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:	***2016.015a-dS***	(to be completed by ICTV officers)

Short title: Create 1 new species (*Rabovirus A*) in a new genus (*Rabovirus*)
(e.g. 6 new species in the genus *Zetavirus*)

Modules attached (modules 1 and 11 are required)	**2** ☒ **3** ☒ **4** ☐ **5** ☐ **6** ☐ **7** ☐ **8** ☐ **9** ☐ **10** ☐ **11** ☒

Author(s):

Roland Zell, Eric Delwart, Alexander E. Gorbalenya, Tapani Hovi, Andrew M.Q. King, Nick J. Knowles, A. Michael Lindberg, Mark A. Pallansch, Ann C. Palmenberg, Gabor Reuter, Peter Simmonds, Tim Skern, Glyn Stanway and Teruo Yamashita

Corresponding author with e-mail address:

Roland Zell (roland.zell@med.uni-jena.de)

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)	*Picornaviridae* Study Group

ICTV Study Group comments (if any) and response of the proposer:

Date first submitted to ICTV: 15/06/2016
Date of this revision (if different to above):

ICTV-EC comments and response of the proposer:

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	***2016.015aS***	(assigned by ICTV officers)

To create 1 new species within:

Genus:	***Rabovirus*** (new)
Subfamily:	
Family:	***Picornaviridae***
Order:	***Picornavirales***

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.

Name of new species:	**Representative isolate: (only 1 per species please)**	**GenBank sequence accession number(s)**
Rabovirus A	Rabovirus [Berlin/Jan2011/0572]	KP233897

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 11

Novel picornaviruses were detected in faecal samples from Norway rats (*Rattus norwegicus*) in USA and Germany. Sequences of two raboviruses are known (KP233897, KJ950883); the amino acid identity of the P1 genome region of these two viruses is ~86.2%; distinction of 2 types when applying the 25% nt divergence/12% aa divergence rule (compare Table 1; Appendix).

Typical L-4-3-4 picornavirus genome layout (compare Figure 1, Appendix):

VPg+5'UTR$^{\text{IRES-II}}$[L-1A-1B-1C-1D/2A$^{\text{Pro}}$-2B-2C$^{\text{Hel}}$/3A-3B$^{\text{VPg}}$-3C$^{\text{Pro}}$-3D$^{\text{Pol}}$]3'UTR-poly(A)

Amino acid identies from raboviruses (compare Tables 1, 2; Appendix):

	Enterovirus	*Sapelovirus*
P1	34-40%	39-41%
3CD	46-54%	51-53%

MODULE 3: **NEW GENUS**

creating a new genus

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

Code	***2016.015bS***	(assigned by ICTV officers)

To create a new genus within:

Subfamily:	
Family:	***Picornaviridae***
Order:	***Picornavirales***

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	***2016.015cS***	(assigned by ICTV officers)

To name the new genus: *Rabovirus*

Assigning the type species and other species to a new genus

Code	***2016.015dS***	(assigned by ICTV officers)

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

Rabovirus A

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 11

Although raboviruses are closely related to *Enterovirus* and *Sapelovirus* (compare Figures 2, 3; Appendix), they exhibit significant distinctive features:
(i) a type II IRES which is uncommon in *Enterovirus* (type I IRES) and *Sapelovirus* (type IV IRES),
(ii) a unique L protein,

Origin of the new genus name:

Rabovirus: from **ra**t-**bo**rne picorna**virus**

Reasons to justify the choice of type species:

only a single species

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.

only a single species

MODULE 11: **APPENDIX**: supporting material

additional material in support of this proposal

References:

Ng TF, Sachsenröder J, Reuter G, Knowles NJ, Delwart E, Johne R. 2015. *Rabovirus*: a proposed new picornavirus genus that is phylogenetically basal to enteroviruses and sapeloviruses. Arch. Virol. 160:2569-2575.

Firth C, Bhat M, Firth MA, Williams SH, Frye MJ, Simmonds P, Conte JM, Ng J, Garcia J, Bhuva NP, Lee B, Che X, Quan PL, Lipkin WI. 2014. Detection of zoonotic pathogens and characterization of novel viruses carried by commensal *Rattus norwegicus* in New York City. mBio 5(5):e01933-14.

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.

Genome organization:

