

## Supplementary Tables S1-S7

Table S1. Descriptive table of SNV numbers by continent/country/region/sub-region around the world: number of reported viruses, minimum number, 1st quartile, median, mean, 3rd quartile and maximum number of mutations on each viral genome

Table S2. Cross-tabulation of six Omicron clusters with six continents in the world

Table S3. Spacial distributions of four emerging polymutants (R346, A701, I1081, N1192) in the spike protein across all countries around world

Table S4. Spacial distributions of six emerging polymutants (V1887, V2867, Y4852, L5086) in ORF1ab, L106 in ORF3a and D343 in N across all countries around world

Table S5. Haplotype frequencies of joined core haplotypes of polymutants in the spike and non-spike genes.

Table S6. Space-time investigation of newly emerging mutation haplotype "RAINVVFGF" for the first reported case. Note that Canada / Ontario reported three cases in November and one case in December, 2021 without providing actual dates.

Table S7. Space-time investigation of newly emerging mutation haplotype "RAVNVAFGY", that has five mutations and observed among 60 viruses in United Kingdom.

Table S1

	<b>Continent/Country/Region/Sub-region</b>	<b>Freq</b>	<b>Min</b>	<b>1st</b>	<b>Med</b>	<b>3rd</b>	<b>Max</b>
1	Africa/Botswana/Gaborone	17	14	26	26	30	30
2	Africa/Botswana/Lobatse	1	31	31	31	31	31
3	Africa/Botswana/Otse	1	26	26	26	26	26
4	Africa/Botswana/Palapye	3	30	30	30	30	30
5	Africa/Botswana/South East/Greater Gaborone/Gaborone	52	12	28	30	31	38
6	Africa/Botswana/South East/Greater Gaborone/Lobatse	2	28	28	29	29	29
7	Africa/Botswana/South East/Greater Gaborone/Mochudi	1	29	29	29	29	29
8	Africa/Botswana/South East/Greater Gaborone/Oodi	1	21	21	21	21	21
9	Africa/Botswana/South East/Greater Gaborone/Ramotswa	1	16	16	16	16	16
10	Africa/Ghana/Accra	33	29	29	30	31	32
11	Africa/Malawi/Blantyre	3	30	31	31	32	32
12	Africa/Nigeria/Abuja	11	28	30	30	31	31
13	Africa/Reunion	2	29	29	30	30	30
14	Africa/Senegal/Dakar/Iressef Diamniadio	1	15	15	15	15	15
15	Africa/Senegal/Dakar/IRESSEF DIAMNIADIO	6	29	29	31	33	34
16	Africa/Sierra Leone	1	29	29	29	29	29
17	Africa/South Africa	6	24	26	30	31	31
18	Africa/South Africa/Eastern Cape	23	28	30	30	31	35
19	Africa/South Africa/Eastern Cape/Nelson Mandela Bay	8	28	29	30	30	33

	Africa/South Africa/Eastern Cape/Sarah						
20	Baartman	6	30	30	31	31	31
21	Africa/South Africa/Free State	11	25	29	29	30	32
22	Africa/South Africa/Gauteng	257	18	29	29	30	34
	Africa/South Africa/Gauteng/City of						
23	Johannesburg Metro	2	29	29	30	30	30
	Africa/South Africa/Gauteng/City of						
24	Johannesburg Metro Region A	2	29	29	29	29	29
	Africa/South Africa/Gauteng/City of						
25	Johannesburg Metro Region B	4	29	29	29	29	30
	Africa/South Africa/Gauteng/City of						
26	Johannesburg Metro Region C	6	29	29	30	30	30
	Africa/South Africa/Gauteng/City of						
27	Johannesburg Metro Region E	14	29	29	30	30	32
	Africa/South Africa/Gauteng/City of						
28	Johannesburg Metro Region F	21	29	29	29	30	31
29	Africa/South Africa/Gauteng/Sedibeng	4	28	30	31	31	31
30	Africa/South Africa/Gauteng/Tshwane	27	27	29	30	30	39
31	Africa/South Africa/Kwazulu-Natal	1	23	23	23	23	23
32	Africa/South Africa/KwaZulu-Natal	90	23	29	30	31	34
	Africa/South Africa/KwaZulu-						
33	Natal/eThekwini	42	29	30	31	32	33
	Africa/South Africa/KwaZulu-Natal/Ilembe						
34	Africa/South Africa/KwaZulu-Natal/Ilembe	6	29	29	30	31	31
	Africa/South Africa/KwaZulu-Natal/King						
35	Cetshwayo	40	22	29	30	32	35
36	Africa/South Africa/KwaZulu-Natal/Ugu	10	30	30	31	31	33
	Africa/South Africa/KwaZulu-						
37	Natal/uMkhanyakude	3	29	30	30	30	30
	Africa/South Africa/KwaZulu-						
38	Natal/Zululand	13	28	31	31	32	34

