

SUPPLEMENTARY INFORMATION¹

Mass mortality in freshwater mussels (*Actinonaias pectorosa*) in the Clinch River, USA, linked to a novel densovirus

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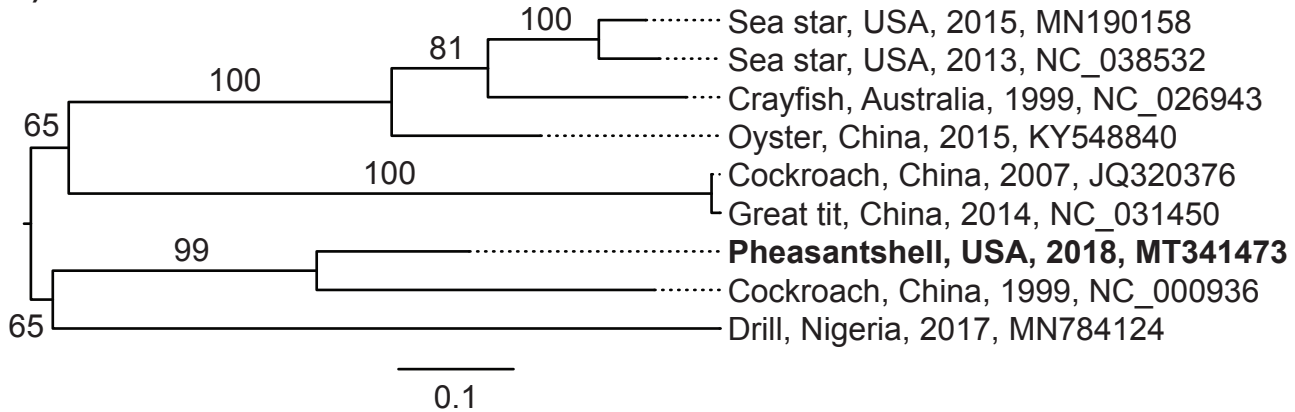
Table S1. Details of Clinch River pheasantshells (*Actinonaias pectorosa*) used in the analyses

Table S2. Loads of 17 viruses in Clinch River pheasantshells (*Actinonaias pectorosa*)

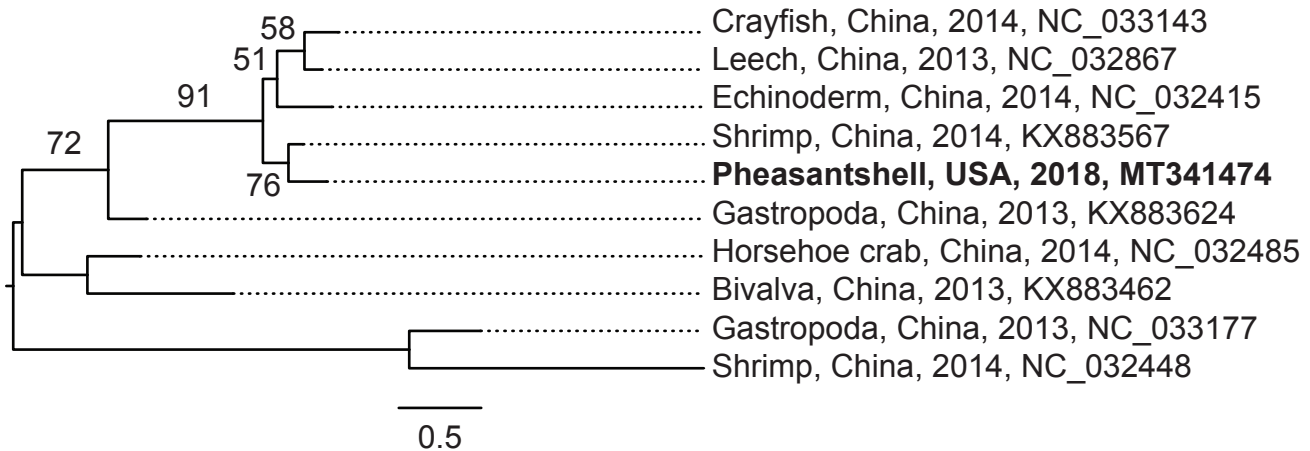
Figure S1. Maximum likelihood phylogenetic trees of 17 viruses identified in Clinch River pheasantshells (*Actinonaias pectorosa*) and their relatives in the GenBank database. Taxon names indicate host, country, year of collection, and GenBank accession number; see Table 2 for additional details. Viruses identified in the present study are shown in bold type. Numbers beside branches are bootstrap values representing statistical confidence in clades based on 1000 resamplings of the data; only bootstrap values $\geq 50\%$ are shown. Scale bars indicate nucleotide substitutions per site.