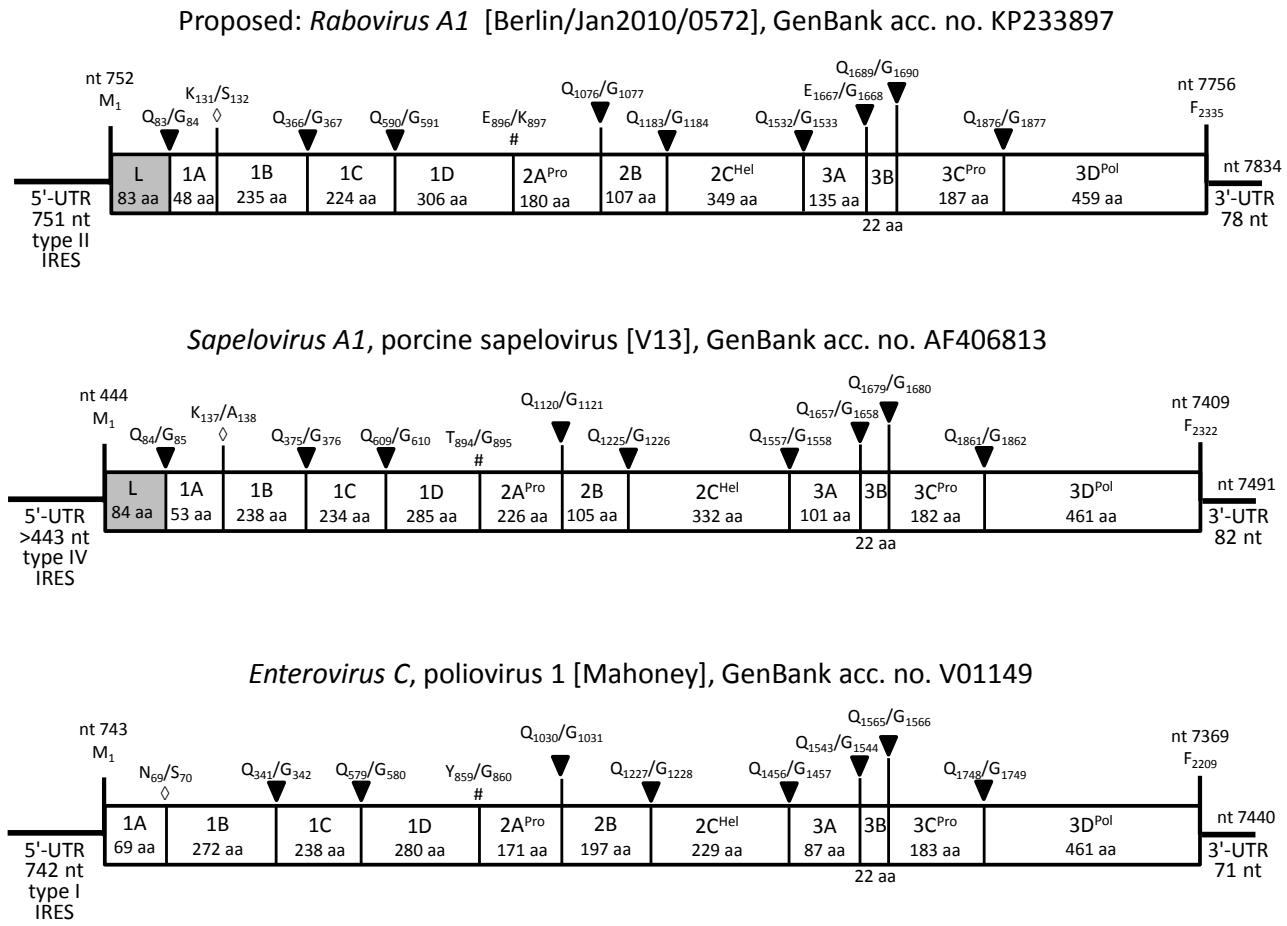

Figure 1: Comparison of the *Rabovirus* (top), *Sapelovirus* (middle) and *Enterovirus* (below) genome organization (schematic depiction). The open reading frames are indicated by boxes. Positions of putative amino acid cleavage sites and the lengths of the deduced proteins are shown as proposed by Ng et al. (2015). Triangles (▼) indicate the putative $3C^{Pro}$ cleavage sites, hash tags (#) the $2C^{Pro}$ processing sites and diamonds (◊) the 1AB processing sites. The L-encoding genome regions of rabovirus and sapelovirus which lack significant sequence homology are shaded.