39	Africa/South Africa/Limpopo	6	29	29	30	31	31
40	Africa/South Africa/Mpumalanga	35	22	28	28	31	32
41	Africa/South Africa/North West	30	26	29	30	31	32
42	Africa/South Africa/Northern Cape	37	20	28	29	29	32
43	Africa/South Africa/Western Cape	39	27	29	30	30	32
	Africa/South Africa/Western Cape						
44	Province/Cape Town Metro	157	23	29	29	30	33
45	Asia/Bangladesh/Dhaka/Dhaka	2	29	29	30	30	30
46	Asia/Hong Kong	18	29	29	30	31	31
47	Asia/India/Delhi	2	29	30	30	31	31
48	Asia/India/Gujarat/Jamnagar	1	46	46	46	46	46
49	Asia/India/Karnataka	2	30	30	30	30	30
50	Asia/India/Maharashtra/Pune	1	32	32	32	32	32
51	Asia/India/New Delhi	1	30	30	30	30	30
52	Asia/Israel	67	19	29	30	31	32
53	Asia/Japan	7	30	30	32	32	33
54	Asia/Jordan/Amman	2	29	29	30	30	30
55	Asia/Malaysia/Selangor	1	20	20	20	20	20
56	Asia/Maldives/Sandies Bathala resort	1	22	22	22	22	22
57	Asia/Nepal/Bagmati	2	29	29	29	29	29
58	Asia/Pakistan	1	29	29	29	29	29
59	Asia/Singapore	13	29	30	31	31	35
60	Asia/South Korea	9	29	30	30	30	30
61	Asia/Sri Lanka/Marawila	2	21	24	27	29	32
62	Asia/Thailand/Bangkok/Bangrak	1	26	26	26	26	26
63	Asia/Thailand/Bangkok/Nongkhaem	2	32	32	33	33	33
64	Europe/Austria/Burgenland	2	26	27	28	29	30
65	Europe/Austria/Lower Austria	5	29	29	32	33	33
	Europe/Austria/Lower Austria/Bruck an der						
66	Leitha/Schwechat	2	30	30	30	30	30
67	Europe/Austria/Tyrol/Schwaz	1	29	29	29	29	29

68	Europe/Austria/Tyrol/Schwaz/Vomp	3	29	29	29	29	29
	Europe/Austria/Upper Austria/VÄ¶cklabruck/St. Georgen im Attergau	1	31	31	31	31	31
70	Europe/Austria/Vienna	3	30	30	30	31	31
71	Europe/Belgium	2	30	30	30	30	30
72	Europe/Belgium/Antwerpen	1	32	32	32	32	32
73	Europe/Belgium/Beersel	1	30	30	30	30	30
74	Europe/Belgium/Brabant Wallon	1	30	30	30	30	30
75	Europe/Belgium/Brussels	2	32	32	32	32	32
76	Europe/Belgium/Brussels Capital Region	11	30	30	31	32	34
77	Europe/Belgium/Flemish Brabant	5	27	28	30	30	32
78	Europe/Belgium/Geel	1	30	30	30	30	30
79	Europe/Belgium/Ghent	3	29	30	30	31	32
80	Europe/Belgium/Hainaut	29	26	30	30	31	33
81	Europe/Belgium/Jette	1	34	34	34	34	34
82	Europe/Belgium/Liege	1	31	31	31	31	31
83	Europe/Belgium/Limburg	1	32	32	32	32	32
84	Europe/Belgium/Meerhout	2	30	30	31	31	31
85	Europe/Belgium/Namur	1	34	34	34	34	34
86	Europe/Belgium/Putte	5	21	30	30	30	32
87	Europe/Belgium/Sint-agatha-berchem	1	25	25	25	25	25
88	Europe/Belgium/Sint-Agatha-Berchem	1	34	34	34	34	34
89	Europe/Belgium/Sint-Pieters-Leeuw	3	29	29	29	30	30
90	Europe/Belgium/Vlamertinge	1	28	28	28	28	28
91	Europe/Belgium/Wallonie/Hainaut/Enghien	1	32	32	32	32	32
92	Europe/Belgium/Wilrijk	1	30	30	30	30	30
93	Europe/Croatia/The City of Zagreb	1	32	32	32	32	32
94	Europe/Croatia/Zagreb County	1	32	32	32	32	32

95	Europe/Czech Republic/Liberec Region/Rynoltice	1	29	29	29	29	29
96	Europe/Czech Republic/South Moravian Region/Adamov	2	29	30	30	31	31
97	Europe/Czech Republic/South Moravian Region/Brno	1	27	27	27	27	27
98	Europe/Czech Republic/South Moravian Region/Slavkov u Brna	1	29	29	29	29	29
99	Europe/Denmark	1	30	30	30	30	30
100	Europe/Denmark/Hovedstaden	46	29	30	31	31	32
101	Europe/Denmark/Midtjylland	66	29	32	32	32	34
102	Europe/Denmark/Nordjylland	17	30	32	32	33	34
103	Europe/Denmark/Sjaelland	4	29	30	31	31	32
104	Europe/Denmark/Syddanmark	12	23	30	30	30	33
105	Europe/Finland	3	30	30	30	31	31
106	Europe/France/Auvergne-Rhone- Alpes/Clermont Ferrand	1	26	26	26	26	26
107	Europe/France/Auvergne-Rhone- Alpes/Haute-Savoie	2	29	29	29	29	29
108	Europe/France/Auvergne-Rhone- Alpes/Thonon les bains	1	30	30	30	30	30
109	Europe/France/Bretagne/Rennes	2	28	28	29	29	29
110	Europe/France/Centre-Val de Loire/Eure- et-Loir	1	30	30	30	30	30
111	Europe/France/Centre-Val de Loire/Luisant	1	29	29	29	29	29
112	Europe/France/Ile-de-France	6	30	31	31	31	32
113	Europe/France/Nouvelle-Aquitaine	1	27	27	27	27	27
114	Europe/France/Nouvelle- Aquitaine/Bordeaux	1	30	30	30	30	30