¹Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

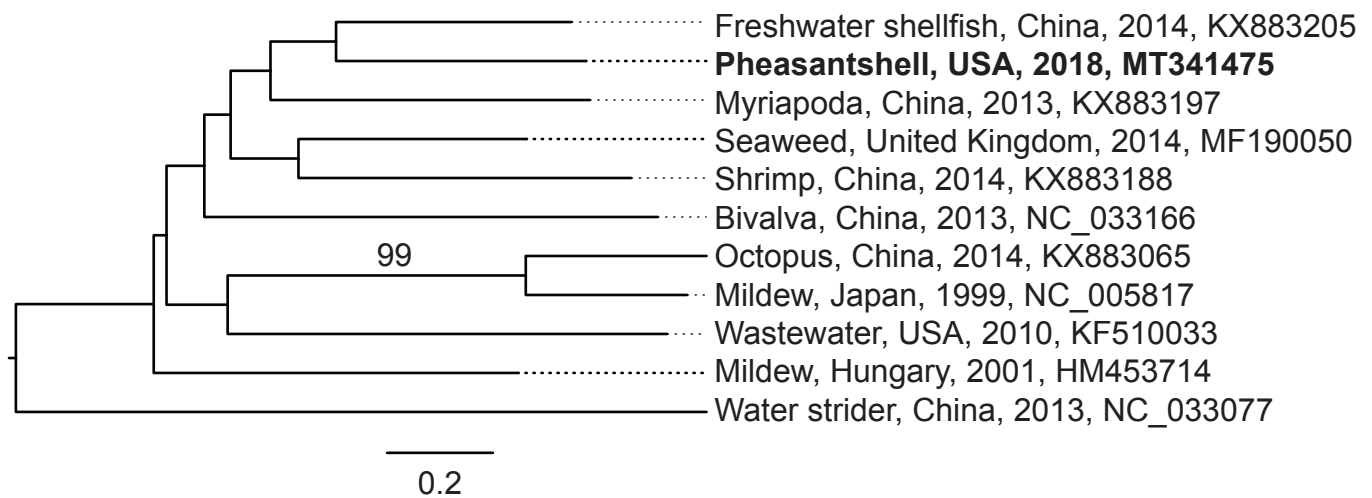
A) Densoviruses



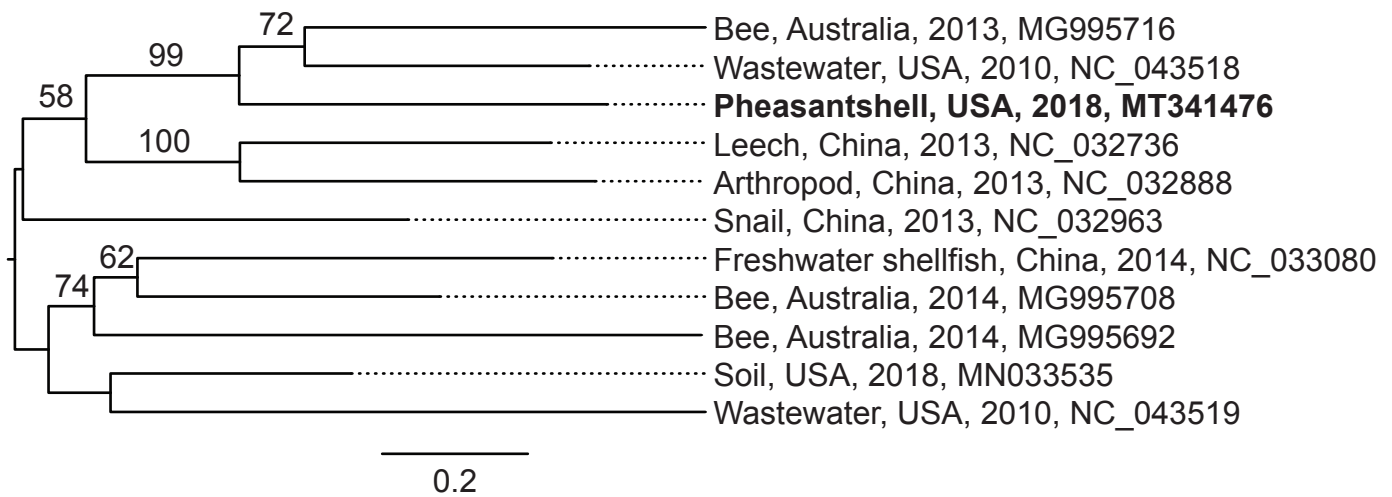
B) Narna-like viruses



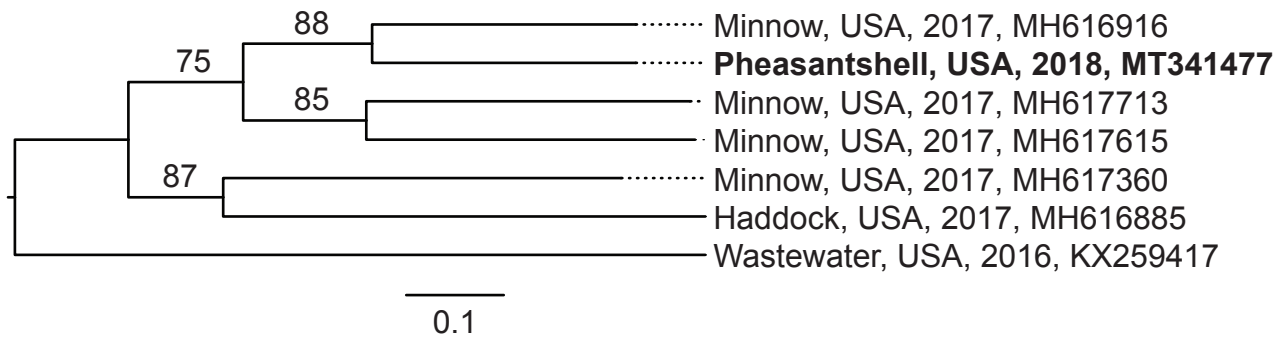
C) Noda-like viruses



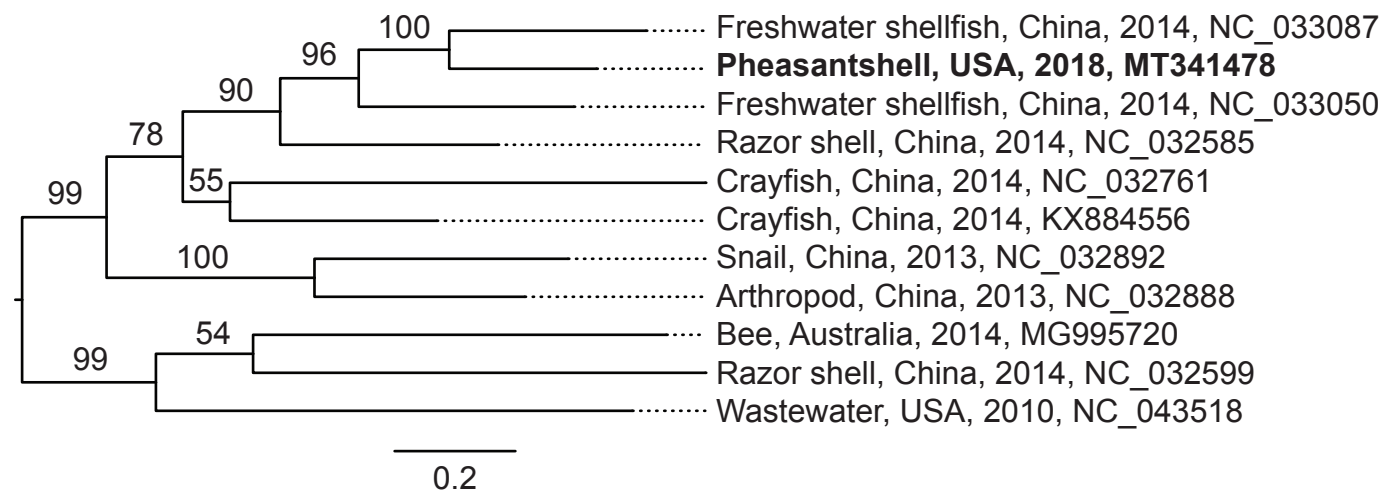
D) Picorna-like viruses (1)