Fig. 2
P1

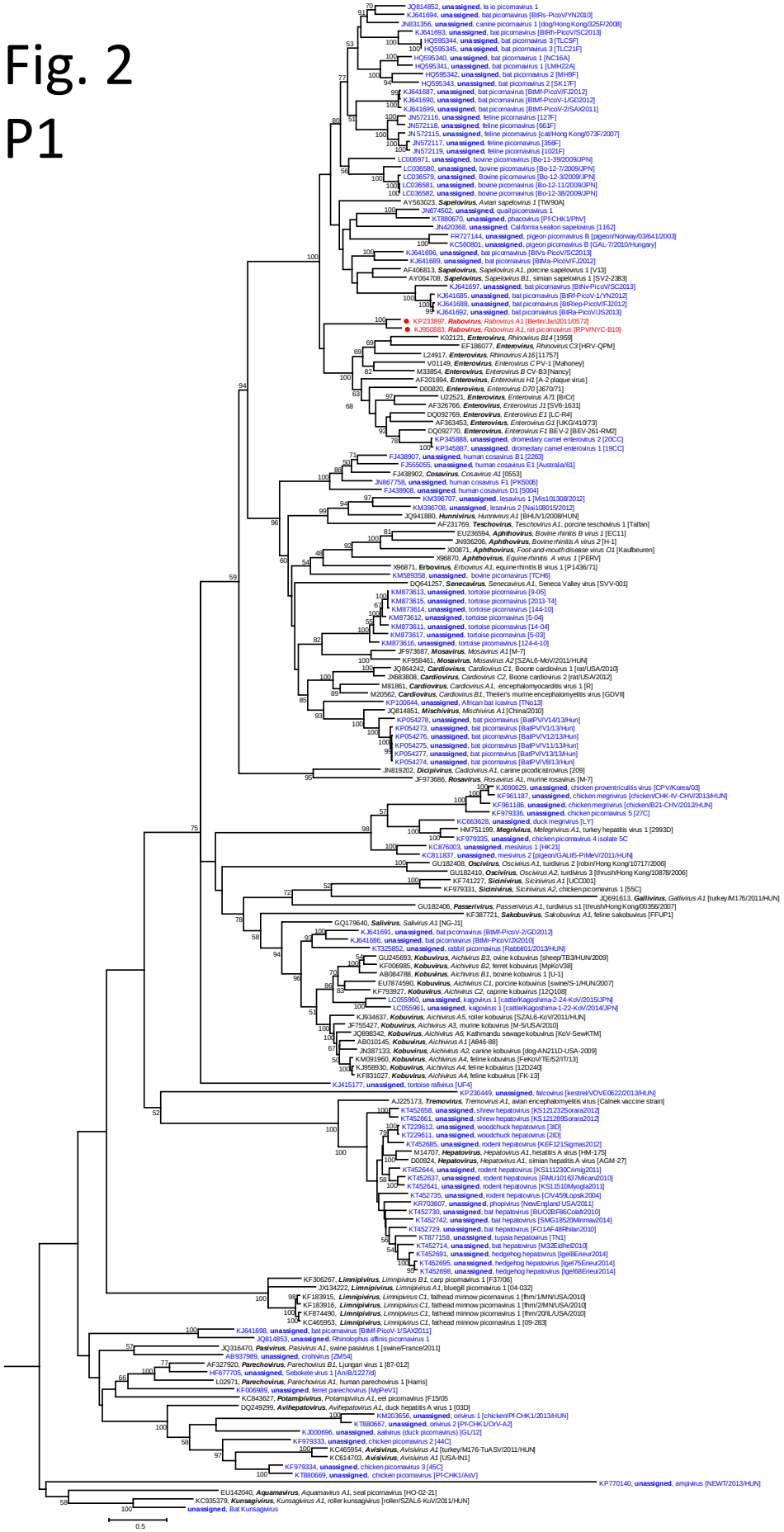
JQ814852, unassigned, Ia io picornavirus 1
KJ641694, unassigned, bat picornavirus [BtRs-PicoV/YN2010]
JN831356, unassigned, canine picornavirus 1 [dog/Hong Kong/325F/2008]
KJ641693, unassigned, bat picornavirus [BtRh-PicoV/SC2013]
HQ595344, unassigned, bat picornavirus 3 [TLC5F]
HQ595345, unassigned, bat picornavirus 3 [TLC21F]
HQ595340, unassigned, bat picornavirus 1 [NC16A]
HQ595341, unassigned, bat picornavirus 1 [UMH22A]
HQ595342, unassigned, bat picornavirus 2 [MH9F]
HQ595343, unassigned, bat picornavirus 2 [SK17F]
KJ641687, unassigned, bat picornavirus [BtMf-PicoV/FJ2012]
KJ641690, unassigned, bat picornavirus [BtMf-PicoV-1/GD2012]
KJ641699, unassigned, bat picornavirus [BtMf-PicoV-2/SAX2011]
JN572116, unassigned, feline picornavirus 12?F
JN572118, unassigned, feline picornavirus [61F]
JN 572115, unassigned, feline picornavirus [cat/Hong Kong/073F/2007]
JN572117, unassigned, feline picornavirus [356F]
JN572119, unassigned, feline picornavirus [1021F]
LC006971, unassigned, bovine picornavirus [Bo-11-39/2009/JPN]
LC036580, unassigned, bovine picornavirus [Bo-12-7/2009/JPN]
LC036579, unassigned, Bovine picornavirus [Bo-12-3/2009/JPN]
LC036581, unassigned, bovine picornavirus [Bo-12-11/2009/JPN]
LC036582, unassigned, bovine picornavirus [Bo-12-38/2009/JPN]
AY563023, Sapelovirus, Avian sapelovirus 1 [TW90A]
JN674502, unassigned, quail picornavirus 1
KT880670, unassigned, phacovirus [Pf-CHK1/PtrV]
JN420369, unassigned, California sealion sapelovirus [1162]
FR727144, unassigned, pigeon picornavirus B [pigeon/Norway/03/641/2003]
KC560801, unassigned, pigeon picornavirus B [GAL-7/2010/Hungary]
KJ641696, unassigned, bat picornavirus [BtVs-PicoV/SC2013]
KJ641689, unassigned, bat picornavirus [BtMa-PicoV/FJ2012]
AF406813, Sapelovirus, Sapelovirus A1, porcine sapelovirus 1 [V13]
AY064708, Sapelovirus, Sapelovirus B1, simian sapelovirus 1 [SV2-2383]
KJ641697, unassigned, bat picornavirus [BtHv-PicoV/SC2013]
KJ641685, unassigned, bat picornavirus [BtRf-PicoV-1/YN2012]
KJ641688, unassigned, bat picornavirus [BtRlep-PicoV/FJ2012]
KJ641692, unassigned, bat picornavirus [BtRa-PicoV/JS2013]
KP233897, Rabovirus, Rabovirus A1 [Berlin/Jan2011/0572]
KJ950883, Rabovirus, Rabovirus A1, rat picornavirus [RPV/NYC-B10]
K02121, Enterovirus, Rhinovirus B14 [1959]
EF186077, Enterovirus, Rhinovirus C3 [HRV-QPM]
L24917, Enterovirus, Rhinovirus A16 [11757]
V01149, Enterovirus, Enterovirus C PV-1 [Mahoney]
M33854, Enterovirus, Enterovirus B CV-B3 [Nancy]
AF201894, Enterovirus, Enterovirus H1 [A-2 plaque virus]
D00820, Enterovirus, Enterovirus D70 [J670/71]
U22521, Enterovirus, Enterovirus A71 [BrCr]
AF326766, Enterovirus, Enterovirus J1 [SV6-1631]
DQ092769, Enterovirus, Enterovirus E1 [LC-R6]
AF363453, Enterovirus, Enterovirus G1 [UKG/410/73]
DQ092770, Enterovirus, Enterovirus F1 BEV-2 [BEV-261-RM2]
KP345888, unassigned, dromedary camel enterovirus 2 [20CC]
KP345887, unassigned, dromedary camel enterovirus 1 [19CC]
FJ438907, unassigned, human cosavirus B1 [2263]
FJ555055, unassigned, human cosavirus E1 [Australia/61]
FJ438902, Cosavirus, Cosavirus A1 [0553]
JN867758, unassigned, human cosavirus F1 [PK5006]
FJ438908, unassigned, human cosavirus D1 [5004]
KM396707, unassigned, Iesavirus 1 [Mis101308/2012]
KM396708, unassigned, Iesavirus 2 [Nai108015/2012]
JQ941880, Hunnivirus, Hunnivirus A1 [BHUV/12008/HUN]
AF231769, Teschovirus, Teschovirus A1, porcine teschovirus 1 [Talfan]
EU236594, Aphthovirus, Bovine rhinitis B virus 1 [EC11]
JN936206, Aphthovirus, Bovine rhinitis A virus 2 [H-1]
X00871, Aphthovirus, Foot-and-mouth disease virus O1 [Kaufbeuren]
X96870, Aphthovirus, Equine rhinitis A virus 1 [PERV]
X96871, Erbovirus, Erbovirus A1, equine rhinitis B virus 1 [P1436/71]
KM589358, unassigned, bovine picornavirus [TCH6]
DQ641257, Senecavirus, Senecavirus A1, Seneca Valley virus [SVV-001]
KM873613, unassigned, tortoise picornavirus [9-05]
KM873615, unassigned, tortoise picornavirus [2013-T4]
KM873614, unassigned, tortoise picornavirus [144-10]
KM873612, unassigned, tortoise picornavirus [5-04]
KM873611, unassigned, tortoise picornavirus [14-04]
KM873617, unassigned, tortoise picornavirus [5-03]
KM873616, unassigned, tortoise picornavirus [124-4-10]
JF973687, Mosavirus, Mosavirus A1 [M-7]
KP958461, Mosavirus, Mosavirus A2 [SZAL6-MoV/2011/HUN]
JQ864242, Cardiovirus, Cardiovirus C1, Boone cardiovirus 1 [rat/USA/2010]
JX683808, Cardiovirus, Cardiovirus C2, Boone cardiovirus 2 [rat/USA/2012]
M81861, Cardiovirus, Cardiovirus A1, encephalomyocarditis virus 1 [R]
M20562, Cardiovirus, Cardiovirus B1, Theiler's murine encephalomyelitis virus [GDVII]
KP100644, unassigned, African bat icavirus [TNo13]
JQ814851, Mischivirus, Mischivirus A1 [China/2010]
KP054278, unassigned, bat picornavirus [BatPV/V14/13/Hun]
KP054273, unassigned, bat picornavirus [BatPV/V1/13/Hun]
KP054276, unassigned, bat picornavirus [BatPV/V12/13/Hun]
KP054275, unassigned, bat picornavirus [BatPV/V11/13/Hun]
KP054277, unassigned, bat picornavirus [BatPV/V13/13/Hun]
KP054274, unassigned, bat picornavirus [BatPV/V8/13/Hun]
JN819202, Diopivirus, Cadicivirus A1, canine picodicistrovirus [209]
JF973686, Rosavirus, Rosavirus A1, murine rosavirus [M-7]
KJ690629, unassigned, chicken proventriculitis virus [CPV/Korea/03]