115	Europe/France/Pays de loire/La roche sur yon	1	29	29	29	29	29
116	Europe/France/Provence-Alpes-Cote d Azur	15	27	30	30	31	31
117	Europe/France/Provence-Alpes-Cote d'Azur	3	29	30	30	30	30
118	Europe/France/Provence-Alpes-Cote d'Azur/Alpes-Maritimes	1	31	31	31	31	31
119	Europe/Germany/Baden-Wurttemberg	6	30	31	32	32	35
120	Europe/Germany/Bavaria	18	29	29	30	32	33
121	Europe/Germany/Bavaria/Munich	23	24	30	30	30	33
122	Europe/Germany/Berlin	1	29	29	29	29	29
123	Europe/Germany/Berlin/Berlin	1	31	31	31	31	31
124	Europe/Germany/Brandenburg	3	29	29	29	30	31
125	Europe/Germany/Hamburg	7	28	29	30	31	32
126	Europe/Germany/Hesse	24	29	29	30	31	32
127	Europe/Germany/Lower Saxony	4	28	29	30	30	30
128	Europe/Germany/North Rhine-Westphalia	6	29	29	30	31	33
129	Europe/Germany/North Rhine- Westphalia/Düsseldorf Health department	3	27	27	27	27	27
130	Europe/Germany/Saxony	1	27	27	27	27	27
131	Europe/Germany/Schleswig-Holstein	3	30	30	30	31	31
132	Europe/Germany/Thuringia	1	32	32	32	32	32
133	Europe/Gibraltar	6	31	33	33	35	38
134	Europe/Greece	1	28	28	28	28	28
135	Europe/Ireland/Dublin	1	30	30	30	30	30
136	Europe/Ireland/Longford	1	30	30	30	30	30
137	Europe/Ireland/Meath	4	25	29	30	30	31
138	Europe/Italy/Calabria	1	30	30	30	30	30
139	Europe/Italy/Campania	3	29	32	35	46	56

140	Europe/Italy/Lombardia	2	27	28	29	30	31
141	Europe/Italy/Piemonte	2	36	37	38	38	39
142	Europe/Italy/Puglia	2	28	28	28	28	28
143	Europe/Italy/Trentino-Alto Adige	1	29	29	29	29	29
144	Europe/Liechtenstein	1	26	26	26	26	26
145	Europe/Netherlands/Gelderland	1	32	32	32	32	32
146	Europe/Netherlands/Noord-Holland	39	28	29	30	31	33
147	Europe/Netherlands/Noord-Holland/Amsterdam	21	29	29	31	32	34
148	Europe/Netherlands/Utrecht	1	29	29	29	29	29
149	Europe/Netherlands/Zeeland/Tholen	1	29	29	29	29	29
150	Europe/Norway/Oslo	19	29	29	29	29	30
151	Europe/Norway/Vestland	1	29	29	29	29	29
152	Europe/Norway/Viken	12	29	29	29	30	31
153	Europe/Portugal	23	21	29	31	31	32
154	Europe/Romania/Bucuresti	2	30	30	31	31	31
155	Europe/Russia/Moscow	2	29	29	29	29	29
156	Europe/Slovakia/Nitra	2	30	30	30	30	30
157	Europe/Slovakia/Presov	1	30	30	30	30	30
158	Europe/Spain/Albacete	3	30	31	31	31	31
159	Europe/Spain/Balearic Island	6	19	30	31	31	33
160	Europe/Spain/Basque Country/Donostia-San Sebastian	1	29	29	29	29	29
161	Europe/Spain/Castilla-La Mancha/Ciudad Real	5	28	31	31	32	32
162	Europe/Spain/Catalunya	10	30	31	31	32	34
163	Europe/Spain/Catalunya/Barcelona	1	30	30	30	30	30
164	Europe/Spain/Catalunya/Girona	1	32	32	32	32	32
165	Europe/Spain/Galicia/Vigo	2	32	32	33	33	33
166	Europe/Spain/Madrid	22	30	32	33	35	41
167	Europe/Sweden/Jonkopings lan	1	30	30	30	30	30



