	BPV3	AF486184
Xipapillomavirus	*Xipapillomavirus 2*	ξ2	Bos taurus papillomavirus 12 *	BPV12	JF834523
Omikronpapillomavirus	*Omikronpapillomavirus 1*	ο1	Phocoena spinipinnis papillomavirus 1 *	PsPV1	AJ238373
Pipapillomavirus	*Pipapillomavirus 1*	π1	Mesocricetus auratus papillomavirus 1 *	MaPV1	E15111
Pipapillomavirus	*Pipapillomavirus 2*	π2	Mastomys coucha papillomavirus 2 *	McPV2	DQ664501
Rhopapillomavirus	*Rhopapillomavirus 1*	ρ1	Trichechus manatus latirostris papillomavirus 1 *	TmPV1	AY609301
Sigmapapillomavirus	*Sigmapapillomavirus 1*	σ1	Erethizon dorsatum papillomavirus 1 *	EdPV1	AY684126
Taupapillomavirus	*Taupapillomavirus 1*	τ1	Canis familiaris papillomavirus 2 *	CPV2	AY722648
Taupapillomavirus	*Taupapillomavirus 2*	τ2	Canis familiaris papillomavirus 13 *	CPV13	JX141478
Upsilonpapillomavirus	*Upsilonpapillomavirus 1*	υ1	Tursiops truncatus papillomavirus 1 *	TtPV1	EU240894

Upsilonpapillomavirus	*Upsilonpapillomavirus 2*	υ2	Tursiops truncatus papillomavirus 2 *	TtPV2	AY956402
Upsilonpapillomavirus	*Upsilonpapillomavirus 3*	υ3	Phocoena phocoena papillomavirus 2 *	PphPV2	GU117622
Phipapillomavirus	*Phipapillomavirus 1*	ϕ1	Capra hircus papillomavirus 1 *	ChPV1	DQ091200
Chipapillomavirus	*Chipapillomavirus 1*	χ1	Canis familiaris papillomavirus 3 *	CPV3	DQ295066
Chipapillomavirus	*Chipapillomavirus 2*	χ2	Canis familiaris papillomavirus 4 *	CPV4	EF584537
Chipapillomavirus	*Chipapillomavirus 3*	χ3	Canis familiaris papillomavirus 8 *	CPV8	HQ262536
Psipapillomavirus	*Psipapillomavirus 1*	ψ1	Rousettus aegyptiacus papillomavirus 1 *	RaPV1	DQ366842
Omegapapillomavirus	*Omegapapillomavirus 1*	ω1	Ursus maritimus papillomavirus 1 *	UmPV1	EF536349
Dyodeltapapillomavirus	*Dyodeltapapillomavirus 1*	dyo-δ1	Sus scrofa papillomavirus 1 *	SsPV1	EF395818
Dyoepsilonpapillomavirus	*Dyoepsilonpapillomavirus 1*	dyo-ε1	Francolinus leucoscepus papillomavirus 1 *	FlPV1	EU188799
Dyozetapapillomavirus	*Dyozetapapillomavirus 1*	dyo-ζ1	Caretta caretta papillomavirus 1 *	CcPV1	EU493092
Dyoetapapillomavirus	*Dyoetapapillomavirus 1*	dyo-η1	Erinaceus europaeus papillomavirus 1 *	EePV1	FJ379293
Dyothetapapillomavirus	*Dyothetapapillomavirus 1*	dyo-θ1	Felis catus papillomavirus 2 *	FcaPV2	EU796884
Dyoiotapapillomavirus	*Dyoiotapapillomavirus 1*	dyo-ι1	Equus caballus papillomavirus 2 *	EcPV2	EU503122
Dyoiotapapillomavirus	*Dyoiotapapillomavirus 2*	dyo-ι2	Equus caballus papillomavirus 4 *	EcPV4	JQ031032
Dyokappapapillomavirus	*Dyokappapapillomavirus 1*	dyo-κ1	Ovis aries papillomavirus 3 *	OaPV3	FJ796965
Dyolambdapapillomavirus	*Dyolambdapapillomavirus 1*	dyo-λ1	Bettongia penicillata papillomavirus 1 *	BpPV1	GU220391
Dyomupapillomavirus	*Dyomupapillomavirus 1*	dyo-μ1	Morelia spilota papillomavirus 1 *	MsPV1	HQ262535
Dyonupapillomavirus	*Dyonupapillomavirus 1*	dyo-ν1	Zalophus californianus papillomavirus 1 *	ZcPV1	HQ293213
Dyoxipapillomavirus	*Dyoxipapillomavirus 1*	dyo-ξ1	Bos taurus papillomavirus 7 *	BPV7	DQ217793
Dyoomikronpapillomavirus	*Dyoomikronpapillomavirus 1*	dyo-ο1	Saimiri sciureus papillomavirus 1 *	SscPV1	JF304765
Dyopipapillomavirus	*Dyopipapillomavirus 1*	dyo-π1	Phocoena phocoena papillomavirus 4 *	PphPV4	GU117623
Dyorhopapillomavirus	*Dyorhopapillomavirus 1*	dyo-ρ1	Equus caballus papillomavirus 3 *	EcPV3	GU384895
Dyosigmapapillomavirus	*Dyosigmapapillomavirus 1*	dyo-σ1	Castor canadensis papillomavirus 1 *	CcanPV1	KC020689

*Red indicates NEW Species and/or Genus; *indicates the type first recognized in the species and possibly the genus*

additional material in support of this proposal

References:

Bernard, H.U., Burk, R.D., Chen, Z., van Doorslaer, K., Hausen, H. & de Villiers, E.M. (2010). Classification of papillomaviruses (PVs) based on 189 PV types and proposal of taxonomic amendments. Virology 401, 70-79.

A. Stamatakis, RAxML-VI-HPC: maximum likelihood-based phylogenetic analyses with thousands of taxa and mixed models. *Bioinformatics* **22**, 2688 (Nov 1, 2006).

Annex:

Include as much information as necessary to support the proposal, including diagrams comparing the old and new taxonomic orders. The use of Figures and Tables is strongly recommended but direct pasting of content from publications will require permission from the copyright holder together with appropriate acknowledgement as this proposal will be placed on a public web site. For phylogenetic analysis, try to provide a tree where branch length is related to genetic distance.

These proposals expand upon the *Papillomaviridae* family nomenclature based on recently reported viral genomes. No metagenomic sequences are considered for inclusion. The basis of classifying PV species and genera is presented in the reference, Bernard et al. (2010). The Study Group proposes a significant expansion of the family *Papillomaviridae*. To achieve this, the names of genera are continued based on the Greek alphabet (*Alphapapillomavirus* through *Omegapapillomavirus*), followed by recommencement with a Dyo- prefix from *Dyodeltapapillomavirus* onwards to avoid confusion with the most important genera, *Alphapapillomavirus* through *Gammapapillomavirus*.

Papillomavirus taxa are defined on the basis of phylogenetic distances among the L1 DNA sequences. In addition, the species name also reflects the host organism from which the papillomavirus was isolated. A phylogenetic tree is shown in the attachment. The criteria for defining species and genera are general and not absolute, with sequence identity ranges overlapping somewhat. Thus, intergeneric identities range from about 43-62%, interspecies identities from about 55-71%, and intraspecies identities from about 67-88%. The proposals are in line with this criterion.

We are proposing 9 new genera and 26 new species. This proposal is supported by the appended phylogenetic tree based on 95 papillomavirus L1 nucleotide sequences, and supports the criteria for defining species and genera.

A complete list of papillomavirus genera, species, and types is appended as additional supporting material.