

<https://helda.helsinki.fi>

---

## Taxonomy of the order Bunyavirales : second update 2018

Maes, Piet

2019-03

---

Maes , P , Adkins , S , Alkhovsky , S V , Avsic-Zupanc , T , Ballinger , M J , Bente , D A , Beer , M , Bergeron , E , Blair , C D , Briese , T , Buchmeier , M J , Burt , F J , Calisher , C H , Charrel , R N , Choi , I R , Clegg , J C S , de la Torre , J C , de Lamballerie , X , DeRisi , J L , Digiaro , M , Drebot , M , Ebihara , H , Elbeaino , T , Ergunay , K , Fulhorst , C F , Garrison , A R , Gao , G F , Gonzalez , J-P J , Groschup , M H , Guenther , S , Haenni , A-L , Hall , R A , Hewson , R , Hughes , H R , Jain , R K , Jonson , M G , Junglen , S , Klempa , B , Klingstrom , J , Kormelink , R , Lambert , A J , Langevin , S A , Lukashevich , I S , Marklewitz , M , Martelli , G P , Mielke-Ehret , N , Mirazimi , A , Muehlbach , H-P , Naidu , R , Teixeira Nunes , M R , Palacios , G , Papa , A , Paweska , J T , Peters , C J , Plyusnin , A , Radoshitzky , S R , Resende , R O , Romanowski , V , Sall , A A , Salvato , M S , Sasaya , T , Schmaljohn , C , Shi , X , Shirako , Y , Simmonds , P , Sironi , M , Song , J-W , Spengler , J R , Stenglein , M D , Tesh , R B , Turina , M , Wei , T , Whitfield , A E , Yeh , S-D , Murilo Zerbini , F , Zhang , Y-Z , Zhou , X & Kuhn , J H 2019 , ' Taxonomy of the order Bunyavirales : second update 2018 ' , Archives of Virology , vol. 164 , no. 3 , pp. 927-941 . <https://doi.org/10.1007/s00705-018-04127-3>

---

<http://hdl.handle.net/10138/300295>

<https://doi.org/10.1007/s00705-018-04127-3>

---

publishedVersion

---

*Downloaded from Helda, University of Helsinki institutional repository.*

*This is an electronic reprint of the original article.*

*This reprint may differ from the original in pagination and typographic detail.*

*Please cite the original version.*



## Taxonomy of the order *Bunyavirales*: second update 2018

Piet Maes<sup>1</sup> · Scott Adkins<sup>2</sup> · Sergey V. Alkhovsky<sup>3</sup> · Tatjana Avšič-Županc<sup>4</sup> · Matthew J. Ballinger<sup>5</sup> · Dennis A. Bente<sup>6</sup> · Martin Beer<sup>7</sup> · Éric Bergeron<sup>8</sup> · Carol D. Blair<sup>9</sup> · Thomas Briese<sup>10</sup> · Michael J. Buchmeier<sup>11</sup> · Felicity J. Burt<sup>12,13</sup> · Charles H. Calisher<sup>9</sup> · Rémi N. Charrel<sup>14</sup> · Il Ryong Choi<sup>15</sup> · J. Christopher S. Clegg<sup>16</sup> · Juan Carlos de la Torre<sup>17</sup> · Xavier de Lamballerie<sup>14</sup> · Joseph L. DeRisi<sup>18,19,20</sup> · Michele Digiaro<sup>21</sup> · Mike Drobot<sup>22</sup> · Hideki Ebihara<sup>23</sup> · Toufic Elbeaino<sup>21</sup> · Koray Ergünay<sup>24</sup> · Charles F. Fulhorst<sup>6</sup> · Aura R. Garrison<sup>25</sup> · George Fú Gão<sup>26</sup> · Jean-Paul J. Gonzalez<sup>27</sup> · Martin H. Groschup<sup>28,29</sup> · Stephan Günther<sup>30</sup> · Anne-Lise Haenni<sup>31</sup> · Roy A. Hall<sup>32</sup> · Roger Hewson<sup>33</sup> · Holly R. Hughes<sup>34</sup> · Rakesh K. Jain<sup>35</sup> · Miranda Gilda Jonson<sup>36</sup> · Sandra Junglen<sup>37,38</sup> · Boris Klempa<sup>37,39</sup> · Jonas Klingström<sup>40</sup> · Richard Kormelink<sup>41</sup> · Amy J. Lambert<sup>34</sup> · Stanley A. Langevin<sup>42</sup> · Igor S. Lukashevich<sup>43</sup> · Marco Marklewitz<sup>37,38</sup> · Giovanni P. Martelli<sup>44</sup> · Nicole Mielke-Ehret<sup>45</sup> · Ali Mirazimi<sup>46</sup> · Hans-Peter Mühlbach<sup>45</sup> · Rayapati Naidu<sup>47</sup> · Márcio Roberto Teixeira Nunes<sup>48</sup> · Gustavo Palacios<sup>25</sup> · Anna Papa<sup>49</sup> · Janusz T. Pawęska<sup>50,51</sup> · Clarence J. Peters<sup>6</sup> · Alexander Plyusnin<sup>52</sup> · Sheli R. Radoshitzky<sup>25</sup> · Renato O. Resende<sup>53</sup> · Víctor Romanowski<sup>54</sup> · Amadou Alpha Sall<sup>55</sup> · Maria S. Salvato<sup>56</sup> · Takahide Sasaya<sup>57</sup> · Connie Schmaljohn<sup>25</sup> · Xiāohóng Shí<sup>58</sup> · Yukio Shirako<sup>59</sup> · Peter Simmonds<sup>60</sup> · Manuela Sironi<sup>61</sup> · Jin-Won Song<sup>62</sup> · Jessica R. Spengler<sup>8</sup> · Mark D. Stenglein<sup>63</sup> · Robert B. Tesh<sup>6</sup> · Massimo Turina<sup>64</sup> · Tàiyún Wèi<sup>65</sup> · Anna E. Whitfield<sup>66</sup> · Shyi-Dong Yeh<sup>67</sup> · F. Murilo Zerbini<sup>68</sup> · Yong-Zhen Zhang<sup>28,29</sup> · Xueping Zhou<sup>69</sup> · Jens H. Kuhn<sup>70</sup>

Published online: 20 January 2019

© This is a U.S. government work and its text is not subject to copyright protection in the United States; however, its text may be subject to foreign copyright protection 2019

### Abstract

In October 2018, the order *Bunyavirales* was amended by inclusion of the family *Arenaviridae*, abolishment of three families, creation of three new families, 19 new genera, and 14 new species, and renaming of three genera and 22 species. This article presents the updated taxonomy of the order *Bunyavirales* as now accepted by the International Committee on Taxonomy of Viruses (ICTV).

Handling Editor: Sead Sabanadzovic.