168	Europe/Sweden/Skane	1	31	31	31	31	31
169	Europe/Sweden/Stockholm	14	21	28	30	32	33
170	Europe/Switzerland/Aargau	2	30	30	31	31	31
171	Europe/Switzerland/Basel-Landschaft	6	30	30	31	31	31
172	Europe/Switzerland/Basel-Stadt	2	31	31	31	31	31
173	Europe/Switzerland/Bern	5	28	28	29	30	30
174	Europe/Switzerland/BL	3	31	31	31	31	31
175	Europe/Switzerland/BS	8	31	31	31	31	31
176	Europe/Switzerland/Geneva	1	29	29	29	29	29
177	Europe/Switzerland/Solothurn	1	31	31	31	31	31
178	Europe/Switzerland/Thurgau	1	24	24	24	24	24
179	Europe/Switzerland/Vaud	3	30	30	30	30	30
180	Europe/Switzerland/Zug	1	29	29	29	29	29
181	Europe/Switzerland/Zurich	16	28	30	31	32	38
182	Europe/Turkey	1	30	30	30	30	30
183	Europe/United Kingdom/England	1700	27	32	33	35	43
184	Europe/United Kingdom/Scotland	412	27	31	32	34	39
185	Europe/United Kingdom/Wales	9	31	32	33	34	36
186	North America/Canada/Alberta	10	24	29	31	33	33
187	North America/Canada/British Columbia	5	30	30	31	31	31
188	North America/Canada/Manitoba	5	30	30	30	30	31
189	North America/Canada/Ontario	29	23	30	31	32	41
190	North America/Canada/Quebec	1	30	30	30	30	30
191	North America/Canada/Saskatchewan	4	29	31	32	32	33
192	North America/Mexico/Mexico City	2	31	31	31	31	31
193	North America/Mexico/State of Mexico	1	32	32	32	32	32
194	North America/Puerto Rico	1	29	29	29	29	29
195	North America/USA/Alaska/Anchorage-Mat Su	1	24	24	24	24	24
196	North America/USA/Arizona/Maricopa County	5	31	31	31	35	42

197	North America/USA/Arizona/Pima County	1	33	33	33	33	33
198	North America/USA/California	4	30	30	30	30	31
	North America/USA/California/Alameda						
199	County	4	26	29	30	30	30
	North America/USA/California/Los Angeles						
200	County	2	30	31	31	32	32
	North America/USA/California/San						
201	Francisco County	1	32	32	32	32	32
	North America/USA/California/West						
202	Sacramento	1	31	31	31	31	31
203	North America/USA/Colorado	2	26	27	28	29	30
204	North America/USA/Connecticut	3	24	28	31	31	31
205	North America/USA/Connecticut/Fairfield	4	30	30	31	32	32
206	North America/USA/Connecticut/Farifield	1	30	30	30	30	30
	North America/USA/Connecticut/Hartford						
207	County	1	30	30	30	30	30
	North America/USA/Connecticut/New						
208	Haven	2	30	30	31	31	31
209	North America/USA/District of Columbia	1	23	23	23	23	23
210	North America/USA/Florida	2	30	30	30	30	30
211	North America/USA/Georgia	4	29	29	30	31	32
212	North America/USA/Hawaii	2	30	31	31	32	32
	North America/USA/Hawaii/Honolulu						
213	County	12	30	30	30	31	32
214	North America/USA/Idaho	1	30	30	30	30	30
	North America/USA/Illinois/Cook						
215	County/Chicago	1	30	30	30	30	30
216	North America/USA/Iowa	1	31	31	31	31	31
217	North America/USA/Louisiana	2	29	30	31	31	32
	North America/USA/Louisiana/Caddo						
218	Parish	1	31	31	31	31	31

219	North America/USA/Louisiana/Orleans	1	32	32	32	32	32
220	North America/USA/Louisiana/St Tammany	2	27	27	27	27	27
221	North America/USA/Maryland	10	27	30	30	30	31
222	North America/USA/Massachusetts	16	29	30	30	30	32
	North America/USA/Massachusetts/Middlesex County	3	30	30	30	30	30
223	North America/USA/Michigan	1	31	31	31	31	31
224	North America/USA/Minnesota	2	30	30	30	30	30
225	North America/USA/Mississippi	1	29	29	29	29	29
226	North America/USA/Missouri	1	30	30	30	30	30
227	North America/USA/Nebraska	6	30	31	31	31	31
228	North America/USA/New Jersey	2	29	30	30	31	31
229	North America/USA/New York	5	29	30	30	30	31
	North America/USA/New York/New York City	10	28	29	30	31	31
231	North America/USA/New York/Oneida	2	23	24	25	26	27
232	North America/USA/New York/Suffolk	2	25	26	27	28	29
	North America/USA/New York/Westchester	1	31	31	31	31	31
234	North America/USA/Ohio	4	30	30	31	32	32
	North America/USA/Oregon/Multnomah County	1	32	32	32	32	32
236	North America/USA/Oregon/Washington County	2	30	30	31	31	31
237	North America/USA/Pennsylvania	2	28	29	30	30	31
238	North America/USA/Rhode Island	1	30	30	30	30	30
239	North America/USA/Tennessee	1	23	23	23	23	23
240	North America/USA/Texas	4	31	32	32	32	32
241	North America/USA/Texas/Ellis	1	32	32	32	32	32
242							