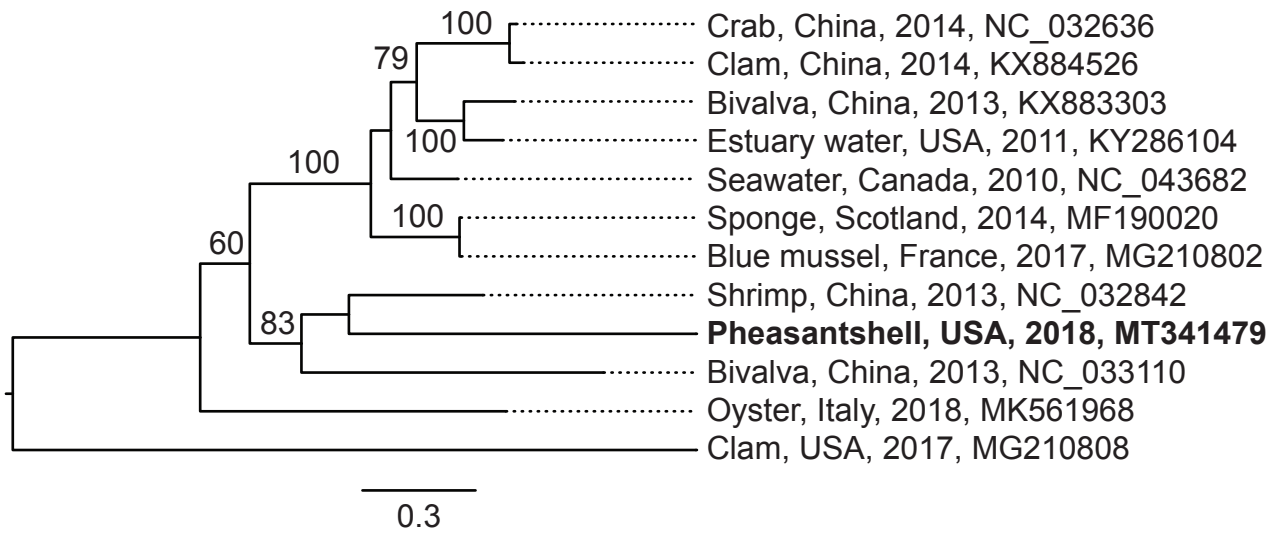
E) CRESS viruses



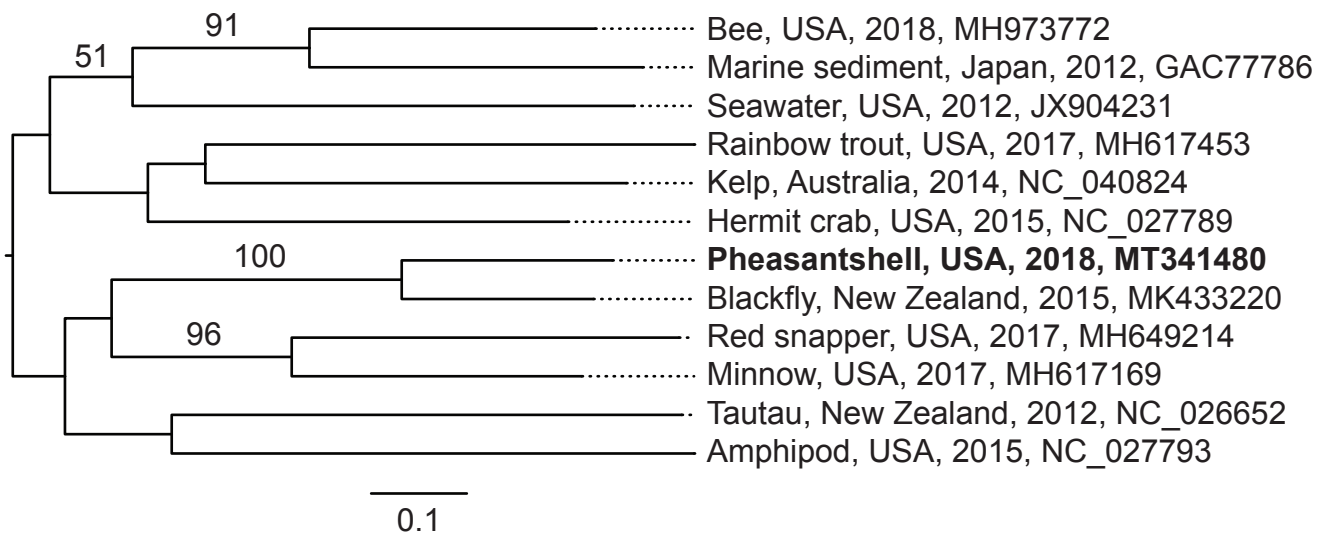
F) Picorna-like viruses (2)