KF961187, unassigned, chicken megrivirus [chicken/CHK-IV-CHV/2013/HUN]
KF961186, unassigned, chicken megrivirus [chicken/B21-CHV/2012/HUN]
KF979336, unassigned, chicken picornavirus 5 [27C]
KC663628, unassigned, duck megrivirus [LY]
HM751199, Megrivirus, Melegrivirus A1, turkey hepatitis virus 1 [2993D]
KF979335, unassigned, chicken picornavirus 4 isolate 5C
KC876003, unassigned, mesivirus 1 [HK21]
KC811837, unassigned, mesivirus 2 [pigeon/GALI5-PiMeV/2011/HUN]
GU182408, Oscivirus, Oscivirus A1, turdivirus 2 [robin/Hong Kong/10717/2006]
GU182410, Oscivirus, Oscivirus A2, turdivirus 3 [thrush/Hong Kong/10878/2006]
KF741227, Sicinivirus, Sicinivirus A1 [UCC001]
KF979331, Sicinivirus, Sicinivirus A2, chicken picornavirus 1 [55C]
JQ691613, Gallivirus, Gallivirus A1 [turkey/M176/2011/HUN]
GU182406, Passerivirus, Passerivirus A1, turdivirus s1 [thrush/Hong Kong/00356/2007]
KF387721, Sakobuvirus, Sakobuvirus A1, feline sakobuvirus [FFUP1]
GQ179640, Salivirus, Salivirus A1 [NG-J1]
KJ641691, unassigned, bat picornavirus [BtMf-PicoV-2/GD2012]
KJ641686, unassigned, bat picornavirus [BtMr-PicoV/JX2010]
KT325852, unassigned, rabbit picornavirus [Rabbit01/2013/HUN]
GU245693, Kobuvirus, Aichivirus B3, ovine kobuvirus [sheep/TB3/HUN/2009]
KF006985, Kobuvirus, Aichivirus B2, ferret kobuvirus [MpKoV38]
AB084788, Kobuvirus, Aichivirus B1, bovine kobuvirus 1 [U-1]
EU7874590, Kobuvirus, Aichivirus C1, porcine kobuvirus [swine/S-1/HUN/2007]
KF793927, Kobuvirus, Aichivirus C2, caprine kobuvirus [12Q108]
LC055960, unassigned, kagovirus 1 [cattle/Kagoshima-2-24-KoV/2015/JPN]
LC055961, unassigned, kagovirus 1 [cattle/Kagoshima-1-22-KoV/2014/JPN]
KJ934637, Kobuvirus, Aichivirus A5, roller kobuvirus [SZAL6-KoV/2011/HUN]
JF755427, Kobuvirus, Aichivirus A3, murine kobuvirus [M-5/USA/2010]
JQ898342, Kobuvirus, Aichivirus A6, Kathmandu sewage kobuvirus [KoV-SewKTM]
AB010145, Kobuvirus, Aichivirus A1 [A846-88]
JN387133, Kobuvirus, Aichivirus A2, canine kobuvirus [dog-AN211D-USA-2009]
KM091960, Kobuvirus, Aichivirus A4, feline kobuvirus [FeKoV/TE/52/IT/13]
KJ958930, Kobuvirus, Aichivirus A4, feline kobuvirus [12D240]
KF831027, Kobuvirus, Aichivirus A4, feline kobuvirus [FK-13]
KJ415177, unassigned, tortoise rafivirus [UF4]
KP230449, unassigned, falcovirus [kestrel/VOVE0622/2013/HUN]
AJ225173, Tremovirus, Tremovirus A1, avian encephalomyelitis virus [Calnek vaccine strain]
KT452658, unassigned, shrew hepatovirus [KS12123Sorara2012]
KT452661, unassigned, shrew hepatovirus [KS12128Sorara2012]
KT229612, unassigned, woodchuck hepatovirus [3D]
KT229611, unassigned, woodchuck hepatovirus [2D]
KT452685, unassigned, rodent hepatovirus [KEF121Sigmas2012]
M14707, Hepatovirus, Hepatovirus A1, hetalitis A virus [HM-175]
D00924, Hepatovirus, Hepatovirus A1, simian hepatitis A virus [AGM-27]
KT452644, unassigned, rodent hepatovirus [KS111230Cirmig2011]
KT452637, unassigned, rodent hepatovirus [RMU10163?Mican2010]
KT452641, unassigned, rodent hepatovirus [KS1510Myogla2011]
KT452735, unassigned, rodent hepatovirus [CIV459Lopsik2004]
KR703607, unassigned, phopivirus [NewEngland USA/2011]
KT452730, unassigned, bat hepatovirus [BUC0BFRBCoalk2010]
KT452742, unassigned, bat hepatovirus [SMC18520Minmax2014]
KT452729, unassigned, bat hepatovirus [FO1AF48Rhilan2010]
KT877158, unassigned, tupaia hepatovirus [TN1]
KT452714, unassigned, bat hepatovirus [M33Ei8Pte2010]
KT452691, unassigned, hedgehog hepatovirus [Igel8Erieur2014]
KT452695, unassigned, hedgehog hepatovirus [Igel75Erieur2014]
KT452698, unassigned, hedgehog hepatovirus [Igel68Erieur2014]
KF306267, Limnipivirus, Limnipivirus B1, carp picornavirus 1 [F37/06]
JX134222, Limnipivirus, Limnipivirus A1, bluegill picornavirus 1 [04-032]
KF183915, Limnipivirus, Limnipivirus C1, fathead minnow picornavirus 1 [fhm/1/MN/USA/2010]
KF183916, Limnipivirus, Limnipivirus C1, fathead minnow picornavirus 1 [fhm/2/MN/USA/2010]
KF874490, Limnipivirus, Limnipivirus C1, fathead minnow picornavirus 1 [fhm/20/IL/USA/2010]
KC465953, Limnipivirus, Limnipivirus C1, fathead minnow picornavirus 1 [09-283]
KJ641698, unassigned, bat picornavirus [BtMf-PicoV-1/SAX2011]
JQ814853, unassigned, Rhinolophus affinis picornavirus 1
JQ316470, Pasivirus, Pasivirus A1, swine pasivirus 1 [swine/France/2011]
AB937989, unassigned, crohivirus [ZM54]
AF327920, Parechovirus, Parechovirus B1, Ljungan virus 1 [87-012]
HF677705, unassigned, Setokele virus 1 [AnB/BJ227/6]
L02971, Parechovirus, Parechovirus A1, human parechovirus 1 [Harris]
KF006989, unassigned, ferret parechovirus [MpPeV1]
KC843627, Potamipivirus, Potamipivirus A1, eel picornavirus [F15/05
DQ249299, Avihepatovirus, Avihepatovirus A1, duck hepatitis A virus 1 [03D]
KM203656, unassigned, orivirus 1 [chicken/Pf-CHK1/2013/HUN]
KT880667, unassigned, orivirus 2 [Pf-CHK1/OrV-A2]
KJ000696, unassigned, aalivirus (duck picornavirus) [GL/12]
KF979333, unassigned, chicken picornavirus 2 [44C]
KC465954, Avisivirus, Avisivirus A1 [turkey/M176-TuASV/2011/HUN]
KC614703, Avisivirus, Avisivirus A1 [USA-IN1]
KF979334, unassigned, chicken picornavirus 3 [45C]
KT880669, unassigned, chicken picornavirus [Pf-CHK1/AsV]
KP770140, unassigned, ampivirus [NEWT/2013/HUN]
EU142040, Aquamavirus, Aquamavirus A1, seal picornavirus [HO-02-21]
KC935379, Kunsagivirus, Kunsagivirus A1, roller kunsagivirus [roller/SZAL6-KuV/2011/HUN]
unassigned, Bat Kunsagivirus
0.5