243	North America/USA/Texas/Houston	6	29	32	34	34	35
244	North America/USA/Texas/Houston County	25	32	32	33	34	44
	North America/USA/Texas/San Antonio						
245	County	2	34	35	35	36	36
246	North America/USA/Texas/Tarrant County	1	26	26	26	26	26
247	North America/USA/Utah	4	28	30	31	31	31
248	North America/USA/Virginia	1	30	30	30	30	30
249	North America/USA/Washington	7	29	30	30	32	32
	North America/USA/Washington/King						
250	County	1	30	30	30	30	30
	North America/USA/Washington/Whatcom						
251	County	1	32	32	32	32	32
252	North America/USA/Wisconsin	1	32	32	32	32	32
	North America/USA/Wisconsin/Milwaukee						
253	County	4	24	29	30	31	33
	Oceania/Australia/Australian Capital						
254	Territory	10	29	30	30	30	31
	Oceania/Australia/New South						
255	Wales/Sydney	79	19	28	30	30	32
256	Oceania/Australia/Northern Territory	1	29	29	29	29	29
257	Oceania/Australia/Queensland	2	33	35	37	38	40
258	South America/Argentina/San Luis	1	30	30	30	30	30
	South America/Brazil/Distrito						
259	Federal/Brasilia	1	31	31	31	31	31
	South America/Brazil/Federal						
260	District/Brasilia	1	30	30	30	30	30
	South America/Brazil/Rio Grande do						
261	Sul/Santa Cruz do Sul	1	30	30	30	30	30

262	South America/Brazil/SÃ£o Paulo	1	30	30	30	30	30
263	South America/Brazil/Sao Paulo	2	29	29	29	29	29
264	South America/Brazil/Sao Paulo/Guarulhos	1	30	30	30	30	30
265	South America/Brazil/Sao Paulo/Limeira	1	30	30	30	30	30

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Table S2

<b>Continent</b>	<b>O1</b>	<b>O2</b>	<b>O3</b>	<b>O4</b>	<b>O5</b>	<b>O6</b>	<b>total</b>
	453	94	142	40	301	6	
Africa	(43.73)	(9.07)	(13.71)	(3.86)	(29.05)	(0.58)	1036
	84	17	20	3			
Asia	(62.22)	(12.59)	(14.81)	(2.22)	11 (8.15)		135
	279	173	2210	8	101	2	
Europe	(10.06)	(6.24)	(79.7)	(0.29)	(3.64)	(0.07)	2773
North		60	95		29	5	
America	61 (24.3)	(23.9)	(37.85)	1 (0.4)	(11.55)	(1.99)	251
		10	1	70	1		
Oceania	5 (5.43)	5 (5.43)	(10.87)	(1.09)	(76.09)	(1.09)	92
South		1					
America	6 (66.67)	(11.11)	1 (11.11)		1 (11.11)		9

Table S3

Emerging Polymutant Amino acids	R346		A701		I1081		N1192	
	K	R	A	V	I	V	N	S
Total N	347	3949	3595	696	4132	164	4292	4
Africa/Botswana	1 (0.29)	78 (1.98)	79 (2.2)		79 (1.91)		79 (1.84)	
Africa/Ghana	10 (2.88)	23 (0.58)	33 (0.92)		33 (0.8)		33 (0.77)	
Africa/Malawi		3 (0.08)	3 (0.08)		3 (0.07)		3 (0.07)	
Africa/Nigeria	3 (0.86)	8 (0.2)	11 (0.31)		11 (0.27)		11 (0.26)	
Africa/Reunion	1 (0.29)	1 (0.03)	2 (0.06)		2 (0.05)		2 (0.05)	
Africa/Senegal		7 (0.18)	7 (0.19)		4 (0.1)	3 (1.83)	7 (0.16)	
Africa/Sierra Leone	1 (0.29)		1 (0.03)		1 (0.02)		1 (0.02)	
Africa/South Africa	31 (8.93)	869 (22.01)	848 (23.59)	52 (7.47)	900 (21.78)		900 (20.97)	
Asia/Bangladesh		2 (0.05)	2 (0.06)		2 (0.05)		2 (0.05)	
Asia/Hong Kong	6 (1.73)	12 (0.3)	16 (0.45)	2 (0.29)	18 (0.44)		16 (0.37)	2 (50)
Asia/India	1 (0.29)	6 (0.15)	7 (0.19)		7 (0.17)		7 (0.16)	
Asia/Israel	4 (1.15)	63 (1.6)	65 (1.81)	2 (0.29)	67 (1.62)		66 (1.54)	1 (25)
Asia/Japan	2 (0.58)	5 (0.13)	7 (0.19)		7 (0.17)		7 (0.16)	
Asia/Jordan		2 (0.05)	2 (0.06)		2 (0.05)		2 (0.05)	
Asia/Malaysia		1 (0.03)	1 (0.03)		1 (0.02)		1 (0.02)	
Asia/Maldives		1 (0.03)	1 (0.03)		1 (0.02)		1 (0.02)	
Asia/Nepal		2 (0.05)	2 (0.06)		2 (0.05)		2 (0.05)	
Asia/Pakistan		1 (0.03)	1 (0.03)		1 (0.02)		1 (0.02)	
Asia/Singapore	1 (0.29)	12 (0.3)	13 (0.36)		11 (0.27)	2 (1.22)	13 (0.3)	
Asia/South Korea		9 (0.23)	9 (0.25)		9 (0.22)		9 (0.21)	
Asia/Sri Lanka		2 (0.05)	2 (0.06)		2 (0.05)		2 (0.05)	
Asia/Thailand		3 (0.08)	3 (0.08)		3 (0.07)		3 (0.07)	
Europe/Austria	2 (0.58)	15 (0.38)	15 (0.42)	2 (0.29)	17 (0.41)		17 (0.4)	
Europe/Belgium	4 (1.15)	71 (1.8)	75 (2.09)		75 (1.82)		75 (1.75)	
Europe/Croatia		2 (0.05)	2 (0.06)		2 (0.05)		2 (0.05)	