Michael J. Buchmeier, Rémi N. Charrel, J. Christopher S. Clegg, Juan Carlos de la Torre, Jean-Paul J. Gonzalez, Stephan Günther, Igor S. Lukashevich, Sheli R. Radoshitzky, Víctor Romanowski, Maria S. Salvato, Manuela Sironi, Mark D. Stenglein, Jens H. Kuhn: the members of the 2017–2020 International Committee on Taxonomy of Viruses (ICTV) *Arenaviridae* Study Group; Piet Maes, Scott Adkins, Juan Carlos de la Torre, Sandra Junglen, Amy J. Lambert, Gustavo Palacios, Takahide Sasaya, Yong-Zhen Zhang, Jens H. Kuhn: the members of the 2017–2020 ICTV *Bunyavirales* Study Group; Michele Digiaro, Toufic Elbeaino, Giovanni P. Martelli, Nicole Mielke-Ehret, Hans-Peter Mühlbach: the members of the 2017–2020 ICTV *Fimoviridae* Study Group; Piet Maes, Charles H. Calisher, Charles F. Fulhorst, Boris Klempa, Jonas Klingström, Jin-Won Song, Yong-Zhen Zhang: the members of the 2017–2020 ICTV *Hantaviridae* Study Group; Sergey V. Alkhovsky, Tatjana Avšič-Županc, Dennis A. Bente, Éric Bergeron, Felicity J. Burt, Koray Ergünay, Aura R. Garrison, Roger Hewson, Ali Mirazimi, Gustavo Palacios, Anna Papa, Janusz T. Pawęska, Amadou Alpha Sall, Jessica R. Spengler, Jens H. Kuhn: the members of the 2017–2020 ICTV *Nairoviridae* Study Group; Scott Adkins, Sergey V. Alkhovsky, Martin Beer, Carol D. Blair, Charles H. Calisher, Amy J. Lambert, Marco Marklewitz, Márcio Roberto Teixeira Nunes, Xiāohóng Shí: the members of the 2017–2020 ICTV *Peribunyaviridae* Study Group; Holly R. Hughes, Matthew J. Ballinger, Mike Drobot, Roy A. Hall, Sandra Junglen, Stanley A. Langevin: the members of the 2017–2020 ICTV *Phasmaviridae* Study Group; Thomas Briese, Rémi N. Charrel, Xavier de Lamballerie, Hideki Ebihara, George Fú Gão, Martin H. Groschup, Márcio Roberto Teixeira Nunes, Gustavo Palacios, Takahide Sasaya, Jin-Won Song: the members of the 2017–2020 ICTV *Phenuiviridae* Study Group; Il Ryong Choi, Anne-Lise Haenni, Miranda Gilda Jonson, Takahide Sasaya, Yukio Shirako, Tàiyún Wèi, Xueping Zhou: the members of the 2017–2020 ICTV *Tenuivirus* Study Group; Scott Adkins, Amy J. Lambert, Rayapati Naidu, Renato O. Resende, Massimo Turina, Anna E. Whitfield: the members of the 2017–2020 ICTV *Tospovirus* Study Group; Peter Simmonds: the 2017–2020 ICTV Chair of the Fungal and Protist Viruses Subcommittee; F. Murilo Zerbini: the 2017–2020 ICTV Chair of the Plant Viruses Subcommittee; the 2017–2020 ICTV Chair of the Animal dsRNA and ssRNA- Viruses Subcommittee.

Extended author information available on the last page of the article

## Introduction

The virus order *Bunyavirales* was established in 2017 to accommodate related viruses with segmented, linear, single-stranded, negative-sense or ambisense RNA genomes classified into nine families [2]. Here, we present the changes that were proposed via an official ICTV taxonomic proposal (TaxoProp 2017.012M.A.v1.Bunyavirales\_rev) at <http://www.ictvonline.org/> in 2017 and were accepted by the ICTV Executive Committee (EC) in October 2018. These changes are now part of the official ICTV taxonomy as of October 2018.

## Taxonomic changes at the order rank

In October 2018, the order *Bunyavirales* was amended by inclusion of the previously unassigned family *Arenaviridae*. The families *Feraviridae*, *Jonviridae*, and *Tospoviridae* were dissolved, and their genera (*Orthoferavirus*, *Orthojonvirus*, and *Orthotospovirus*) were renamed (*Feravirus*, *Jonvirus*, and *Tospovirus*, respectively) and moved into established families (*Feravirus*, *Jonvirus*→*Phasmaviridae* and *Tospovirus*→*Peribunyaviridae*). Three new families were created for novel invertebrate viruses: *Cruliviridae* for Wēnlǐng crustacean virus 9 (WICV-9), *Myopoviridae* for Húběi myriapoda virus 5 (HbMV-5), and *Wupedeviridae* for Wǔhàn millipede virus 2 (WhMV-2) [4].

## Taxonomic changes at the family rank

### *Fimoviridae*

In 2018, no changes were made at the family rank.

### *Hantaviridae*

In October 2018, the family was expanded by the addition of three new genera (*Loanvirus*, *Mobatvirus*, and *Thottimvirus*) for the species *Longquan orthohantavirus*, *Laibin orthohantavirus*, *Nova orthohantavirus*, *Quezon orthohantavirus*, *Imjin orthohantavirus*, and *Thottapalayam orthohantavirus* (now renamed *Longquan loanvirus*, *Lai-bin mobatvirus*, *Nova mobatvirus*, *Quezon mobatvirus*,

*Imjin thottimvirus*, and *Thottapalayam thottimvirus*, respectively).

### *Nairoviridae*

In October 2018, the family was expanded by the addition of two new genera, *Shaspivirus* and *Striwavivirus*, for Shāyáng spider virus 1 (SySV-1) and Sānxiá water strider virus 1 (SxWSV-1) discovered in invertebrates, respectively [1, 4].

### *Peribunyaviridae*

In October 2018, the family was expanded by the addition of the new genus *Shangavirus* for the species *Shuangao insect herbevirus* (now renamed *Insect shangavirus*).

### *Phasmaviridae*

In October 2018, the family was expanded by the addition of the new genus *Inshuvirus* for the species *Shuangao insect orthophasmavirus 2* (now renamed *Insect inshuvirus*) and the new genus *Wuhivirus* for Wǔhàn insect virus 2 (WhIV-2) discovered in invertebrates [1].

### *Phenuiviridae*

In October 2018, the family was expanded by the addition of the new genus *Banyangvirus* for the species *SFTS phlebovirus* (now renamed *Huaiyangshan banyangvirus*) and the new genera *Beidivirus*, *Horwuvirus*, *Hudivirus*, *Hudovirus*, *Mobuvirus*, *Pidchovirus*, and *Wubeivirus* for Húběi diptera virus 3 (HbDV-3), Wǔhàn horsefly virus (WhHV), Húběi diptera virus 4 (HbDV-4), Húběi lepidoptera virus 1 (HbLV-1), Mothra virus (MTHV), Pidgey virus (PGYV), and Húběi diptera virus 5 (HbDV-5)/Wǔhàn fly virus 1 (WhFV-1), respectively, discovered in invertebrates [1, 3, 4].

## Summary

A summary of the current, ICTV-accepted taxonomy of the order *Bunyavirales* is presented in Table 1.

**Table 1** ICTV-accepted taxonomy of the order *Bunyavirales* as of October 2018. Listed are all bunyaviruses that are classified into species