Figure 2 (previous page): Phylogenetic analyses of picornavirus P1 using maximum likelihood tree inference (MEGA5.2). 178 picornavirus sequences were retrieved from GenBank. Presented are GenBank accession numbers, ***genus names***, *species names* and *types*. If available, common names and designations of isolates [in square brackets] are given. Yet unassigned viruses are printed in blue. Proposed names are printed in red and indicated by a dot (●). Numbers at nodes indicate bootstrap values obtained after 200 replications. The optimal substitution model (GTR+G+I) was determined with MEGA 5. The scale indicates substitutions/site.

Fig. 3
3CD


KJ958930, Kobuvirus, Aichivirus A4, feline kobuvirus [12D240]
KM091960, Kobuvirus, Aichivirus A4, feline kobuvirus [FeKoV/TE/52/IT/13]
KF831027, Kobuvirus, Aichivirus A4, feline kobuvirus [FK-13]
JN387133, Kobuvirus, Aichivirus A2, canine kobuvirus 1 [dog-AN211D-USA-2009]
JF755427, Kobuvirus, Aichivirus A3, murine kobuvirus 1 [M-5-USA-2010]
AB010145, Kobuvirus, Aichivirus A1 [A846-88]
JQ898342, Kobuvirus, Aichivirus A6, Kathmandu sewage kobuvirus [KoV-SewKTM]
KJ934637, Kobuvirus, Aichivirus A5, roller kobuvirus [SZAL6-KoV/2011/HUN]
AB084786, Kobuvirus, Aichivirus B1, bovine kobuvirus 1 [U-1]
GU245693, Kobuvirus, Aichivirus B3, ovine kobuvirus [sheep/TB3/HUN/2009]
KF006985, Kobuvirus, Aichivirus B2, ferret kobuvirus [ferret/MpKoV38/NL/2010]
EU787450, Kobuvirus, Aichivirus C1, porcine kobuvirus 1 [swS-1/HUN/2007]
KF793927, Kobuvirus, Aichivirus C2, caprine kobuvirus [12Q108]
LC055960, unassigned, kagovirus 2 [cattle/Kagoshima-2-24-KoV/2015/JPN]
LC055961, unassigned, kagovirus 1 [cattle/Kagoshima-1-22-KoV/2014/JPN]
GQ179540, Salivirus, Salivirus A1 [huVNG-J1/Nigeria/2007]
JQ691613, Gallivirus, Gallivirus A1 [turkey/HUN/M176/2011]
GU182406, Passerivirus, Passerivirus A1, turdivirus 1 [thrush/Hong Kong/00356/2007]
KF741227, Sicinivirus, Sicinivirus A1 [chicken/UCC001/Eire]
KF979331, Sicinivirus, Sicinivirus A1 [ChPV-1/chicken/55C/Hong Kong/2008]
KF387721, Sakobuvirus, Sakobuvirus A1 [FFUP1/Portugal/2012]
KJ641686, unassigned, bat picornavirus [BtMr-PicoV/JX2010]
KJ641691, unassigned, bat picornavirus [BtMf-PicoV-2/GD2012]
KT325852, unassigned, rabbit picornavirus [Rabbit01/2013/HUN]
GU182408, Oscivirus, Oscivirus A1, turdivirus 2 [robin/Hong Kong/10717/2006)
GU182410, Oscivirus, Oscivirus A2, turdivirus 3 [robin/Hong Kong/1087872006]
KJ415177, unassigned, tortoise rafivirus [UF-4]
KF961186, unassigned, chicken megrivirus [chicken/B21-CHV/2012/HUN]
KF961187, unassigned, chicken megrivirus [chicken/CHK-IV-CHV/2013/HUN]
KJ690629, unassigned, chicken proventriculitis virus [CPV/Korea/03]
HM751199, Megrivirus, Melegrivirus A1, turkey hepatitis virus [2993D]
KF979336, unassigned, chicken picornavirus 5 [27C]
KF979335, unassigned, chicken picornavirus 4 [5C]
KC663628, unassigned, duck megrivirus [LY]
KC811837, unassigned, pigeon mesivirus 2 [pigeon/GALII5-PiMeV/2011/HUN]
KC876003, unassigned, mesivirus 1 [HK21]
JN819202, Dicipivirus, Cadicivirus A1, canine picodicistrovirus [209]
JF973686, Rosavirus, Rosavirus A1 [mouse/USA/M-7/2010]
KP054278, unassigned, bat picornavirus [BatPV/V14/13/Hun]
KP054276, unassigned, bat picornavirus [BatPV/V12/13/Hun]
KP054275, unassigned, bat picornavirus [BatPV/V11/13/Hun]
KP054277, unassigned, bat picornavirus [BatPV/V13/13/Hun]
KP054274, unassigned, bat picornavirus [BatPV/V8/13/Hun]
KP054273, unassigned, bat picornavirus [BatPV/V1/13/Hun]
JQ814851, Mischivirus, Mischivirus A1 [bat/China/2010]
KP100644, unassigned, African bat icavirus [Tkx13]
M20562, Cardiovirus, Cardiovirus B1, Theiler's murine encephalomyelitis virus [GDVII]
M81861, Cardiovirus, Cardiovirus A1, encephalomyocarditis virus 1 [R]
JQ864242, Cardiovirus, Cardiovirus C1, Boone cardiovirus 1 [rat/USA/2010]
JX683808, Cardiovirus, Cardiovirus C2, Boone cardiovirus 2 [rat/USA/2012]
DQ641257, Senecavirus, Senecavirus A1, Seneca Valley virus 1 [cc/US/SVV-001]
FJ438908, unassigned, human cosavirus D1 [5004]
FJ555055, unassigned, human cosavirus E1 [Australia/61]
FJ438907, unassigned, human cosavirus B1 [2263]
FJ438902, Cosavirus, Cosavirus A1 [0553]
JN867758, unassigned, human cosavirus F1 [PK5006]
EU236594, Aphthovirus, Bovine rhinitis B virus 1 [EC11]
JN936206, Aphthovirus, Bovine rhinitis A virus 2 [H-1]
X00871, Aphthovirus, Foot-and-mouth disease virus O1 [Kaufbeuren]
X96870, Aphthovirus, Equine rhinitis A virus 1 [PERV]
KM096707, unassigned, lesavirus 1 [Mis101308/2012]
KM396708, unassigned, lesavirus 2 [Nai108015/2012]
JQ941880, Hunnivirus, Hunnivirus A1 [cattle/HUN/2008]
AF231769, Teschovirus, Teschovirus A1, porcine teschovirus 1 [Talfan]
X96871, Erbovirus, Erbovirus A1, equine rhinitis B virus 1 [P1436/71]
KM589358, unassigned, bovine erbo-like picornavirus [TCH6]
KM873613, unassigned, tortoise picornavirus [9-05]
KM873614, unassigned, tortoise picornavirus [144-10]
KM873615, unassigned, tortoise picornavirus [2013-T4]
KM873612, unassigned, tortoise picornavirus [5-04]
KM873611, unassigned, tortoise picornavirus [14-04]
KM873616, unassigned, tortoise picornavirus [124-4-10]
KM873617, unassigned, tortoise picornavirus [5-03]
JF973687, Mosavirus, Mosavirus A1 [mouse/M-7/USA/2010]
KF958461, Mosavirus, Mosavirus A2 [SZAL6-MoV/2011/HUN]
JN572117, unassigned, feline picornavirus [356F]
JN572119, unassigned, feline picornavirus [1021F]
JN572115, unassigned, feline picornavirus [cat/Hong Kong/073F/20079
JN572116, unassigned, feline picornavirus [127F]
JN572118, unassigned, feline picornavirus [661F]
KJ641687, unassigned, bat picornavirus [BtMf-PicoV/FJ2012]
KJ641699, unassigned, bat picornavirus [BtMf-PicoV-2/SAX2011]