Europe/Czech Republic		5 (0.13)	3 (0.08)	2 (0.29)	5 (0.12)		5 (0.12)	
Europe/Denmark	2 (0.58)	144 (3.65)	103 (2.87)	43 (6.18)	146 (3.53)		146 (3.4)	
Europe/Finland		3 (0.08)	3 (0.08)		3 (0.07)		3 (0.07)	
Europe/France	4 (1.15)	32 (0.81)	34 (0.95)	2 (0.29)	36 (0.87)		36 (0.84)	
Europe/Germany	3 (0.86)	98 (2.48)	93 (2.59)	8 (1.15)	101 (2.44)		101 (2.35)	
Europe/Gibraltar		6 (0.15)	6 (0.17)		6 (0.15)		6 (0.14)	
Europe/Greece		1 (0.03)	1 (0.03)		1 (0.02)		1 (0.02)	
Europe/Ireland		6 (0.15)	5 (0.14)	1 (0.14)	6 (0.15)		6 (0.14)	
Europe/Italy		11 (0.28)	10 (0.28)	1 (0.14)	11 (0.27)		11 (0.26)	
Europe/Liechtenstein		1 (0.03)	1 (0.03)		1 (0.02)		1 (0.02)	
Europe/Netherlands	6 (1.73)	57 (1.44)	59 (1.64)	4 (0.57)	63 (1.52)		63 (1.47)	
Europe/Norway	2 (0.58)	30 (0.76)	32 (0.89)		32 (0.77)		32 (0.75)	
Europe/Portugal		23 (0.58)	23 (0.64)		23 (0.56)		23 (0.54)	
Europe/Romania		2 (0.05)	2 (0.06)		2 (0.05)		2 (0.05)	
Europe/Russia		2 (0.05)	2 (0.06)		2 (0.05)		2 (0.05)	
Europe/Slovakia		3 (0.08)	3 (0.08)		3 (0.07)		3 (0.07)	
Europe/Spain	5 (1.44)	46 (1.16)	50 (1.39)	1 (0.14)	51 (1.23)		51 (1.19)	
Europe/Sweden		16 (0.41)	16 (0.45)		16 (0.39)		16 (0.37)	
Europe/Switzerland	4 (1.15)	45 (1.14)	49 (1.36)		49 (1.19)		49 (1.14)	
Europe/Turkey		1 (0.03)	1 (0.03)		1 (0.02)		1 (0.02)	
Europe/United Kingdom*	153 (44.09)	1968 (49.84)	1558 (43.34)	558 (80.17)	1962 (47.48)	159 (96.95)	2120 (49.39)	1 (25)
North America/Canada	17 (4.9)	37 (0.94)	54 (1.5)		54 (1.31)		54 (1.26)	
North America/Mexico		3 (0.08)	3 (0.08)		3 (0.07)		3 (0.07)	
North America/Puerto Rico		1 (0.03)	1 (0.03)		1 (0.02)		1 (0.02)	
North America/USA	36 (10.37)	157 (3.98)	176 (4.9)	17 (2.44)	193 (4.67)		193 (4.5)	
Oceania/Australia	48 (13.83)	44 (1.11)	92 (2.56)		92 (2.23)		92 (2.14)	
South America/Argentina		1 (0.03)		1 (0.14)	1 (0.02)		1 (0.02)	
South America/Brazil		8 (0.2)	8 (0.22)		8 (0.19)		8 (0.19)	

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\* there are five missing nucleotide observations