Genus	Species <sup>¶</sup>	Virus (abbreviation) <sup>¶</sup>	
<b>Family Arenaviridae</b>			
<i>Hartmanivirus</i>	<i>Haartman hartmanivirus</i> *	Haartman Institute snake virus 1 (HISV-1)	
<i>Mammarenavirus</i>	<i>Allpahuayo mammarenavirus</i>	Allpahuayo virus (ALLV)	
	<i>Argentinian mammarenavirus</i>	Junín virus (JUNV)	
	<i>Bear Canyon mammarenavirus</i>	Bear Canyon virus (BCNV)	
	<i>Brazilian mammarenavirus</i>	Sabiá virus (SBAV)	
	<i>Cali mammarenavirus</i>	Pichindé virus (PICHV)	
	<i>Chapare mammarenavirus</i>	Chapare virus (CHAPV)	
	<i>Cupixi mammarenavirus</i>	Cupixi virus (CUPXV)	
	<i>Flexal mammarenavirus</i>	Flexal virus (FLEV)	
	<i>Gairo mammarenavirus</i>	Gairo virus (GAIV)	
	<i>Guanarito mammarenavirus</i>	Guanarito virus (GTOV)	
	<i>Ippy mammarenavirus</i>	Ippy virus (IPPYV)	
	<i>Lassa mammarenavirus</i>	Lassa virus (LASV)	
	<i>Latino mammarenavirus</i>	Latino virus (LATV)	
	<i>Loei River mammarenavirus</i>	Loei River virus (LORV)	
	<i>Lujo mammarenavirus</i>	Lujo virus (LUJV)	
	<i>Luna mammarenavirus</i>	Luna virus (LUAV)	
		Luli virus (LULV)	
		Lunk virus (LNKV)	
		Dandenong virus (DANV)	
		lymphocytic choriomeningitis virus (LCMV)	
		<i>Machupo mammarenavirus</i>	Machupo virus (MACV)
		<i>Mariental mammarenavirus</i>	Mariental virus (MRLV)
		<i>Merino Walk mammarenavirus</i>	Merino Walk virus (MRWV)
		<i>Mobala mammarenavirus</i>	mobala virus (MOBV)
		<i>Mopeia mammarenavirus</i>	Mopeia virus (MPOV)
			Morogoro virus (MORV)
		<i>Okahandja mammarenavirus</i>	Okahandja virus (OKAV)
		<i>Oliveros mammarenavirus</i>	Oliveros virus (OLVV)
		<i>Paraguayan mammarenavirus</i>	Paraná virus (PRAV)
		<i>Piritital mammarenavirus</i>	Piritital virus (PIRV)
		<i>Ryukyu mammarenavirus</i>	Ryukyu virus (RYKV)
		<i>Serra do Navio mammarenavirus</i>	Amaparí virus (AMAV)
		<i>Solwezi mammarenavirus</i>	Solwezi virus (SOLV)
		<i>Souris mammarenavirus</i>	souris virus (SOUV)
		<i>Tacaribe mammarenavirus</i>	Tacaribe virus (TCRV)
		<i>Tamiami mammarenavirus</i>	Tamiami virus (TMMV)
	<i>Wenzhou mammarenavirus</i>	Wēnzhōu virus (WENV) <sup>1</sup>	
	<i>Whitewater Arroyo mammarenavirus</i>	Big Brushy Tank virus (BBRTV)	
		Catarina virus (CTNV)	
		Skinner Tank virus (SKTV)	
		Tonto Creek virus (TTCV)	
		Whitewater Arroyo virus (WWAV)	
<i>Reptarenavirus</i>	<i>California reptarenavirus</i>	CAS virus (CASV)	
	<i>Giessen reptarenavirus</i>	University of Giessen virus 1 (UGV-1)	
		University of Giessen virus 2 (UGV-2)	
		University of Giessen virus 3 (UGV-3)	
	<i>Golden reptarenavirus</i> *	Golden Gate virus (GOGV)	
	<i>Ordinary reptarenavirus</i>	tavallinen suomalainen mies virus 2 (TSMV-2)	

**Table 1** (continued)

Genus	Species <sup>¶</sup>	Virus (abbreviation) <sup>¶</sup>
	<i>Rotterdam reptarenavirus</i>	ROUT virus (ROUTV) University of Helsinki virus 1 (UHV-1)
<b>Family Cruliviridae</b>		
<i>Lincrovirus</i>	<i>Crustacean lincrovirus</i> *	Wenling crustacean virus 9 (WICV-9)
<b>Family Fimoviridae</b>		
<i>Emaravirus</i>	<i>Actinidia chlorotic ringspot-associated emaravirus</i>	Actinidia chlorotic ringspot-associated virus (AcCRaV)
	<i>European mountain ash ringspot-associated emaravirus</i> *	European mountain ash ringspot-associated virus (EMARaV)
	<i>Fig mosaic emaravirus</i>	fig mosaic virus (FMV)
	<i>High Plains wheat mosaic emaravirus</i>	High Plains wheat mosaic virus (HPWMoV)
	<i>Pigeonpea sterility mosaic emaravirus 1</i>	pigeonpea sterility mosaic virus (PPSMV)
	<i>Pigeonpea sterility mosaic emaravirus 2</i>	pigeonpea sterility mosaic virus 2 (PPSMV-2)
	<i>Raspberry leaf blotch emaravirus</i>	raspberry leaf blotch virus (RLBV)
	<i>Redbud yellow ringspot-associated emaravirus</i>	redbud yellow ringspot-associated virus (RYRaV)
	<i>Rose rosette emaravirus</i>	rose rosette virus (RRV)
<b>Family Hantaviridae</b>		
<i>Orthohantavirus</i>	<i>Amga orthohantavirus</i>	Amga virus (MGAV) <sup>2</sup>
	<i>Andes orthohantavirus</i>	Andes virus (ANDV) Castelo dos Sonhos virus (CASV) Lechiguanas virus (LECV = LECHV) Orán virus (ORNV)
	<i>Asama orthohantavirus</i>	Asama virus (ASAV)
	<i>Asikkala orthohantavirus</i>	Asikkala virus (ASIV)
	<i>Bayou orthohantavirus</i>	bayou virus (BAYV) Catacamas virus (CATV)
	<i>Black Creek Canal orthohantavirus</i>	Black Creek Canal virus (BCCV)
	<i>Bowe orthohantavirus</i>	Bowé virus (BOWV)
	<i>Bruges orthohantavirus</i>	Bruges virus (BRGV)
	<i>Cano Delgadito orthohantavirus</i>	Caño Delgadito virus (CADV)
	<i>Cao Bang orthohantavirus</i>	Cao Bả̃ng virus (CBNV) Liánghé virus (LHEV)
	<i>Choclo orthohantavirus</i>	Choclo virus (CHOV)
	<i>Dabieshan orthohantavirus</i>	Dàbiéshān virus (DBSV)
	<i>Dobrava-Belgrade orthohantavirus</i>	Dobrava virus (DOBV) Kurkino virus (KURV) Saaremaa virus (SAAV) Sochi virus (SOCV)
	<i>El Moro Canyon orthohantavirus</i>	Carrizal virus (CARV) El Moro Canyon virus (ELMCV) Huitzilac virus (HUIV)
	<i>Fugong orthohantavirus</i>	Fúgòng virus (FUGV)
	<i>Fusong orthohantavirus</i>	Fūsōng virus (FUSV)
	<i>Hantaan orthohantavirus</i> *	Amur virus (AMRV) Hantaan virus (HTNV) Soochong virus (SOOV)
	<i>Jeju orthohantavirus</i>	Jeju virus (JJUV)
	<i>Kenkeme orthohantavirus</i>	Kenkeme virus (KKMV)
	<i>Khabarovsk orthohantavirus</i>	Khabarovsk virus (KHAV) Topografov virus (TOPV)
	<i>Laguna Negra orthohantavirus</i>	Laguna Negra virus (LANV)