KJ641690, unassigned, bat picornavirus [BtMf-PicoV-1/GD2012]
HQ595344, unassigned, bat picornavirus [TLC5F]
HQ595345, unassigned, bat picornavirus [TLC21F]
KJ641693, unassigned, bat picornavirus [BtRh-PicoV/SC2013]
HQ595340, unassigned, bat picornavirus [NC16A]
HQ595341, unassigned, bat picornavirus [LMH22A]
HQ595342, unassigned, bat picornavirus [MH9F]
HQ595343, unassigned, bat picornavirus [SK17F]
JQ814852, unassigned, Ia io picornavirus 1
KJ641694, unassigned, bat picornavirus [BtRs-PicoV/YN2010]
JN831356, unassigned, canine picornavirus [dog/Hong Kong/325F/2008]
LC036579, unassigned, bovine picornavirus [Bo-12-3/2009/JPN]
LC036581, unassigned, bovine picornavirus [Bo-12-11/2009/JPN]
LC036580, unassigned, bovine picornavirus [Bo-12-7/2009/JPN]
LC036582, unassigned, bovine picornavirus [Bo-12-38/2009/JPN]
LC006971, unassigned, Bovine picornavirus [Bo-11-39/2009/JPN]
AF406813, Sapelovirus, Sapelovirus A1, porcine sapelovirus 1 [V13]
AY064708, Sapelovirus, Sapelovirus B1, simian sapelovirus 1 [SV2-2383]
KJ641696, unassigned, bat picornavirus [BtVs-PicoV/SC2013]
KJ641689, unassigned, bat picornavirus [BtMa-PicoV/FJ2012]
AY563023, Sapelovirus, Avian sapelovirus 1 [TW90A]
JN420368, unassigned, Californian sealion sapelovirus [1162]
KJ641688, unassigned, bat picornavirus [BtRlep-PicoV/FJ2012]
KJ641692, unassigned, bat picornavirus [BtRa-PicoV/JS2013]
KJ641685, unassigned, bat picornavirus [BtRf-PicoV-1/YN2012]
KJ641697, unassigned, bat picornavirus [BtNv-PicoV/SC2013]
M33854, Enterovirus, EV-B CV-B3 [Nancy]
AF326766, Enterovirus, EV-J1 [SV6-1631]
D00820, Enterovirus, EV-D70 [J670-71]
V01149, Enterovirus, EV-C PV1 [Mahoney]
U22521, Enterovirus, EV-A71 [BrCr]
KP345888, unassigned, Dromedary camel enterovirus 2 [20CC]
KP345887, unassigned, Dromedary camel enterovirus 1 [19CC]
DQ092770, Enterovirus, EV-F1 BEV-2 [BEV-261 RM2]
DQ092769, Enterovirus, EV-E1 BEV-1 [LC-R4]
AF363453, Enterovirus, EV-G1 [UKG/410/73]
AF201894, Enterovirus, EV-H1 [A-2 plaque virus]
L24917, Enterovirus, RV-A16 [11757]
EF186077, Enterovirus, RV-C3 [HRV-QPM]
K02121, Enterovirus, RV-B14 [1959]
KP233897, Rabovirus, Rabovirus A1 [Berlin/Jan2011/0572]
KJ950883, Rabovirus, Rabovirus A1, rat picornavirus [rat/NYC-B10/USA/2010]
FR727144, unassigned, pigeon picornavirus B [pigeon/Norway/03/641/2003]
KC560801, unassigned, pigeon picornavirus B [GAL-7/2010/Hungary]
FR727145, unassigned, pigeon picornavirus A [pigeon/Norway/03/603-7/2003]
JN674502, unassigned, quail picornavirus 1 [quail/HUN/2010]
KT880670, unassigned, phacovirus [Pf-CHK1/PhV]
KP230449, unassigned, falcovirus [kestrel/VOVE0622/2013/HUN]
KJ641684, unassigned, bat picornavirus [BtRf-PicoV-2/YN2012]
KT452637, unassigned, rodent hepatovirus [RMU101637Micar2010]
KT452641, unassigned, rodent hepatovirus [KS11510Mycgla2011]
KT452644, unassigned, rodent hepatovirus [KS1111230Crimig2011]
KT229612, unassigned, woodchuck hepatovirus [3ID]
KT229611, unassigned, woodchuck hepatovirus [2ID]
KT452685, unassigned, rodent hepatovirus [KEF121Sigmas2012]
M14707, Hepatovirus, Hepatovirus A1, hepatitis A virus [HM-175]
D00924, Hepatovirus, Hepatovirus A1, simian hepatitis A virus [AGM-27]
KT452658, unassigned, shrew hepatovirus [KS121232Sorara2012]
KT452661, unassigned, shrew hepatovirus [KS121289Sorara2012]
KT452695, unassigned, hedgehog hepatovirus [Igel75Erieur2014]
KT452698, unassigned, hedgehog hepatovirus [Igel68Erieur2014]
KT452691, unassigned, hedgehog hepatovirus [Igel8Erieur2014]
KT452714, unassigned, bat hepatovirus [M32Eidhel2010]
KT877158, unassigned, tupaia hepatovirus [TN1]
KT452730, unassigned, bat hepatovirus [BU02BF86Colafr2010]
KT452729, unassigned, bat hepatovirus [FO1AF48Philan2010]
KR703607, unassigned, phopivirus [NewEngland/USA/2011]
KT452742, unassigned, bat hepatovirus [SMG18520Minmav2014]
KT452735, unassigned, rodent hepatovirus [CIV459Logsoi2004]
AJ225173, Tremovirus, Tremovirus A1, avian encephalomyelitis virus 1 [Calnek vaccine strain]
KF183915, Limnipivirus, Limnipivirus C1, fathead minnow picornavirus 1 [fhm/1/MN/USA/2010]
KF183916, Limnipivirus, Limnipivirus C1, fathead minnow picornavirus 1 [fhm/2/MN/USA/2010]
KF874490, Limnipivirus, Limnipivirus C1, fathead minnow picornavirus 1 [fhm/20/IL/USA/2010]
KF306267, Limnipivirus, Limnipivirus B1, carp picornavirus 1 [F37/06]
JX134222, Limnipivirus, Limnipivirus A1, bluegill picornavirus 1 [04-032]
KC843627, Potamipivirus, Potamipivirus A1, eel picornavirus 1 [F15/05]
KJ641698, unassigned, bat picornavirus [BtMf-PicoV-3/SAX2011]
AF327920, Parechovirus, Parechovirus B1, Ljungan virus 1 [87-012]
HF677705, unassigned, sebokele virus 1 [An/B/1227/d]
L02971, Parechovirus, Parechovirus A1, human parechovirus 1 [Harris]
KF006989, unassigned, ferret parechovirus [ferret/MpPeV1/NL]
JQ316470, Pasivirus, Pasivirus A1 [swine/France/2011]
AB937989, unassigned, crohivirus 1 [shrew/ZM54/Zambia/2012]
KC465954, Avisivirus, Avisivirus A1 [turkey/M176-TuASV/2011/HUN]
KC614703, Avisivirus, Avisivirus A1 [turkey/USA/IN1/2010]
KF979334, unassigned, chicken picornavirus 3 [45C]
KT880669, unassigned, chicken picornavirus [Pf-CHK1/AsV]
KF979333, unassigned, chicken picornavirus 2 [44C]
KJ000696, unassigned, aalivirus [duck/GL/12/China/2012]
KM203656, unassigned, orivirus 1 [chicken/Pf-CHK1/2013/HUN]
KT880667, unassigned, orivirus 2 [Pf-CHK1]
DQ249299, Avihepatovirus, Avihepatovirus A1, duck hepatitis A virus 1 [03D]
KC935379, Kunsagivirus, Kunsagivirus A1 [roller/SZAL6-KuV/2011/HUN]
unassigned, bat kunsagivirus
EU142040, Aquamavirus, Aquamavirus A1, seal picornavirus 1 [HO-02-21]
KP770140, unassigned, ampivirus [NEW7/2013/HUN]
0.5