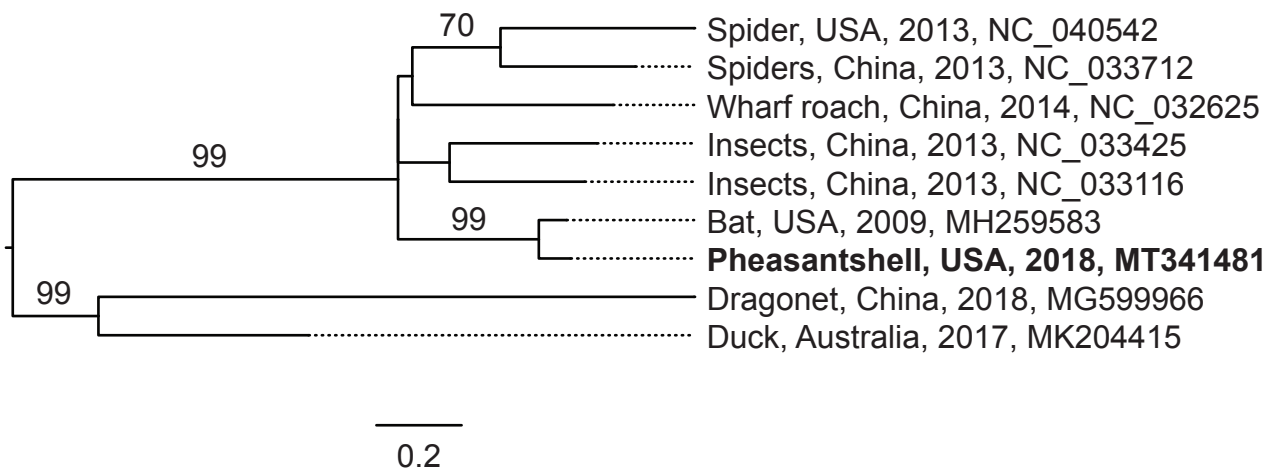
G) Picorna-like viruses (3)



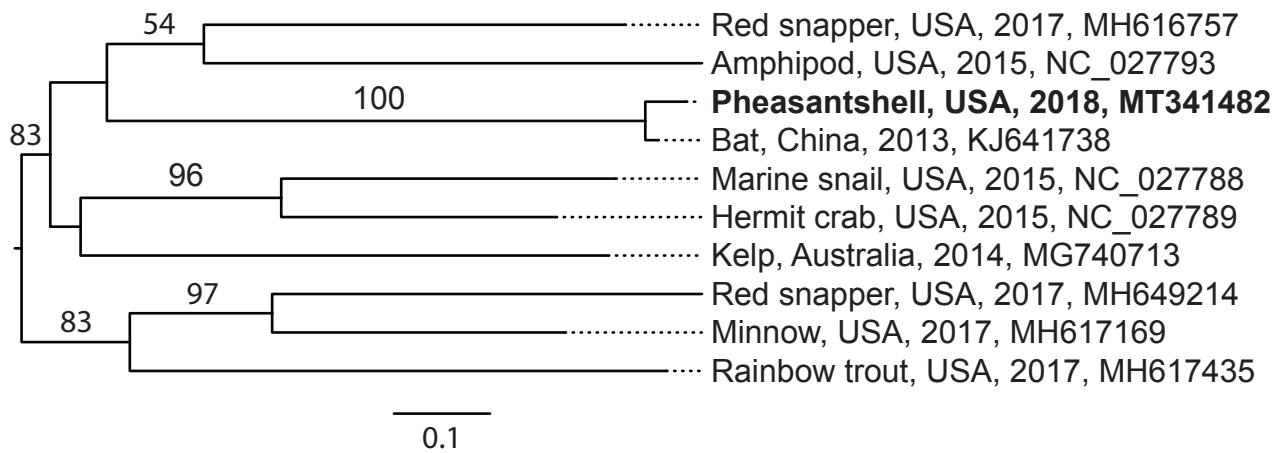
H) Circular viruses (1)