**Table 1** (continued)

Genus	Species <sup>¶</sup>	Virus (abbreviation) <sup>¶</sup>
		Maripa virus (MARV)
		Río Mamoré virus (RIOMV)
	<i>Luxi orthohantavirus</i>	Lúxī virus (LUXV)
	<i>Maporal orthohantavirus</i>	Maporal virus (MAPV)
	<i>Montano orthohantavirus</i>	Montaño virus (MTNV)
	<i>Necocli orthohantavirus</i>	Necocli virus (NECV)
	<i>Oxbow orthohantavirus</i>	Oxbow virus (OXBV)
	<i>Prospect Hill orthohantavirus</i>	Prospect Hill virus (PHV)
	<i>Puumala orthohantavirus</i>	Hokkaido virus (HOKV)
		Muju virus (MUJV)
		Puumala virus (PUUV)
	<i>Rockport orthohantavirus</i>	Rockport virus (RKPV)
	<i>Sangassou orthohantavirus</i>	Sangassou virus (SANGV)
	<i>Seoul orthohantavirus</i>	gōu virus (GOUV)
		Seoul virus (SEOV)
	<i>Sin Nombre orthohantavirus</i>	New York virus (NYV) <sup>3</sup>
		Sin Nombre virus (SNV)
	<i>Thailand orthohantavirus</i>	Anjzorobe virus (ANJZV)
		Serang virus (SERV) <sup>4</sup>
		Thailand virus (THAIV)
	<i>Tula orthohantavirus</i>	Adler virus (ADLV)
		Tula virus (TULV)
	<i>Yakeshi orthohantavirus</i>	Yákèshí virus (YKSV)
<i>Loanvirus</i>	<i>Longquan loanvirus</i> *	Lóngquán virus (LQUV)
<i>Mobatvirus</i>	<i>Laibin mobatvirus</i>	Láibīn virus (LAIV)
	<i>Nova mobatvirus</i> *	Nova virus (NVAV)
	<i>Quezon mobatvirus</i>	Quezon virus (QZNV)
<i>Thottimvirus</i>	<i>Imjin thottimvirus</i>	Imjin virus (MJNV)
	<i>Thottapalayam thottimvirus</i> *	Thottapalayam virus (TPMV)
<b>Family Mypoviridae</b>		
<i>Hubavirus</i>	<i>Myriapod hubavirus</i> *	Húběi myriapoda virus 5 (HbMV-5)
<b>Family Nairoviridae</b>		
<i>Orthonairovirus</i>	<i>Artashat orthonairovirus</i>	Artashat virus (ARTSV)
	<i>Chim orthonairovirus</i>	Chim virus (CHIMV)
	<i>Crimean-Congo hemorrhagic fever orthonairovirus</i>	Crimean-Congo hemorrhagic fever virus (CCHFV)
	<i>Dera Ghazi Khan orthonairovirus</i>	Abu Hammad virus (AHV) <sup>5</sup>
		Abu Mina virus (AMV)
		Dera Ghazi Khan virus (DGKV)
		Sapphire II virus (SAPV)
	<i>Dugbe orthonairovirus</i> *	Dugbe virus (DUGV)
		kupe virus (KUPEV)
	<i>Hazara orthonairovirus</i>	Hazara virus (HAZV)
		Tofla virus (TFLV)
	<i>Hughes orthonairovirus</i>	Caspiy virus (CASV)
		Farallon virus (FARV)
		Great Saltee virus (GRSV)
		Hughes virus (HUGV)
		Punta Salinas virus (PSV)
		Raza virus (RAZAV)
		Soldado virus (SOLV)

**Table 1** (continued)

Genus	Species <sup>¶</sup>	Virus (abbreviation) <sup>¶</sup>
	<i>Kasokero orthonavivirus</i>	Zirqa virus (ZIRV) Kasokero virus (KASV = KASOV) Leopards Hill virus (LPHV)
	<i>Keterah orthonavivirus</i>	Yogue virus (YOGV) Gossas virus (GOSV) Issyk-kul virus (ISKV) Keterah virus (KTRV) <sup>6</sup> Uzun-Agach virus (UZAV)
	<i>Nairobi sheep disease orthonavivirus</i>	Nairobi sheep disease virus (NSDV) <sup>7</sup>
	<i>Qalyub orthonavivirus</i>	Bandia virus (BDV) Geran virus (GERV) Qalyub virus (QYBV)
	<i>Sakhalin orthonavivirus</i>	Avalon virus (AVAV) Clo Mor virus (CMV = CLMV) Sakhalin virus (SAKV) Taggert virus (TAGV) Tillamook virus (TILLV)
	<i>Tamdy orthonavivirus</i>	Burana virus (BURV) Huángpí tick virus 1 (HpTV-1) Tamdy virus (TAMV) Tāchéng tick virus 1 (TeTV-1) Wēnzhōu tick virus (WzTV)
	<i>Thiafora orthonavivirus</i>	Erve virus (ERVEV) Thiafora virus (TFAV)
<i>Shaspivirus</i>	<i>Spider shaspivirus</i> *	Shāyáng spider virus 1 (SySV-1)
<i>Striwavivirus</i>	<i>Strider striwavivirus</i> *	Sānxiá water strider virus 1 (SxWSV-1)
<b>Family Peribunyaviridae</b>		
<i>Herbevirus</i>	<i>Herbert herbevirus</i> *	Herbert virus (HEBV)
	<i>Kibale herbevirus</i>	Kibale virus (KIBV)
	<i>Tai herbevirus</i>	Tai virus (TAIV)
<i>Orthobunyavirus</i>	<i>Acara orthobunyavirus</i>	Acará virus (ACAV) Morange virus (MORV)
	<i>Akabane orthobunyavirus</i>	Akabane virus (AKAV) Sabo virus (SABOV) Tinaroo virus (TINV) Yaba-7 virus (Y7V)
	<i>Alajuella orthobunyavirus</i>	Alajuella virus (ALJV) Brus Laguna virus (BLAV) San Juan virus (SJV)
	<i>Anopheles A orthobunyavirus</i>	Anopheles A virus (ANAV) Arumateua virus (ARTV = ARMTV) Caraipé virus (CPEV = CRPV) Las Maloyas virus (LMV) Lukuni virus (LUKV) Trombetas virus (TRMV) Tucuruí virus (TUCV = TUCRV)
	<i>Anopheles B orthobunyavirus</i>	Anopheles B virus (ANBV) Boracéia virus (BORV)
	<i>Bakau orthobunyavirus</i>	Bakau virus (BAKV) Ketapang virus (KETV)

**Table 1** (continued)

Genus	Species <sup>¶</sup>	Virus (abbreviation) <sup>¶</sup>
		Nola virus (NOLAV)
		Tanjong Rabok virus (TRV)
		Telok Forest virus (TFV)
	<i>Batama orthobunyavirus</i>	Batama virus (BMAV)
	<i>Benevides orthobunyavirus</i>	Benevides virus (BVSV = BENV)
	<i>Bertioga orthobunyavirus</i>	Bertioga virus (BERV)
		Cananéia virus (CNAV)
		Guaratuba virus (GTBV)
		Itimirim virus (ITIV)
		Mirim virus (MIRV)
	<i>Bimiti orthobunyavirus</i>	bimiti virus (BIMV)
	<i>Botambi orthobunyavirus</i>	Botambi virus (BOTV)
	<i>Bunyamwera orthobunyavirus</i> *	Anadyr virus (ANADV)
		Batai virus (BATV) <sup>8</sup>
		Birao virus (BIRV)
		Bozo virus (BOZOV)
		Bunyamwera virus (BUNV)
		Cache Valley virus (CVV)
		Fort Sherman virus (FSV)
		Germiston virus (GERV)
		Ilesha virus (ILEV)
		Lokern virus (LOKV)
		Maguari virus (MAGV)
		Mboké virus (MBOV)
		Ngari virus (NRIV) <sup>9</sup>
		Northway virus (NORV)
		Playas virus (PLAV)
		Potosi virus (POTV)
		Santa Rosa virus (SARV)
		Shokwe virus (SHOV)
		Stanfield virus (STAV)
		Tensaw virus (TENV)
		Tlacotalpan virus (TLAV)
		Xingu virus (XINV)
	<i>Bushbush orthobunyavirus</i>	Benfica virus (BENV = BNFV)
		Bushbush virus (BSBV)
		Juan Díaz virus (JDV)
	<i>Bwamba orthobunyavirus</i>	Bwamba virus (BWAV)
		Pongola virus (PGAV)
	<i>California encephalitis orthobunyavirus</i>	Achiote virus (ACHOV)
		California encephalitis virus (CEV)
		infirmatus virus (INFV)
		Inkoo virus (INKV)
		Jamestown Canyon virus (JCV)
		Jerry Slough virus (JSV)
		Keystone virus (KEYV)
		Khatanga virus (KHATV) <sup>10</sup>
		La Crosse virus (LACV)
		Lumbo virus (LUMV)
		Melao virus (MELV)



Table 1 (continued)