Figure 3 (previous page): Phylogenetic analyses of picornavirus 3CD gene regions using Bayesian tree inference (MrBayes 3.2). 178 sequences were retrieved from GenBank. Presented are GenBank accession numbers, ***genus names***, *species names* and *types*. If available, common names and designations of isolates [in square brackets] are given. Yet unassigned viruses are printed in blue. Proposed names are printed in red and indicated by a dot (●). Numbers at nodes indicate posterior probabilities obtained after 4,750,000 generations. The optimal substitution model (GTR+G+I) was determined with MEGA 5. The scale indicates substitutions/site.

Table 1: Estimates of Evolutionary Divergence between P1 Sequences

[1] #KP233897_Rabovirus_A_isolate_Berlin/Jan2011/0572
[2] #KJ950883_Rat_picornavirus_isolate_RPV/NYC-B10
[3] #U22521_Entero_EV-A_EV-71-BrCr
[4] #M33854_Entero_EV-B_CVB3-Nancy
[5] #V01149_Entero_EV-C_PV1-Mahoney
[6] #D00820_Entero_EV-D_EV-70-J670-7
[7] #DQ092769_EV-E_BEV-1_LC-R4
[8] #DQ092770_EV-F_BEV-2_BEV-261_RM2
[9] #AF363453_EV-G_PEV-9_UKG-410-73
[10] #AF201894_EV-H_A-2_plaque
[11] #AF326766_EV-J_SV6-1631
[12] #KP345888_"EV-K"_Dromedary_camel_enterovirus_20CC
[13] #KP345887_"EV-K"_Dromedary_camel_enterovirus_19CC
[14] #L24917_Entero_HRV-A_HRV-16-11757
[15] #K02121_Entero_HRV-B_HRV-14-1959
[16] #EF186077_Entero_HRV-C_HRV-QPM
[17] #AF406813_Sapelovirus_A_PSV-1_V13
[18] #AY064708_Sapelovirus_B_SSV-1_SV2-2383
[19] #AY563023_Avian_Sapelovirus_ASV-1_TW90A