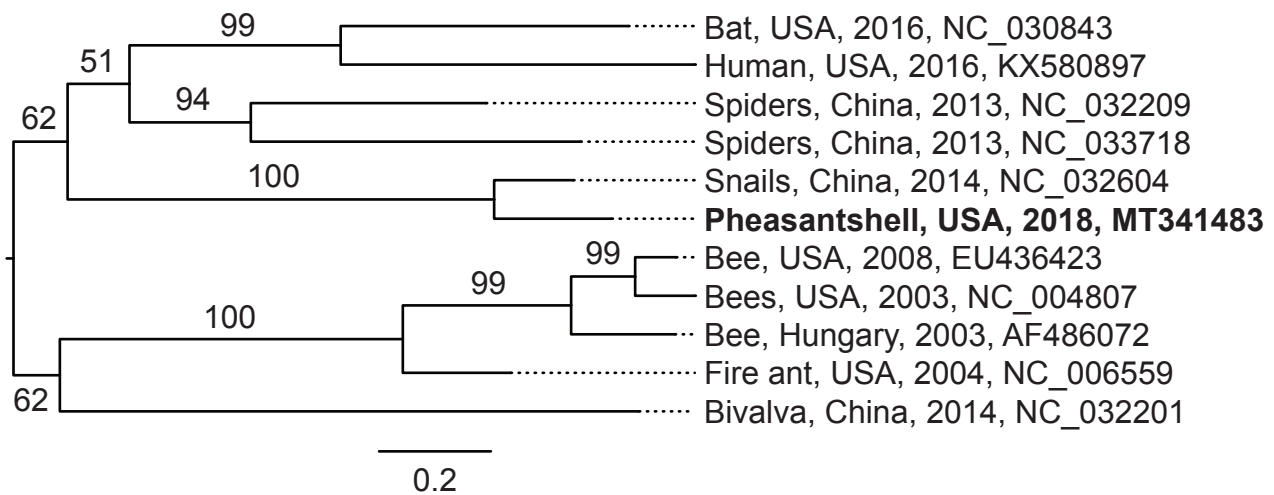
I) Caliciviruses



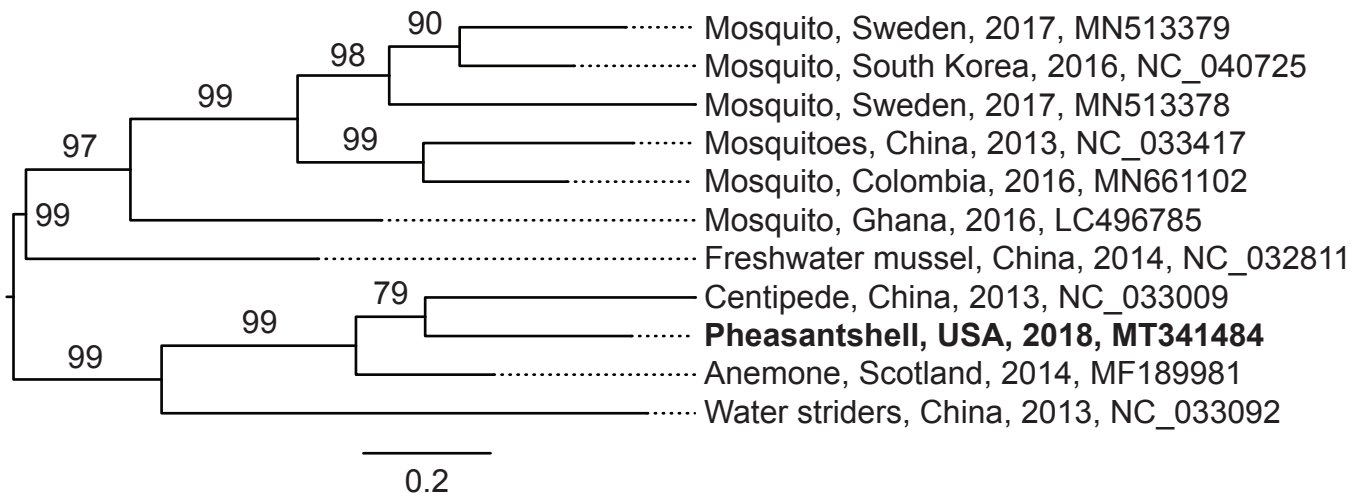
J) Circular viruses (2)



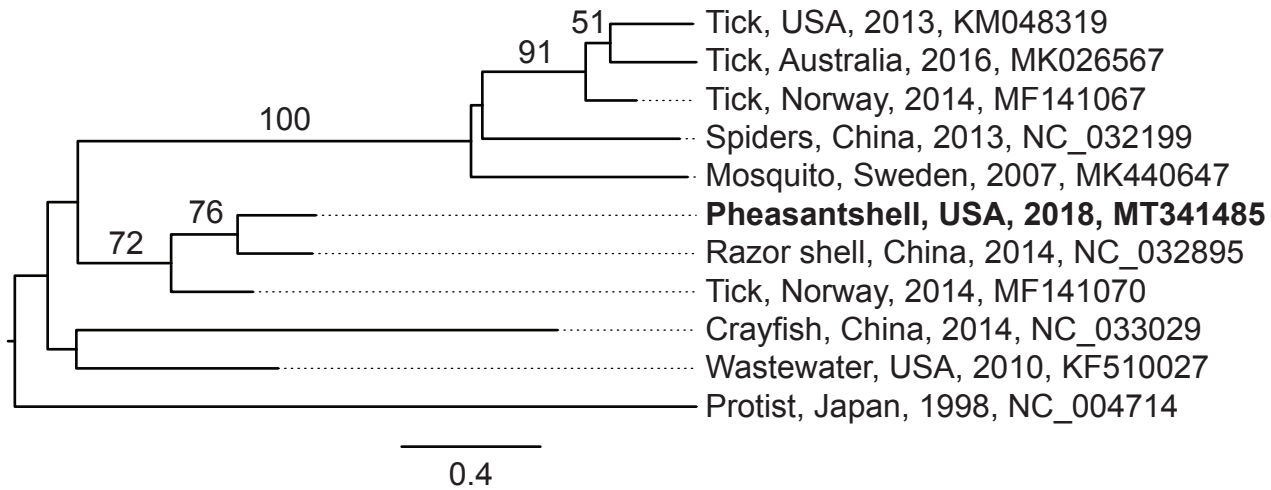
K) Dicistro-like viruses (1)