Genus	Species <sup>¶</sup>	Virus (abbreviation) <sup>¶</sup>
		Morro Bay virus (MBV)
		San Angelo virus (SAV)
		Serra do Navio virus (SDNV)
		snowshoe hare virus (SSHV)
		South River virus (SORV)
		Ťahyňa virus (TAHV)
		trivittatus virus (TVT <sub>V</sub> )
	<i>Capim orthobunyavirus</i>	Capim virus (CAPV)
	<i>Caraparu orthobunyavirus</i>	Apeú virus (APEUV)
		Bruconha virus (BRUV)
		Caraparú virus (CARV)
		El Huayo virus (EHUV)
		Itaya virus (ITYV)
		Ossa virus (OSSAV)
		Vinces virus (VINV)
	<i>Catu orthobunyavirus</i>	Catú virus (CATUV)
	<i>Estero Real orthobunyavirus</i>	Estero Real virus (ERV)
	<i>Gamboa orthobunyavirus</i>	Calchaquí virus (CQIV)
		Gamboa virus (GAMV)
		Pueblo Viejo virus (PVV)
		Soberanía virus (SOBV)
	<i>Guajara orthobunyavirus</i>	Guajará virus (GJAV)
	<i>Guama orthobunyavirus</i>	Ananindeua virus (ANUV)
		Guamá virus (GMAV)
		Mahogany Hammock virus (MHV)
		Moju virus (MOJUV)
	<i>Guaroa orthobunyavirus</i>	Guaroa virus (GROV)
	<i>Kaeng Khoi orthobunyavirus</i>	Kaeng Khoi virus (KKV)
	<i>Kairi orthobunyavirus</i>	Kairi virus (KRIV)
	<i>Koongol orthobunyavirus</i>	koongol virus (KOOV)
		wongal virus (WONV)
	<i>Madrid orthobunyavirus</i>	Madrid virus (MADV)
	<i>Main Drain orthobunyavirus</i>	Main Drain virus (MDV)
	<i>Manzanilla orthobunyavirus</i>	Buttonwillow virus (BUTV)
		Cát Qué virus (CQV)
		Ingwavuma virus (INGV)
		Inini virus (INIV)
		Manzanilla virus (MANV)
		Mermet virus (MERV)
	<i>Marituba orthobunyavirus</i>	Gumbo Limbo virus (GLV)
		Marituba virus (MTBV)
		Murutucú virus (MURV)
		Nepuyo virus (NEPV)
		Restan virus (RESV)
		Zungarococha virus (ZUNV)
	<i>Minatitlan orthobunyavirus</i>	Minatitlán virus (MNTV)
		Palestina virus (PLSV)
	<i>MPoko orthobunyavirus</i>	M'Poko virus (MPOV)
		Yaba-1 virus (Y1V)
	<i>Nyando orthobunyavirus</i>	Nyando virus (NDV)

**Table 1** (continued)

Genus	Species <sup>¶</sup>	Virus (abbreviation) <sup>¶</sup>
	<i>Olifantsvlei orthobunyavirus</i>	Eretmapodites virus (ERETV) Bobia virus (BIAV) Dabakala virus (DABV) Olifantsvlei virus (OLIV) Oubi virus (OUBIV)
	<i>Oriboca orthobunyavirus</i>	Itaqui virus (ITQV) Oriboca virus (ORIV)
	<i>Oropouche orthobunyavirus</i>	Facey's paddock virus (FPV) IQUITOS virus (IQTV) <sup>d</sup> Madre de Dios virus (MDDV) Oropouche virus (OROV) Perdões virus (PDEV) Pintupo virus (PINTV) Utinga virus (UTIV) Utivé virus (UVV = UTVEV)
	<i>Patois orthobunyavirus</i>	Abras virus (ABRV) Babahoya virus (BABV) Pahayokee virus (PAHV) Patois virus (PATV) Shark River virus (SRV)
	<i>Sathuperi orthobunyavirus</i>	Douglas virus (DOUV) Sathuperi virus (SATV)
	<i>Shamonda orthobunyavirus</i>	Peaton virus (PEAV) Sango virus (SANV) Shamonda virus (SHAV)
	<i>Shuni orthobunyavirus</i>	Aino virus (AINOV) Kaikalur virus (KAIV) Shuni virus (SHUV)
	<i>Simbu orthobunyavirus</i>	Oya virus (OYAV) Simbu virus (SIMV)
	<i>Tacaiuma orthobunyavirus</i>	CoAr 1071 virus (CA1071V) CoAr 3627 virus (CA3626V) Tacaiuma virus (TCMV) Virgin River virus (VRV)
	<i>Tete orthobunyavirus</i>	Bahig virus (BAHV) Matruh virus (MTRV) Tete virus (TETEV) Tsuruse virus (TSUV) Weldona virus (WELV)
	<i>Thimiri orthobunyavirus</i>	Thimiri virus (THIV)
	<i>Timboteua orthobunyavirus</i>	Timboteua virus (TBTV)
	<i>Turlock orthobunyavirus</i>	Lednice virus (LEDV) Turlock virus (TURV) Umbre virus (UMBV)
	<i>Wolkberg orthobunyavirus</i>	Wolkberg virus (WBV)
	<i>Wyeomyia orthobunyavirus</i>	Anhembí virus (AMBV) BeAr 328208 virus (BAV) Cachoeira Porteira virus (CPOV) Iaco virus (IACOV) Macauã virus (MCAV)

**Table 1** (continued)

Genus	Species <sup>¶</sup>	Virus (abbreviation) <sup>¶</sup>
		Rio Pracupi virus
		Sororoca virus (SORV)
		Taiassui virus (TAIAV)
		Tucunduba virus (TUCV)
		Wyeomyia virus (WYOV)
	<i>Zegla orthobunyavirus</i>	Zegla virus (ZEGV)
<i>Shangavirus</i>	<i>Insect shangavirus</i>	Shuāngào insect virus 1 (SgIV-1)
<i>Tospovirus</i>	<i>Groundnut bud necrosis tospovirus</i>	groundnut bud necrosis virus (GBNV) <sup>11</sup>
	<i>Groundnut ringspot tospovirus</i>	groundnut ringspot virus (GRSV)
	<i>Groundnut yellow spot tospovirus</i>	groundnut yellow spot virus (GYSV) <sup>12</sup>
	<i>Impatiens necrotic spot tospovirus</i>	impatiens necrotic spot virus (INSV)
	<i>Iris yellow spot tospovirus</i>	iris yellow spot virus (IYSV)
	<i>Polygonum ringspot tospovirus</i>	Polygonum ringspot virus (PoIRSV)
	<i>Tomato chlorotic spot tospovirus</i>	tomato chlorotic spot virus (TCSV)
	<i>Tomato spotted wilt tospovirus*</i>	tomato spotted wilt virus (TSWV)
	<i>Watermelon bud necrosis tospovirus</i>	watermelon bud necrosis virus (WBNV)
	<i>Watermelon silver mottle tospovirus</i>	watermelon silver mottle virus (WSMoV)
	<i>Zucchini lethal chlorosis tospovirus</i>	zucchini lethal chlorosis virus (ZLCV)
<b>Family Phasmaviridae</b>		
<i>Feravirus</i>	<i>Ferak feravirus*</i>	Ferak virus (FERV)
<i>Inshuvirus</i>	<i>Insect inshuvirus*</i>	Shuāngào insect virus 2 (SgIV-2)
<i>Jonvirus</i>	<i>Jonchet jonvirus*</i>	jonchet virus (JONV)
<i>Orthophasmavirus</i>	<i>Kigluaik phantom orthophasmavirus*</i>	Kigluaik phantom virus (KIGV)
	<i>Nome phantom orthophasmavirus</i>	Nome phantom virus (NOMV)
	<i>Wuchang cockroach orthophasmavirus 1</i>	Wūchāng cockroach virus 1 (WcCV-1)
	<i>Wuhan mosquito orthophasmavirus 1</i>	Wūhàn mosquito virus 1 (WhMV-1)
	<i>Wuhan mosquito orthophasmavirus 2</i>	Wūhàn mosquito virus 2 (WhMV-2)
<i>Wuhivirus</i>	<i>Insect wuhivirus*</i>	Wūhàn insect virus 2 (WhIV-2)
<b>Family Phenuiviridae</b>		
<i>Banyangvirus</i>	<i>Huaiyangshan banyangvirus*</i>	severe fever with thrombocytopenia syndrome virus (SFTSV)
<i>Beidivirus</i>	<i>Dipteran beidivirus*</i>	Húběi diptera virus 3 (HbDV-3)
<i>Goukovirus</i>	<i>Cumuto goukovirus</i>	Cumuto virus (CUMV)
	<i>Gouleako goukovirus*</i>	Gouléako virus (GOLV)
	<i>Yichang insect goukovirus</i>	Yíchāng insect virus (YcIV)
<i>Horwuvirus</i>	<i>Horsefly horwuvirus*</i>	Wūhàn horsefly virus (WhHV)
<i>Hudivirus</i>	<i>Dipteran hudivirus*</i>	Húběi diptera virus 4 (HbDV-4)
<i>Hudovirus</i>	<i>Lepidopteran hudovirus*</i>	Húběi lepidoptera virus 1 (HbLV-1)
<i>Mobuvirus</i>	<i>Mothra mobuvirus*</i>	Mothra virus (MTHV)
<i>Phasivirus</i>	<i>Badu phasivirus*</i>	Badu virus (BADUV)
	<i>Phasi Charoen-like phasivirus</i>	Phasi Chaeron-like virus (PCLV)
	<i>Wuhan fly phasivirus<sup>#</sup></i>	
	<i>Wutai mosquito phasivirus</i>	Wūtái mosquito virus (WtMV)
<i>Phlebovirus</i>	<i>Bujaru phlebovirus</i>	Bujaru virus (BUJV)
		Munguba virus (MUNV)
		Alenquer virus (ALEV)
		Ariquemmes virus (ARQV)
		Candirú virus (CDUV)
		Itaituba virus (ITAV)
		Jacundá virus (JCNV)