Table S4

Country	nsp3-V1069		nsp4-V94		RNA poly.-Y460		RNA poly.-L694		ORF3a-L106		N-D343	
	I	V	A	V	C	Y	I	L	F	L	D	G
Freq	1085	3206	1005	3290	3	4293	1685	2611	444	3852	3854	442
Africa/Botswana	8 (0.74)	71 (2.21)		79 (2.4)		79 (1.84)		79 (3.03)		79 (2.05)	79 (2.05)	
Africa/Ghana	3 (0.28)	30 (0.94)		33 (1)		33 (0.77)		33 (1.26)	5 (1.13)	28 (0.73)	28 (0.73)	5 (1.13)
Africa/Malawi		3 (0.09)		3 (0.09)		3 (0.07)		3 (0.11)		3 (0.08)	3 (0.08)	
Africa/Nigeria		11 (0.34)		11 (0.33)		11 (0.26)		11 (0.42)	1 (0.23)	10 (0.26)	10 (0.26)	1 (0.23)
Africa/Reunion		2 (0.06)		2 (0.06)		2 (0.05)		2 (0.08)		2 (0.05)	2 (0.05)	
Africa/Senegal		7 (0.22)		7 (0.21)		7 (0.16)		7 (0.27)	3 (0.68)	4 (0.1)	4 (0.1)	3 (0.68)
Africa/Sierra Leone		1 (0.03)		1 (0.03)		1 (0.02)		1 (0.04)		1 (0.03)	1 (0.03)	
Africa/South Africa	190 (17.51)	710 (22.15)		900 (27.36)		900 (20.96)		900 (34.47)	2 (0.45)	898 (23.31)	898 (23.3)	2 (0.45)
Asia/Bangladesh		2 (0.06)		2 (0.06)		2 (0.05)		2 (0.08)		2 (0.05)	2 (0.05)	
Asia/Hong Kong	2 (0.18)	16 (0.5)		18 (0.55)		18 (0.42)		18 (0.69)		18 (0.47)	18 (0.47)	
Asia/India	1 (0.09)	6 (0.19)		7 (0.21)		7 (0.16)		7 (0.27)		7 (0.18)	7 (0.18)	
Asia/Israel	8 (0.74)	59 (1.84)		67 (2.04)		67 (1.56)		67 (2.57)	6 (1.35)	61 (1.58)	63 (1.63)	4 (0.9)
Asia/Japan		7 (0.22)		7 (0.21)		7 (0.16)		7 (0.27)		7 (0.18)	7 (0.18)	
Asia/Jordan		2 (0.06)		2 (0.06)		2 (0.05)		2 (0.08)		2 (0.05)	2 (0.05)	
Asia/Malaysia		1 (0.03)		1 (0.03)		1 (0.02)		1 (0.04)		1 (0.03)	1 (0.03)	
Asia/Maldives		1 (0.03)		1 (0.03)		1 (0.02)		1 (0.04)		1 (0.03)	1 (0.03)	
Asia/Nepal		2 (0.06)		2 (0.06)		2 (0.05)		2 (0.08)		2 (0.05)	2 (0.05)	
Asia/Pakistan		1 (0.03)		1 (0.03)		1 (0.02)		1 (0.04)		1 (0.03)	1 (0.03)	
Asia/Singapore		13 (0.41)		13 (0.4)		13 (0.3)		13 (0.5)	2 (0.45)	11 (0.29)	11 (0.29)	2 (0.45)
Asia/South Korea		9 (0.28)		9 (0.27)		9 (0.21)		9 (0.34)		9 (0.23)	9 (0.23)	
Asia/Sri Lanka		2 (0.06)		2 (0.06)		2 (0.05)		2 (0.08)	2 (0.45)			2 (0.45)
Asia/Thailand	1 (0.09)	2 (0.06)		3 (0.09)		3 (0.07)		3 (0.11)	1 (0.23)	2 (0.05)	2 (0.05)	1 (0.23)
Europe/Austria	9 (0.83)	8 (0.25)		17 (0.52)		17 (0.4)		17 (0.65)		17 (0.44)	17 (0.44)	