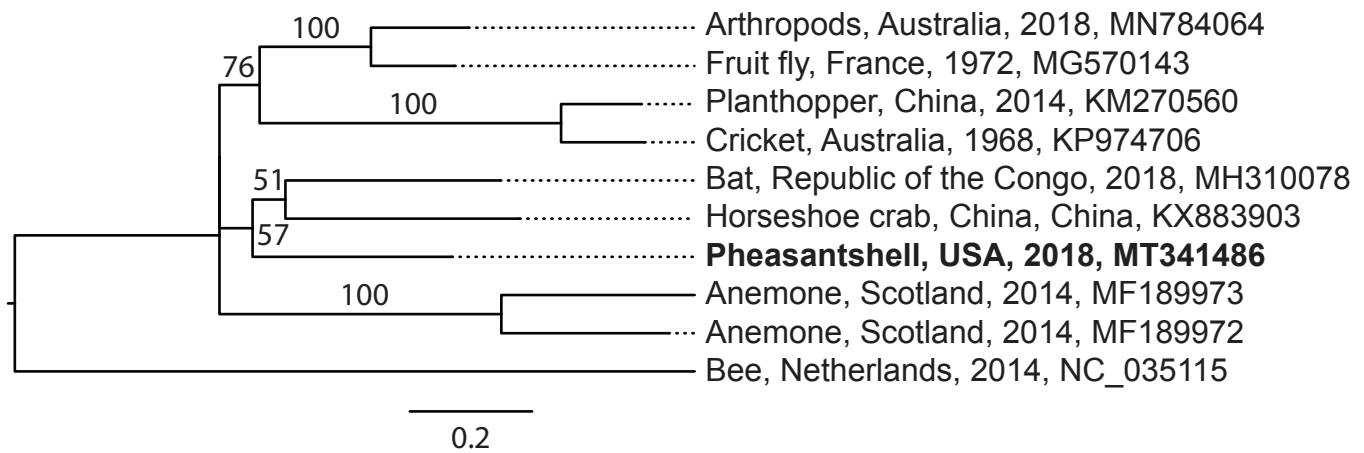
L) Tombus-like viruses



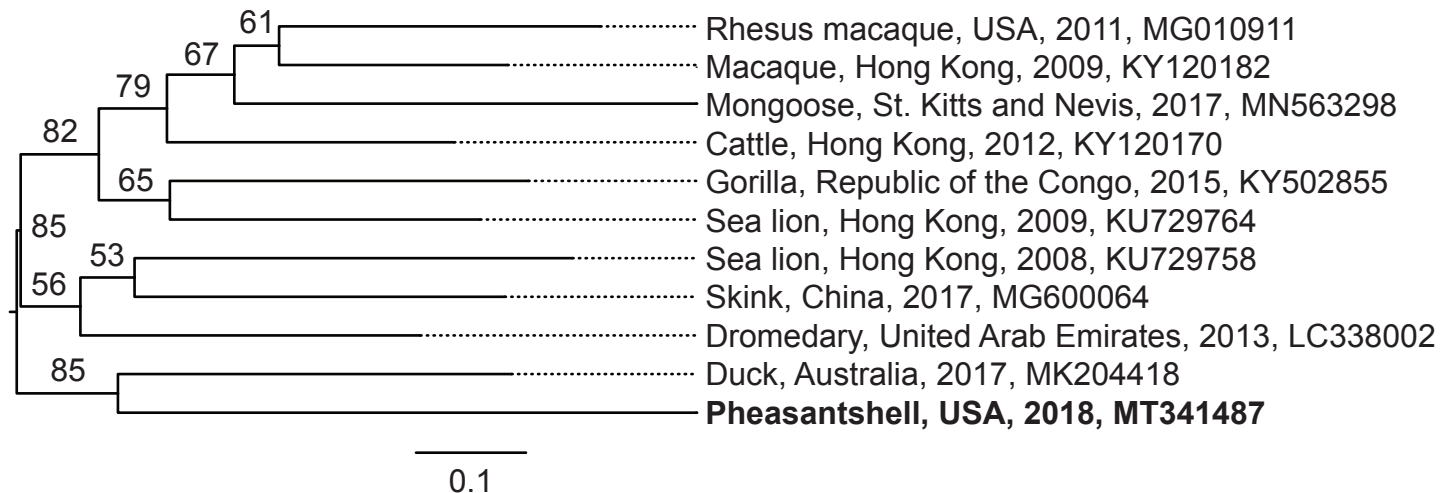
M) Sobemo-like viruses



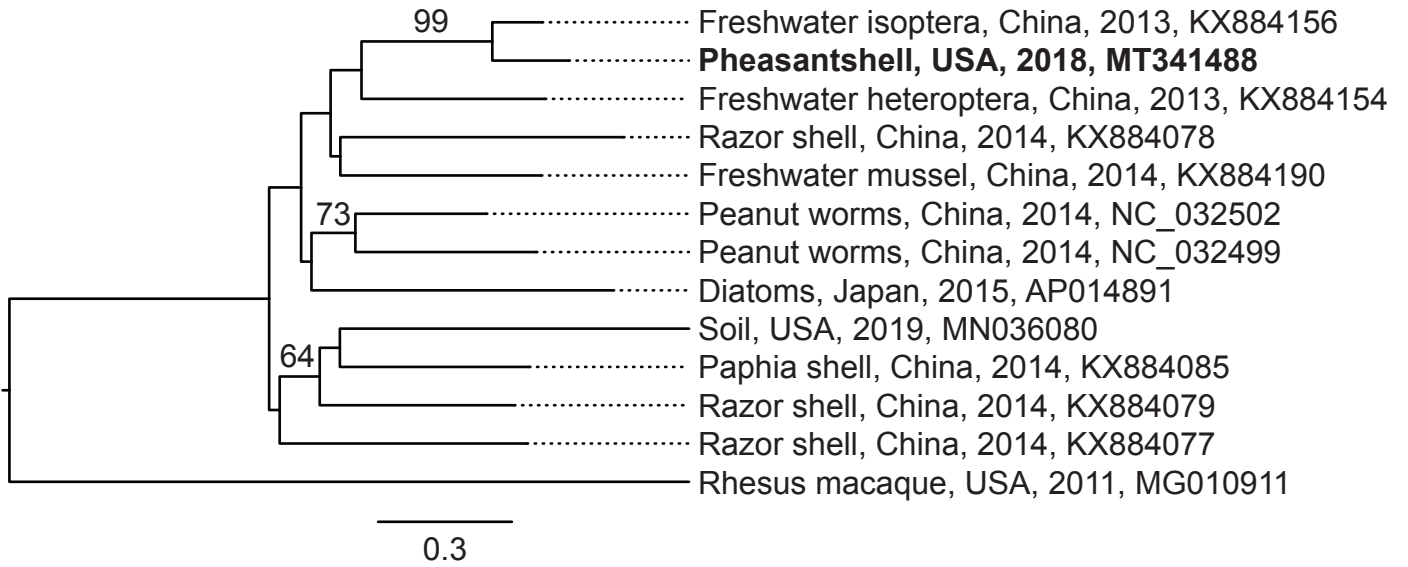
N) Dicistro-like viruses (2)