**Table 1** (continued)

Genus	Species <sup>¶</sup>	Virus (abbreviation) <sup>¶</sup>
		Maldonado virus (MLOV)
		Morumbi virus (MR(M)BV)
		Mucura virus (MCRV/MRAV)
		Nique virus (NIQV)
		Oriximiná virus (ORXV)
		Serra Norte virus (SRNV)
		Turuna virus (TUAV)
	<i>Chilibre phlebovirus</i>	Cacao virus (CACV)
		Chilibre virus (CHIV)
	<i>Frijoles phlebovirus</i>	frijoles virus (FRIV)
		Joá virus (JOAV)
	<i>Punta Toro phlebovirus</i>	Buenaventura virus (BUEV)
		Campana virus (CMAV)
		Capira virus (CAPIV)
		Coclé virus (CCLV)
		Leticia virus (LTCV)
		Punta Toro virus (PTV)
	<i>Rift Valley fever phlebovirus*</i>	Rift Valley fever virus (RVFV)
	<i>Salehabad phlebovirus</i>	Adana virus (ADAV)
		Adria virus (ADRV)
		Alcube virus
		Arbia virus (ARBV)
		Arumowot virus (AMTV)
		Medjerda Valley virus (MVV)
		Odrénisrou virus (ODRV)
		Olbia virus (OLBV)
		Salehabad virus (SALV)
		Bregalaka virus (BREV)
		Zaba virus (ZABAV)
	<i>Sandfly fever Naples phlebovirus</i>	Arrábida virus (ARRV)
		Balkan virus (BALKV)
		Fermo virus (FERV)
		Gordil virus (GORV)
		Granada virus (GRV = GRAV)
		Massilia virus (MASV)
		Punique virus (PUNV)
		Saddaguia virus (SADV)
		Saint-Floris virus (SAFV)
		sandfly fever Naples virus (SFNV)
		Tehran virus (THEV)
		Toscana virus (TOSV)
		Zerdali virus (ZERV)
	<i>Uukuniemi phlebovirus</i>	Chizé virus (CHZV)
		EgAN 1825-61 virus (EGAV)
		Fin V 707 virus (FINV)
		Oceanside virus (OCV = OCEV)
		Pontevès virus (PTVV)
		St. Abbs Head virus (SAHV)
		Uukuniemi virus (UUKV)
		Zaliv Terpenyia virus (ZTV)

**Table 1** (continued)

Genus	Species <sup>¶</sup>	Virus (abbreviation) <sup>¶</sup>
<i>Pidchovirus</i>	<i>Pidgey pidchovirus</i> *	Pidgey virus (PGYV)
<i>Tenuivirus</i>	<i>Echinochloa hoja blanca tenuivirus</i>	Echinochloa hoja blanca virus (EHBV)
	<i>Iranian wheat stripe tenuivirus</i>	Iranian wheat stripe virus (IWSV)
	<i>Maize stripe tenuivirus</i>	maize stripe virus (MStV = MSpV)
	<i>Rice grassy stunt tenuivirus</i>	rice grassy stunt virus (RGSV)
	<i>Rice hoja blanca tenuivirus</i>	rice hoja blanca virus (RHBV)
	<i>Rice stripe tenuivirus</i> *	rice stripe virus (RSV = RStV)
	<i>Urochloa hoja blanca tenuivirus</i>	Urochloa hoja blanca virus (UHBV)
<i>Wubeivirus</i>	<i>Dipteran wubeivirus</i> *	Húběi diptera virus 5 (HbDV-5)
	<i>Fly wubeivirus</i>	Wǔhàn fly virus 1 (WhFV-1)
<b>Family Wupedeviridae</b>		
<i>Wumivirus</i>	<i>Millipede wumivirus</i> *	Wǔhàn millipede virus 2 (WhMV-2)

\*Asterisks denote type species

<sup>1</sup>junior synonyms: Cardamones virus, Hainán Medical University virus, Xīngyì virus

<sup>2</sup>synonym: Artybash virus (ARTV)

<sup>3</sup>synonym: New York 1 virus (NY-1V)

<sup>4</sup>synonym: Jurong virus

<sup>5</sup>includes the strain previously referred to as Tunis virus (TUNV)

<sup>6</sup>includes the strain previously referred to as soft tick bunyavirus (STBV)

<sup>7</sup>includes the strain previously referred to as Ganjam virus (GANV)

<sup>8</sup>synonyms: Čalovo virus (CVOV), Chittoor virus (CHITV), Olkya virus, Olyka virus, UgMP-6830 virus

<sup>9</sup>includes the strain previously referred to as Garissa virus

<sup>10</sup>also mistakenly referred to in the literature as Chantanga virus (CHATV) and Chatanga virus (CHATV)

<sup>11</sup>synonym: peanut bud necrosis virus (PDNV)

<sup>12</sup>synonym: peanut yellow spot virus (PYSV)

<sup>#</sup>The virus of this species was moved into a new genus (*Wubeivirus*) and species (*Fly wubeivirus*), but due to a formal error, the species *Wuhan fly phasivirus* was not deleted. A taxonomic proposal to rectify this oversight has been submitted

<sup>¶</sup>Please note that viruses are real objects that are assigned to concepts that are called taxa. Species, genera, families, and orders are taxa. Taxon names are always italicized and always begin with a capital letter. Virus names, on the other hand, are not italicized and are not capitalized, except if the name or a name component is a proper noun. This column lists the virus names with their correct (lack of) capitalization. Lists of viruses within a given species are provisional at this point and will likely be amended in the near future

**Acknowledgements** We thank Laura Bollinger (NIH/NIAID Integrated Research Facility at Fort Detrick, Frederick, MD, USA) for critically editing the manuscript.

**Funding** This work was supported in part through Battelle Memorial Institute's prime contract with the US National Institute of Allergy and Infectious Diseases (NIAID) under Contract No. HHSN272200700016I (J.H.K.). This work was also funded in part by National Institutes of Health (NIH) contract HHSN272201000040I/HHSN27200004/D04 and grant R24AI120942 (R.B.T.).