Europe/Belgium	2 (0.18)	73 (2.28)	75 (2.28)	75 (1.75)	75 (2.87)	75 (1.95)	75 (1.95)				
Europe/Croatia	2 (0.18)		2 (0.06)	2 (0.05)	2 (0.08)	2 (0.05)	2 (0.05)				
Europe/Czech Republic	2 (0.18)	3 (0.09)	5 (0.15)	5 (0.12)	5 (0.19)	5 (0.13)	5 (0.13)				
					146						
Europe/Denmark	78 (7.19)	68 (2.12)	146 (4.44)	146 (3.4)	(5.59)	3 (0.68)	143 (3.71)	143 (3.71)	3 (0.68)		
Europe/Finland	1 (0.09)	2 (0.06)	3 (0.09)	3 (0.07)	3 (0.11)	3 (0.08)	3 (0.08)	3 (0.08)			
Europe/France	19 (1.75)	17 (0.53)	36 (1.09)	36 (0.84)	3 (0.18)	33 (1.26)	36 (0.93)	36 (0.93)			
					101						
Europe/Germany	27 (2.49)	74 (2.31)	101 (3.07)	101 (2.35)	(3.87)	7 (1.58)	94 (2.44)	94 (2.44)	7 (1.58)		
Europe/Gibraltar		6 (0.19)	6 (0.18)	6 (0.14)	6 (0.23)	5 (1.13)	1 (0.03)	1 (0.03)	5 (1.13)		
Europe/Greece		1 (0.03)	1 (0.03)	1 (0.02)	1 (0.04)		1 (0.03)	1 (0.03)			
Europe/Ireland	1 (0.09)	5 (0.16)	6 (0.18)	6 (0.14)	6 (0.23)	1 (0.23)	5 (0.13)	5 (0.13)	1 (0.23)		
Europe/Italy	1 (0.09)	10 (0.31)	11 (0.33)	11 (0.26)	11 (0.42)		11 (0.29)	11 (0.29)			
Europe/Liechtenstein		1 (0.03)	1 (0.03)	1 (0.02)	1 (0.04)		1 (0.03)	1 (0.03)			
Europe/Netherlands	7 (0.65)	56 (1.75)	63 (1.91)	63 (1.47)	63 (2.41)	4 (0.9)	59 (1.53)	59 (1.53)	4 (0.9)		
Europe/Norway		32 (1)	32 (0.97)	32 (0.75)	32 (1.23)		32 (0.83)	32 (0.83)			
Europe/Portugal		23 (0.72)	23 (0.7)	23 (0.54)	23 (0.88)		23 (0.6)	23 (0.6)			
Europe/Romania	1 (0.09)	1 (0.03)	2 (0.06)	2 (0.05)	2 (0.08)		2 (0.05)	2 (0.05)			
Europe/Russia		2 (0.06)	2 (0.06)	2 (0.05)	2 (0.08)		2 (0.05)	2 (0.05)			
Europe/Slovakia		3 (0.09)	3 (0.09)	3 (0.07)	3 (0.11)		3 (0.08)	3 (0.08)			
Europe/Spain	34 (3.13)	17 (0.53)	51 (1.55)	51 (1.19)	51 (1.95)		51 (1.32)	51 (1.32)			
Europe/Sweden	1 (0.09)	15 (0.47)	16 (0.49)	16 (0.37)	16 (0.61)	7 (1.58)	9 (0.23)	9 (0.23)	7 (1.58)		
Europe/Switzerland	4 (0.37)	45 (1.4)	49 (1.49)	49 (1.14)	49 (1.88)		49 (1.27)	49 (1.27)			
Europe/Turkey		1 (0.03)	1 (0.03)	1 (0.02)	1 (0.04)		1 (0.03)	1 (0.03)			
Europe/United Kingdom*	623 (57.42)	1493 (46.57)	1005 (100)	1115 (33.89)	2121 (49.41)	1681 (99.76)	440 (16.85)	335 (75.45)	1786 (46.37)	1786 (46.34)	335 (75.79)

North America/Canada	2 (0.18)	52 (1.62)	54 (1.64)	54 (1.26)	54 (2.07)	9 (2.03)	45 (1.17)	44 (1.14)	10 (2.26)	
North America/Mexico		3 (0.09)	3 (0.09)	3 (0.07)	3 (0.11)		3 (0.08)	3 (0.08)		
North America/Puerto Rico		1 (0.03)	1 (0.03)	1 (0.02)	1 (0.04)		1 (0.03)	1 (0.03)		
North America/USA	32 (2.95)	161 (5.02)	193 (5.87)	193 (4.5)	1 (0.06)	192 (7.35)	50 (11.26)	143 (3.71)	144 (3.74)	49 (11.09)
Oceania/Australia	23 (2.12)	69 (2.15)	92 (2.8)	3 (100)	89 (2.07)	92 (3.52)	1 (0.23)	91 (2.36)	91 (2.36)	1 (0.23)
South America/Argentina	1 (0.09)		1 (0.03)	1 (0.02)	1 (0.04)		1 (0.03)	1 (0.03)		
South America/Brazil	2 (0.18)	6 (0.19)	8 (0.24)	8 (0.19)	8 (0.31)		8 (0.21)	8 (0.21)		
South America/Brazil		8 (0.2)								

\* missing nucleotides





North America / USA / California / San Francisco County	1																				1
North America / USA / Connecticut / Fairfield															1						1
North America / USA / Georgia																					1
North America / USA / Hawaii																					1
North America / USA / Hawaii / Honolulu County																					2
North America / USA / Louisiana																					1
North America / USA / Louisiana / Caddo Parish																					1
North America / USA / Louisiana / Orleans																					1
North America / USA / Louisiana / St Tammany																					2
North America / USA / Massachusetts																					1
North America / USA / Ohio																					1
North America / USA / Texas																					3
North America / USA / Texas / Houston																					5
North America / USA / Texas / Houston County																					21
North America / USA / Texas / San Antonio County	1																				2
North America / USA / Washington																					2
North America / USA / Washington / Whatcom County																					1
North America / USA / Wisconsin / Milwaukee County																					1
Oceania / Australia / Queensland																					1
<b>total</b>		1	1	5	5	5	1	4	10	7	12	7	15	9	8	28	24	2	144		

Table S7

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	England	Scotland	Wales
2021-12-01		4	
2021-12-02		5	
2021-12-03		4	
2021-12-04		13	
2021-12-05		7	
2021-12-06	17	1	
2021-12-07	8		1

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