O) Picobirnaviruses



P) Picobirna-like viruses



Q) Totiviruses

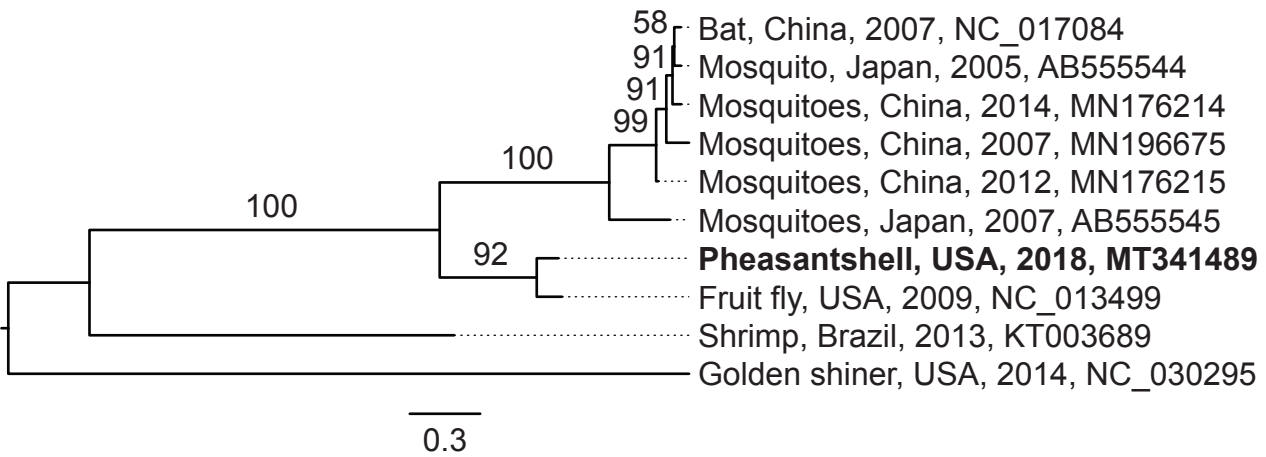


Table S1. Details of Clinch River pheasantshells (*Actinonaias pectorosa*) used in the analyses

Accession	Short ID	Status	Date	Location	Condition ¹	Length (mm)	Gravid ²
AP102017-037	Y37	Case	10/20/17	Frost Ford		96.0	
AP102017-043	Y43	Case	10/20/17	Kyle's Ford		97.0	
AP102017-065	Y65	Case	10/20/17	Kyle's Ford		90.0	
AP102017-066	Y66	Case	10/20/17	Kyle's Ford		92.5	
AP110317-001	Z01	Case	11/3/17	Kyle's Ford		71.0	
AP110317-002	Z02	Case	11/3/17	Kyle's Ford		72.0	
AP110317-005	Z05	Case	11/3/17	Kyle's Ford		75.0	
AP110317-006	Z06	Case	11/3/17	Kyle's Ford		90.0	
AP110317-008	Z08	Case	11/3/17	Kyle's Ford		74.0	
AP110317-016	Z16	Case	11/3/17	Wallen's Bend		80.0	
AP110317-003	Z03	Case	11/3/17	Kyle's Ford		72.0	
20180925SIAPE-0007	B32	Case	9/25/18	Sycamore Island	4	95.0	Yes
20180925SIAPE-0011	B36	Case	9/25/18	Sycamore Island	5	69.0	
20180925SIAPE-0012	B37	Case	9/25/18	Sycamore Island	5	91.0	No
20180925SIAPE-0014	B39	Case	9/25/18	Sycamore Island	4	96.0	
20180925SIAPE-0015	B40	Case	9/25/18	Sycamore Island	5	101.0	Yes
20181024SFape-0001	C16	Case	10/24/18	Speers Ferry	4	103.0	No
20181025SIAPE-0012	C47	Case	10/25/18	Sycamore Island	4	78.0	No
20181025SIAPE-0013	C48	Case	10/25/18	Sycamore Island	4	86.0	Yes
20181025SIAPE-0021	C59	Case	10/25/18	Sycamore Island	4	97.0	No
20181025KFAPE-0007	C69	Case	10/25/18	Kyle's Ford	4	73.0	No
20181025KFAPE-0011	C73	Case	10/25/18	Kyle's Ford	4	70.0	No
20181025KFAPE-0012	C74	Case	10/25/18	Kyle's Ford	3	83.0	No
20181025KFAPE-0014	C76	Case	10/25/18	Kyle's Ford	3	88.0	Yes
20181025KFAPE-0015	C77	Case	10/25/18	Kyle's Ford	2	74.5	No
20181025KFAPE-0016	C78	Case	10/25/18	Kyle's Ford	3	94.0	Yes
AP102017-005	Y05	Control	10/20/17	Sycamore Island		104.0	
AP102017-015	Y15	Control	10/20/17	Wallen's Bend		84.0	
AP102017-027	Y27	Control	10/20/17	Frost Ford		89.0	
AP102017-044	Y44	Control	10/20/17	Kyle's Ford		85.5	
AP110317-009	Z09	Control	11/3/17	Kyle's Ford		94.0	
AP110317-010	Z10	Control	11/3/17	Kyle's Ford		61.0	
AP110317-013	Z13	Control	11/3/17	Wallen's Bend		61.0	
AP110317-015	Z15	Control	11/3/17	Wallen's Bend		84.0	
20180816SIAPE-0002	A10	Control	8/16/18	Sycamore Island	4	96.0	Yes
20180816SIAPE-0008	A16	Control	8/16/18	Sycamore Island	5	95.7	No
20180816WBAPE-0007	A23	Control	8/16/18	Wallen's Bend	4	91.6	No
20180816KFAPE-0002	A34	Control	8/16/18	Kyle's Ford		99.4	No
20180816KFAPE-0006	A38	Control	8/16/18	Kyle's Ford	5	83.8	No
20180925ARAPE-0004	B04	Control	9/25/18	Artrip	4	95.0	Yes
20180925SFape-0004	B17	Control	9/25/18	Speers Ferry	4	85.0	Yes
20180925SIAPE-0002	B26	Control	9/25/18	Sycamore Island	4	92.0	Yes
20180925SIAPE-0003	B27	Control	9/25/18	Sycamore Island	4	97.0	Yes
20180925SIAPE-0004	B28	Control	9/25/18	Sycamore Island	5	91.0	Yes
20180925SIAPE-0006	B31	Control	9/25/18	Sycamore Island	5	104.0	No
20180925WBAPE-0002	B44	Control	9/25/18	Wallen's Bend	4	84.4	No
20181025SIAPE-0002	C36	Control	9/25/18	Sycamore Island	5	93.0	No
20181025KFAPE-0001	C63	Control	9/25/18	Kyle's Ford	4	70.0	No
20181025KFAPE-0002	C64	Control	9/25/18	Kyle's Ford	3	88.0	Yes
20180925KFAPE-0020	B71	Control	9/26/18	Kyle's Ford	4	62.0	No
20180925KFAPE-0022	B73	Control	9/26/18	Kyle's Ford	3	78.0	No
20180925KFAPE-0024	B75	Control	9/26/18	Kyle's Ford	5	60.0	No
20181024ARAPE-0004	C04	Control	10/24/18	Artrip	4	106.0	Yes
20181024SFape-0013	C33	Control	10/24/18	Speers Ferry	5	82.0	No
20181025KFAPE-0004	C66	Control	10/25/18	Kyle's Ford	4	76.0	No
20181025KFAPE-0008	C70	Control	10/25/18	Kyle's Ford	3	58.0	No
20181025KFAPE-0009	C71	Control	10/25/18	Kyle's Ford	3	50.0	No
20181025KFAPE-0013	C75	Control	10/25/18	Kyle's Ford	3	88.0	Yes

¹Body condition score was ranked on an ordinal scale of 1 (poor) to 5 (excellent). Blank cells represent missing data.²Reproductive status (gravid or not gravid) was assessed during physical examination. Blank cells represent missing data.