## Compliance with ethical standards

The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the US Department of the Army, the US Department of Defense, the US Department of Health and Human Services, or of the institutions and companies affiliated with the authors. In no event shall any of these entities have any responsibility or liability for any use, misuse, inability to use, or

reliance upon the information contained herein. The US departments do not endorse any products or commercial services mentioned in this publication.

**Conflict of interest** The authors declare no conflicts of interest.

**Ethical approval** This article does not contain any studies with human participants or animals performed by any of the authors.

## References

- Li C-X, Shi M, Tian J-H, Lin X-D, Kang Y-J, Chen L-J, Qin X-C, Xu J, Holmes EC, Zhang Y-Z (2015) Unprecedented genomic diversity of RNA viruses in arthropods reveals the ancestry of negative-sense RNA viruses. *Elife* 4:e05378
- Maes P, Alkhovsky SV, Bào Y, Beer M, Birkhead M, Briese T, Buchmeier MJ, Calisher CH, Charrel RN, Choi IR, Clegg CS, Torre JCDL, Delwart E, DeRisi JL, Bello PLD, Serio FD, Digiaro M, Dolja VV, Drosten C, Druciarek TZ, Du J, Ebihara

H, Elbeaino T, Gergerich RC, Gillis AN, Gonzalez J-PJ, Haenni A-L, Hepojoki J, Hetzel U, Hò T, Hóng N, Jain RK, Vuren PJV, Jin Q, Jonson MG, Junglen S, Keller KE, Kemp A, Kipar A, Kondov NO, Koonin EV, Kormelink R, Korzyukov Y, Krupovic M, Lambert AJ, Laney AG, LeBreton M, Lukashевич IS, Marklewitz M, Markotter W, Martelli GP, Martin RR, Mielke-Ehret N, Mühlbach H-P, Navarro B, Ng TFF, Nunes MRT, Palacios G, Pawęska JT, Peters CJ, Plyusnin A, Radoshitzky SR, Romanowski V, Salmenperä P, Salvato MS, Sanfaçon H, Sasaya T, Schmaljohn C, Schneider BS, Shirako Y, Siddell S, Sironen TA, Stenglein MD, Storm N, Sudini H, Tesh RB, Tzanetakis IE, Uppala M, Vapalahti O, Vasilakis N, Walker PJ, Wáng G, Wáng L, Wáng Y, Wèi T,

Wiley MR, Wolf YI, Wolfe ND, Wú Z, Xú W, Yang L, Yāng Z, Yeh S-D, Zhāng Y-Z, Zhèng Y, Zhou X, Zhū C, Zirkel F, Kuhn JH (2018) Taxonomy of the family *Arenaviridae* and the order *Bunyavirales*: update 2018. *Arch Virol* 163:2295–2310

- Makhsous N, Shean RC, Droppers D, Guan J, Jerome KR, Greninger AL (2017) Genome sequences of three novel bunyaviruses, two novel rhabdoviruses, and one novel nyamivirus from Washington State moths. *Genome Announc* 5:e01668-01616
- Shi M, Lin X-D, Tian J-H, Chen L-J, Chen X, Li C-X, Qin X-C, Li J, Cao J-P, Eden J-S, Buchmann J, Wang W, Xu J, Holmes EC, Zhang Y-Z (2016) Redefining the invertebrate RNA virosphere. *Nature* 540:539–543

## Affiliations

Piet Maes<sup>1</sup> · Scott Adkins<sup>2</sup> · Sergey V. Alkhovsky<sup>3</sup> · Tatjana Avšič-Županc<sup>4</sup> · Matthew J. Ballinger<sup>5</sup> · Dennis A. Bente<sup>6</sup> · Martin Beer<sup>7</sup> · Éric Bergeron<sup>8</sup> · Carol D. Blair<sup>9</sup> · Thomas Briese<sup>10</sup> · Michael J. Buchmeier<sup>11</sup> · Felicity J. Burt<sup>12,13</sup> · Charles H. Calisher<sup>9</sup> · Rémi N. Charrel<sup>14</sup> · Il Ryong Choi<sup>15</sup> · J. Christopher S. Clegg<sup>16</sup> · Juan Carlos de la Torre<sup>17</sup> · Xavier de Lamballerie<sup>14</sup> · Joseph L. DeRisi<sup>18,19,20</sup> · Michele Digiaro<sup>21</sup> · Mike Drebot<sup>22</sup> · Hideki Ebihara<sup>23</sup> · Toufic Elbeaino<sup>21</sup> · Koray Ergünay<sup>24</sup> · Charles F. Fulhorst<sup>6</sup> · Aura R. Garrison<sup>25</sup> · George Fú Gão<sup>26</sup> · Jean-Paul J. Gonzalez<sup>27</sup> · Martin H. Groschup<sup>28,29</sup> · Stephan Günther<sup>30</sup> · Anne-Lise Haenni<sup>31</sup> · Roy A. Hall<sup>32</sup> · Roger Hewson<sup>33</sup> · Holly R. Hughes<sup>34</sup> · Rakesh K. Jain<sup>35</sup> · Miranda Gilda Jonson<sup>36</sup> · Sandra Junglen<sup>37,38</sup> · Boris Klempa<sup>37,39</sup> · Jonas Klingström<sup>40</sup> · Richard Kormelink<sup>41</sup> · Amy J. Lambert<sup>34</sup> · Stanley A. Langevin<sup>42</sup> · Igor S. Lukashевич<sup>43</sup> · Marco Marklewitz<sup>37,38</sup> · Giovanni P. Martelli<sup>44</sup> · Nicole Mielke-Ehret<sup>45</sup> · Ali Mirazimi<sup>46</sup> · Hans-Peter Mühlbach<sup>45</sup> · Rayapati Naidu<sup>47</sup> · Márcio Roberto Teixeira Nunes<sup>48</sup> · Gustavo Palacios<sup>25</sup> · Anna Papa<sup>49</sup> · Janusz T. Pawęska<sup>50,51</sup> · Clarence J. Peters<sup>6</sup> · Alexander Plyusnin<sup>52</sup> · Sheli R. Radoshitzky<sup>25</sup> · Renato O. Resende<sup>53</sup> · Víctor Romanowski<sup>54</sup> · Amadou Alpha Sall<sup>55</sup> · Maria S. Salvato<sup>56</sup> · Takahide Sasaya<sup>57</sup> · Connie Schmaljohn<sup>25</sup> · Xiāohóng Shí<sup>58</sup> · Yukio Shirako<sup>59</sup> · Peter Simmonds<sup>60</sup> · Manuela Sironi<sup>61</sup> · Jin-Won Song<sup>62</sup> · Jessica R. Spengler<sup>8</sup> · Mark D. Stenglein<sup>63</sup> · Robert B. Tesh<sup>6</sup> · Massimo Turina<sup>64</sup> · Tàiyún Wèi<sup>65</sup> · Anna E. Whitfield<sup>66</sup> · Shyi-Dong Yeh<sup>67</sup> · F. Murilo Zerbini<sup>68</sup> · Yong-Zhen Zhang<sup>28,29</sup> · Xueping Zhou<sup>69</sup> · Jens H. Kuhn<sup>70</sup>

✉ Jens H. Kuhn  
kuhnjens@mail.nih.gov

<sup>1</sup> Zoonotic Infectious Diseases unit, Rega Institute, KU Leuven, Leuven, Belgium

<sup>2</sup> United States Department of Agriculture, Agricultural Research Service, US Horticultural Research Laboratory, Fort Pierce, FL, USA

<sup>3</sup> D. I. Ivanovsky Institute of Virology, N. F. Gamaleya Federal Research Center for Epidemiology and Microbiology, Ministry of Health of the Russian Federation, Moscow, Russia

<sup>4</sup> University of Ljubljana, Ljubljana Faculty of Medicine, Ljubljana, Slovenia

<sup>5</sup> Department of Biological Sciences, Mississippi State University, Mississippi State, MS, USA