[	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19]
[1]	0.0000																		
[2]	0.1421	0.0000																	
[3]	0.6399	0.6532	0.0000																
[4]	0.6343	0.6415	0.5508	0.0000															
[5]	0.6345	0.6540	0.5689	0.4762	0.0000														
[6]	0.6359	0.6425	0.5089	0.5387	0.5602	0.0000													
[7]	0.6201	0.6295	0.4958	0.5453	0.5614	0.4940	0.0000												
[8]	0.6116	0.6078	0.4921	0.5121	0.5280	0.4742	0.3409	0.0000											
[9]	0.6470	0.6511	0.4892	0.5453	0.5783	0.5168	0.3986	0.3973	0.0000										
[10]	0.6008	0.6245	0.5178	0.5234	0.5221	0.5287	0.5181	0.4837	0.5060	0.0000									
[11]	0.6213	0.6375	0.4463	0.5319	0.5624	0.4785	0.4562	0.4401	0.4820	0.4827	0.0000								
[12]	0.5992	0.6167	0.4722	0.5223	0.5401	0.4754	0.3574	0.2857	0.4046	0.4976	0.4274	0.0000							
[13]	0.6005	0.6167	0.4734	0.5235	0.5401	0.4766	0.3574	0.2869	0.4022	0.4988	0.4286	0.0096	0.0000						
[14]	0.6479	0.6572	0.5759	0.5239	0.5292	0.5585	0.5425	0.5366	0.5605	0.5447	0.5749	0.5341	0.5366	0.0000					
[15]	0.6441	0.6611	0.5695	0.5339	0.5343	0.5626	0.5605	0.5371	0.5569	0.5778	0.5680	0.5445	0.5445	0.4929	0.0000				
[16]	0.6371	0.6509	0.5864	0.5497	0.5662	0.5809	0.5866	0.5673	0.5896	0.5741	0.5886	0.5680	0.5680	0.5030	0.5345	0.0000			
[17]	0.5863	0.5954	0.6430	0.6381	0.6663	0.6431	0.6502	0.6373	0.6523	0.6540	0.6491	0.6450	0.6450	0.6612	0.6662	0.6532	0.0000		
[18]	0.5961	0.5946	0.6401	0.6237	0.6584	0.6477	0.6434	0.6407	0.6418	0.6472	0.6461	0.6343	0.6355	0.6562	0.6671	0.6632	0.3870	0.0000	
[19]	0.6024	0.6098	0.6593	0.6629	0.6575	0.6550	0.6360	0.6349	0.6583	0.6344	0.6450	0.6382	0.6382	0.6667	0.6771	0.7045	0.5670	0.5551	0.0000

P1:

intra-typic	-	
inter-typic (within species)	observed rabovirus aa divergence: <15%	⇒ aa identity: >85%
between species	only 1 rabovirus species	
between genera	observed aa divergence from rabovirus: >58%	⇒ aa identity: <42%

Table 2: Estimates of Evolutionary Divergence between 3CD Sequences

[1] #KP233897_Rabovirus_A_isolate_Berlin/Jan2011/0572
[2] #KJ950883_Rat_picornavirus_isolate_RV-A_rat/NYC-B10/USA/2010
[3] #U22521_EV-A71_BrCr
[4] #M33854_EV-B_CV-B3_Nancy
[5] #V01149_EV-C_PV1_Mahoney
[6] #D00820_EV-D70_J670-71
[7] #DQ092769_EV-E1_BEV-1_LC-R4
[8] #DQ092770_EV-F1_BEV-2_BEV-261_RM2
[9] #AF363453_EV-G1_PEV-9_UKG/410/73
[10] #AF201894_EV-H1_SEV-A1_A-2_plaque
[11] #AF326766_EV-J1_SV6-1631
[12] #KP345887_Dromedary_camel_enterovirus_strain_19CC
[13] #KP345888_Dromedary_camel_enterovirus_strain_20CC
[14] #L24917_RV-A_HRV-16_strain_11757
[15] #K02121_RV-B_HRV-14_strain_1959
[16] #EF186077_RV-C_strain_HRV-QPM
[17] #AF406813_Sapelovirus_A_PSV-1_PEV8-V13
[18] #AY064708_Sapelovirus_B_SSV-1_SV2-2383
[19] #AY563023_Sapelovirus_ASV-1_TW90A

[	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19]
[1]	0.0000																		
[2]	0.0217	0.0000																	
[3]	0.4969	0.4966	0.0000																
[4]	0.4859	0.4847	0.3798	0.0000															
[5]	0.4984	0.4983	0.3649	0.2950	0.0000														
[6]	0.4763	0.4846	0.3922	0.2703	0.2844	0.0000													
[7]	0.5078	0.5102	0.3975	0.3276	0.3463	0.3703	0.0000												
[8]	0.4953	0.4966	0.4006	0.3307	0.3354	0.3563	0.1894	0.0000											
[9]	0.4906	0.5017	0.3866	0.3276	0.3214	0.3531	0.2748	0.2702	0.0000										
[10]	0.5173	0.5204	0.4299	0.3567	0.3583	0.3699	0.3847	0.3692	0.3816	0.0000									
[11]	0.4592	0.4644	0.3457	0.1984	0.2826	0.2891	0.3323	0.3168	0.3292	0.3411	0.0000								
[12]	0.4906	0.4949	0.4053	0.3214	0.3385	0.3531	0.1910	0.1025	0.2640	0.3676	0.3106	0.0000							
[13]	0.4897	0.4940	0.4069	0.3239	0.3365	0.3528	0.1972	0.1049	0.2645	0.3689	0.3099	0.0125	0.0000						
[14]	0.5071	0.4992	0.4798	0.4486	0.4735	0.4514	0.4564	0.4579	0.4564	0.4625	0.4315	0.4626	0.4631	0.0000					
[15]	0.5118	0.5195	0.4252	0.3816	0.4065	0.4060	0.4346	0.4174	0.4003	0.4313	0.3879	0.4206	0.4239	0.4602	0.0000				
[16]	0.5338	0.5331	0.4766	0.4486	0.4424	0.4404	0.4455	0.4611	0.4408	0.4625	0.4393	0.4502	0.4490	0.4346	0.4321	0.0000			
[17]	0.4858	0.4915	0.4945	0.4679	0.4796	0.4637	0.4969	0.4765	0.4734	0.4858	0.4413	0.4765	0.4724	0.4906	0.4733	0.5079	0.0000		
[18]	0.4703	0.4747	0.4938	0.4674	0.4837	0.4648	0.4930	0.4666	0.4603	0.4977	0.4581	0.4728	0.4702	0.4961	0.5008	0.5039	0.3484	0.0000	
[19]	0.4725	0.4737	0.5102	0.5023	0.5047	0.5079	0.4953	0.5016	0.5016	0.5063	0.4883	0.4984	0.5008	0.5063	0.5142	0.5299	0.4649	0.4090	0.0000

3CD:

intra-typic	-	
inter-typic (within species)	observed rabovirus aa divergence: <3%	⇒ aa identity: >97%
between species	only 1 rabovirus species	
between genera	observed aa divergencefrom rabovirus: 47-54%	⇒ aa identity: 46-53%