Table S2. Loads of 17 viruses in Clinch River pheasantshells (*Actinonaias pectorosa*)

Short ID ²	Status	Virus ¹																
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
Y37	Case	0.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Y43	Case	1.24	0.30	0.15	2.17	0.00	1.60	0.24	1.43	0.59	0.00	0.00	0.34	0.00	0.21	0.00	0.00	0.00
Y65	Case	0.48	0.00	0.00	1.52	0.00	0.42	0.00	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Y66	Case	1.48	0.00	0.00	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Z01	Case	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Z02	Case	1.44	0.12	0.00	1.16	0.42	0.00	0.00	0.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Z05	Case	1.93	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Z06	Case	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Z08	Case	0.00	0.00	0.00	0.06	0.41	0.28	0.00	0.00	0.00	0.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Z16	Case	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Z03	Case	0.00	0.00	0.00	1.51	0.00	0.11	0.00	0.00	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B32	Case	0.00	0.04	0.09	0.37	0.31	0.00	0.00	0.00	0.05	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B36	Case	1.67	0.00	0.00	0.11	2.13	0.00	0.00	0.00	0.00	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00
B37	Case	0.95	0.51	0.00	2.54	0.67	0.98	0.00	0.00	1.17	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B39	Case	1.32	0.00	0.00	0.66	1.54	0.00	0.00	0.00	0.00	1.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B40	Case	0.00	0.00	0.00	1.46	0.00	0.00	0.00	0.00	0.00	1.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C16	Case	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C47	Case	3.09	2.56	1.30	2.39	1.08	0.64	1.60	0.97	1.45	1.13	1.17	1.26	0.89	1.51	0.00	1.47	1.73
C48	Case	0.72	0.00	0.00	1.07	1.20	0.94	0.00	0.65	0.14	2.29	0.00	0.09	0.00	0.00	0.00	0.00	0.00
C59	Case	0.35	0.00	0.00	0.00	1.40	0.00	0.00	0.39	0.00	1.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C69	Case	0.55	0.00	0.00	0.11	0.79	0.18	0.13	0.77	0.00	1.24	0.00	0.00	0.00	0.00	1.05	0.00	0.00
C73	Case	0.19	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C74	Case	0.95	0.00	0.00	0.00	0.81	0.00	0.00	0.62	0.00	0.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C76	Case	0.00	0.00	0.00	0.13	0.84	0.52	0.00	0.62	0.00	1.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C77	Case	0.32	0.00	0.00	0.00	1.71	0.00	0.00	0.00	0.00	0.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C78	Case	1.36	0.07	0.00	0.57	0.00	0.00	0.00	0.00	0.00	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Y05	Control	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Y15	Control	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Y27	Control	0.00	0.00	0.00	0.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Y44	Control	0.00	0.00	0.00	0.08	0.49	0.00	0.00	0.00	0.00	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Z09	Control	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.54	0.00	0.47	0.00	0.00	0.00	0.00	0.00
Z10	Control	0.32	0.00	0.00	0.53	0.00	0.16	0.00	0.00	0.00	0.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Z13	Control	0.37	0.00	0.00	0.28	0.00	0.00	0.00	0.53	0.00	0.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Z15	Control	0.56	0.00	0.00	0.58	0.20	0.00	0.00	0.00	0.00	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A10	Control	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.00	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A16	Control	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.00	0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A23	Control	0.44	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A34	Control	0.14	0.00	0.00	0.04	0.97	0.12	0.00	0.00	0.00	0.47	0.00	0.00	0.00	0.10	0.00	0.00	0.00
A38	Control	0.00	0.07	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.24	0.00	0.00	0.07	0.00	0.00	0.00	0.00
B04	Control	0.73	0.00	0.00	0.19	0.00	0.00	0.00	0.17	0.00	1.15	0.00	0.00	0.08	0.00	0.00	0.00	0.00
B17	Control	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B26	Control	0.00	0.00	0.00	0.08	0.40	0.44	0.00	0.00	0.24	1.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B27	Control	0.00	0.00	0.00	0.08	0.50	0.21	0.00	0.00	0.42	1.33	0.00	0.00	0.12	0.00	0.00	0.00	0.00
B28	Control	0.00	0.00	0.00	0.30	0.33	0.00	0.00	0.00	0.00	2.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B31	Control	0.00	0.00	0.00	0.09	0.51	0.00	0.00	0.00	0.00	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B44	Control	0.00	0.00	0.00	0.51	1.57	0.00	0.00	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C36	Control	0.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C63	Control	0.00	0.00	0.00	0.06	0.15	0.00	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C64	Control	0.00	0.00	0.00	0.14	1.10	0.00	0.00	1.33	0.00	2.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B71	Control	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B73	Control	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B75	Control	0.41	0.00	0.00	0.12	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C04	Control	0.39	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.14	1.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C33	Control	0.00	0.00	0.00	0.00	0.24	0.62	0.00	0.00	0.19	1.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C66	Control	0.27	0.00	0.00	0.13	0.81	0.54	0.00	0.76	0.00	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C70	Control	0.00	0.00	0.00	0.44	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C71	Control	0.00	0.00	0.00	0.06	0.48	0.17	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C75	Control	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.17	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00

¹For details of viruses, see Table 1. Viral loads are presented as log₁₀ viral reads per million total reads per kilobase of target sequence.

²See Table S1 for full details of Clinch River pheasantshells used in the analyses.