<sup>6</sup> University of Texas Medical Branch, Galveston, TX, USA

<sup>7</sup> Institute of Diagnostic Virology, Friedrich-Loeffler-Institut, Greifswald-Insel Riems, Germany

<sup>8</sup> Viral Special Pathogens Branch, Division of High-Consequence Pathogens and Pathology, Centers for Disease Control and Prevention, Atlanta, GA, USA

<sup>9</sup> Department of Microbiology, Immunology & Pathology, Arthropod-borne and Infectious Diseases Laboratory, Colorado State University, Fort Collins, CO, USA

<sup>10</sup> Department of Epidemiology, Mailman School of Public Health, Center for Infection and Immunity, Columbia University, New York, NY, USA

<sup>11</sup> Department of Molecular Biology and Biochemistry, University of California, Irvine, CA, USA

<sup>12</sup> Division of Virology, National Health Laboratory Service, Bloemfontein, Republic of South Africa

<sup>13</sup> Division of Virology, University of the Free State, Bloemfontein, Republic of South Africa

<sup>14</sup> Unité des Virus Emergents (Aix-Marseille Univ–IRD 190–Inserm 1207–IHU Méditerranée Infection), Marseille, France

<sup>15</sup> Plant Breeding Genetics and Biotechnology Division, International Rice Research Institute, Los Baños, Philippines

<sup>16</sup> Les Mandinaux, Le Grand Madiou, France

<sup>17</sup> Department of Immunology and Microbiology IMM-6, The Scripps Research Institute, La Jolla, CA, USA

<sup>18</sup> Department of Medicine, University of California, San Francisco, CA, USA

- 19 Department of Biochemistry and Biophysics, University of California, San Francisco, CA, USA
- 20 Department of Microbiology, University of California, San Francisco, CA, USA
- 21 Istituto Agronomico Mediterraneo di Bari, Valenzano, Italy
- 22 Zoonotic Diseases and Special Pathogens, National Microbiology Laboratory, Public Health Agency of Canada, Winnipeg, MB, Canada
- 23 Department of Molecular Medicine, Mayo Clinic, Rochester, MN, USA
- 24 Virology Unit, Department of Medical Microbiology, Faculty of Medicine, Hacettepe University, Ankara, Turkey
- 25 United States Army Medical Research Institute of Infectious Diseases, Fort Detrick, Frederick, MD, USA
- 26 National Institute for Viral Disease Control and Prevention, Chinese Center for Disease Control and Prevention, Beijing, China
- 27 Center of Excellence for Emerging and Zoonotic Animal Disease, Kansas State University, Manhattan, KS, USA
- 28 National Institute for Communicable Disease Control and Prevention, Chinese Center for Disease Control and Prevention, Changping, Beijing, China
- 29 Shanghai Public Health Clinical Center & Institutes of Biomedical Sciences, Fudan University, Shanghai, China
- 30 Department of Virology, Bernhard-Nocht Institute for Tropical Medicine, WHO Collaborating Centre for Arboviruses and Hemorrhagic Fever Reference and Research, Hamburg, Germany
- 31 Institut Jacques Monod, CNRS—Université Paris-Diderot, Paris, France
- 32 Australian Infectious Diseases Research Centre, School of Chemistry and Molecular Biosciences, The University of Queensland, Brisbane, Australia
- 33 Public Health England, Porton Down, Wiltshire, Salisbury, UK
- 34 Centers for Disease Control and Prevention, Fort Collins, CO, USA
- 35 Division of Plant Pathology, Indian Agricultural Research Institute, New Delhi, India
- 36 Department of Agricultural Biotechnology, Center for Fungal Pathogenesis, College of Agriculture and Life Sciences, Seoul National University, Seoul, Korea
- 37 Institute of Virology, Charité-Universitätsmedizin Berlin, corporate member of Free University Berlin, Humboldt-University Berlin, and Berlin Institute of Health, Berlin, Germany
- 38 German Centre for Infection Research, Berlin, Germany
- 39 Biomedical Research Center, Slovak Academy of Sciences, Bratislava, Slovakia
- 40 Department of Medicine Huddinge, Center for Infectious Medicine, Karolinska Institutet, Karolinska University Hospital, Stockholm, Sweden
- 41 Laboratory of Virology, Department of Plant Sciences, Wageningen University, Wageningen, The Netherlands
- 42 Department of Microbiology, University of Washington, Washington, USA
- 43 Department of Pharmacology and Toxicology, School of Medicine, and the Center for Predictive Medicine for Biodefense and Emerging Infectious Diseases, University of Louisville, Louisville, KY, USA
- 44 Department of Plant, Soil and Food Sciences, University of Bari Aldo Moro, Bari, Italy
- 45 Biocentre Klein Flottbek, University of Hamburg, Hamburg, Germany
- 46 Folkhalsomyndigheten, Stockholm, Sweden
- 47 Department of Plant Pathology, Irrigated Agricultural Research and Extension Center, Washington State University, Prosser, WA, USA
- 48 Evandro Chagas Institute, Ministry of Health, Rod BR 316, Ananindeua, Brazil
- 49 Department of Microbiology, Medical School, National Reference Centre for Arboviruses and Haemorrhagic Fever Viruses, Aristotle University of Thessaloniki, Thessaloniki, Greece
- 50 Centre for Emerging Zoonotic and Parasitic Diseases, National Institute for Communicable Diseases, National Health Laboratory Service, Sandringham, South Africa
- 51 Department of Medical Virology, Centre for Viral Zoonoses, Faculty of Health Sciences, University of Pretoria, Pretoria, South Africa
- 52 Department of Virology, University of Helsinki, Medicum, Helsinki, Finland
- 53 Departamento de Biologia Celular, Universidade de Brasília, Brasília, DF, Brazil
- 54 Instituto de Biotecnología y Biología Molecular, Centro Científico Tecnológico-La Plata, Consejo Nacional de Investigaciones Científicas y Técnicas—Universidad Nacional de La Plata, La Plata, Argentina
- 55 Institut Pasteur de Dakar, Dakar, Senegal
- 56 Institute of Human Virology, University of Maryland School of Medicine, Baltimore, MD, USA
- 57 Department of Planning and Coordination, National Agriculture and Food Research Organization, Tsukuba, Japan
- 58 MRC-University of Glasgow Centre for Virus Research, Glasgow, Scotland, UK
- 59 Asian Center for Bioresources and Environmental Sciences, University of Tokyo, Tokyo, Japan
- 60 Nuffield Department of Medicine, University of Oxford, Oxford, UK
- 61 Bioinformatics Scientific Institute IRCCS E. MEDEA, Bosisio Parini, Italy
- 62 Department of Microbiology, College of Medicine, Korea University, Seoul, Republic of Korea
- 63 Department of Microbiology, Immunology and Pathology, Colorado State University, Fort Collins, CO, USA
- 64 Institute for Sustainable Plant Protection, CNR, Torino, Italy

- <sup>65</sup> Fujian Province Key Laboratory of Plant Virology, Institute of Plant Virology, Fujian Agriculture and Forestry University, Fuzhou, Fujian, China
- <sup>66</sup> Department of Entomology and Plant Pathology, North Carolina State University, Raleigh, NC, USA
- <sup>67</sup> Department of Plant Pathology, National Chung Hsing University, Taichung, Taiwan
- <sup>68</sup> Departamento de Fitopatologia/BIOAGRO, Universidade Federal de Viçosa, Viçosa, MG, Brazil
- <sup>69</sup> State Key Laboratory for Biology of Plant Diseases and Insect Pests, Institute of Plant Protection, Chinese Academy of Agricultural Sciences, Beijing, China
- <sup>70</sup> Integrated Research Facility at Fort Detrick (IRF-Frederick), Division of Clinical Research (DCR), National Institute of Allergy and Infectious Diseases (NIAID), National Institutes of Health (NIH), B-8200 Research Plaza, Fort Detrick, Frederick, MD 21702, USA