

# Lineages report for GLAS

This report gives summaries of UK specific lineages sequenced by GLAS for week 2020-06-19. There are time lags due to batching, curation and analysis, the most recently sampled sequence is 2020-05-27. The analysis (eg time since last sample) is therefore undertaken from this date. 1594 sequences in the UK from the sequencing centre GLAS have been included in this analysis.

A few notes: the size of a lineage may be due to a low amount of transmission of this lineage, but it is likely also that it just hasn't been sampled as frequently, especially for newer lineages. It's also important to realise that these lineages are *estimates* of how we think the virus is spreading in the UK after being introduced from abroad, as the low evolutionary rate of the virus makes it difficult to separate lineages with certainty.

The minimum number of introductions is 84 and the maximum is 576

Sequences which were replicates or too error-prone were removed from this analysis.

111 are lineages which only contained five sequences or fewer, and so have been left out of visualisation in the interests of clarity

Furthermore, those sequences which haven't been sampled in the last month are not shown.

Of the 14 that remain: 1 is pending extinction ie last seen three weeks ago. 4 lineages have gone quiet, ie haven't been seen this week. 2 lineages have reactivated. 7 lineages have been continuously circulating.

The following table contains information about the ten largest lineages lineages and the number of sequences the dataset. Information about other lineages is found in the appendix, along with the raw data for all of the other figures.

Each entry is the count of sequences from each lineage in each country, with the percentage of the total sequences from that lineage that this count represents.

“Activity score” is calculated by taking the average gap between sampling for each lineage, and dividing it by the number of days since the lineage was last sampled. Therefore the higher the number, the more active the lineage is. If the score is above 1, then it has been sampled *more* recently than expected given its average gap size. We might interpret this as an increase in activity. If the score is below 1, it has been sampled *less* recently than expect given its average gap size, so we might interpret this as a decrease in activity.

The global lineages are correct as of the data release on 2020-05-19

It is written to “summary\_files” as “lineage\_summary.tsv” for further use, and the full list of lineages is available in the same directory as “all\_lineages.csv”

Lineage name	Scotland	Date range	Total sequences	Global lineage	Time since last sample (days)	Activity score
UK5098	294 (100.0%)	Mar-16, May-27	294	B.1.p73	0	active today
UK36	176 (100.0%)	Mar-20, May-25	176	B.1	2	0.1886
UK5	152 (100.0%)	Feb-28, May-27	152	B.1.1.p11, B.1.1.1, B.1.1.13, B.1.1.14, B.1.1	0	active today
UK40	120 (100.0%)	Mar-13, May-26	120	B.16, B	1	0.6218
UK42	91 (100.0%)	Mar-01, May-26	91	B.1.p73, B.1.5, B.1	1	0.9556
UK39	83 (100.0%)	Mar-12, May-24	83	A.2	3	0.2967
UK5676	83 (100.0%)	Mar-12, May-22	83	B.2	5	0.1732
UK2464	50 (100.0%)	Mar-19, May-16	50	B.1.p11	11	0.1076
UK2913	46 (100.0%)	Mar-19, May-19	46	B.1.p11	8	0.1694
UK199	35 (100.0%)	Mar-05, Apr-27	35	B.1.p73, B.1, B.1.5	30	0.052

These data is represented in the figure one. Note that the number of sequences is likely to be due more to differing sampling efforts in different regions, rather than genuine differences in numbers of cases.

The raw data for this bar chart are in the table above.

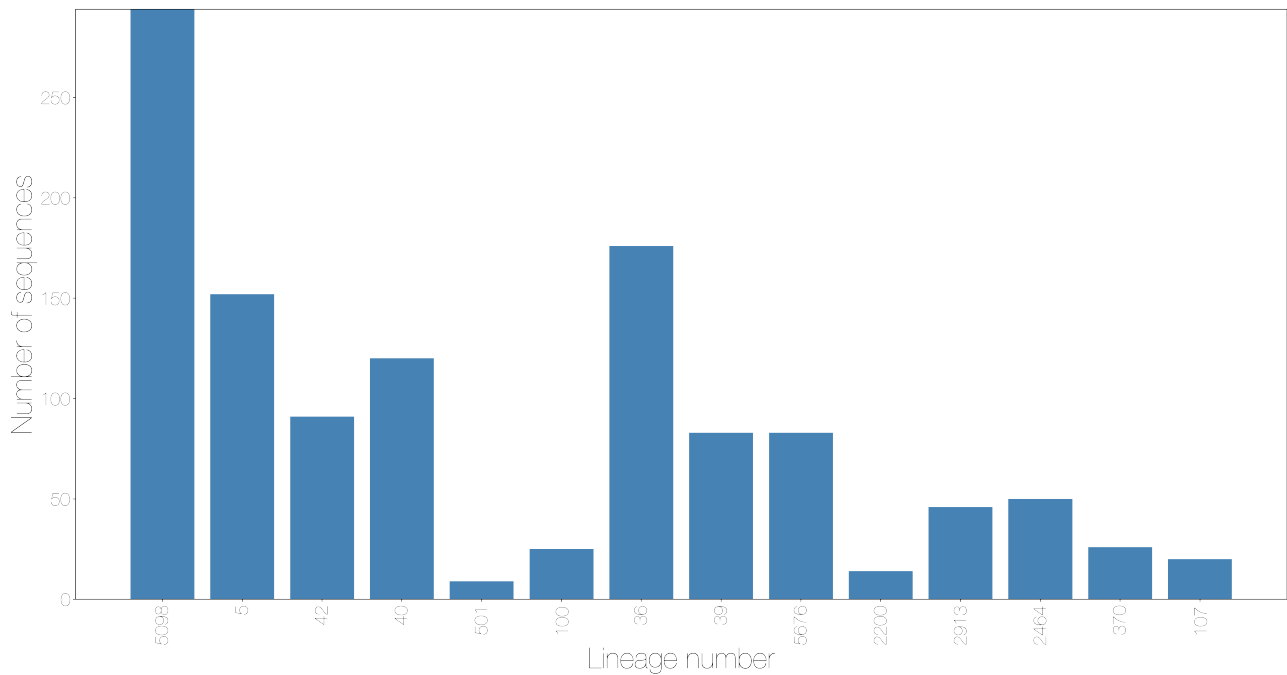


Figure 1: Number of sequences sampled in a lineage by country

Different sequencing centres have different delays in turn around from receipt of samples to submission of sequence data. This will affect all of the figures shown after this if lineages have geographical variation, as some regions have less up to date data.

**The lag for this sequencing centre is 23 days**

The relative growth and decline of the ten most sampled lineages in terms of number of counties they are present in is shown in figure three.

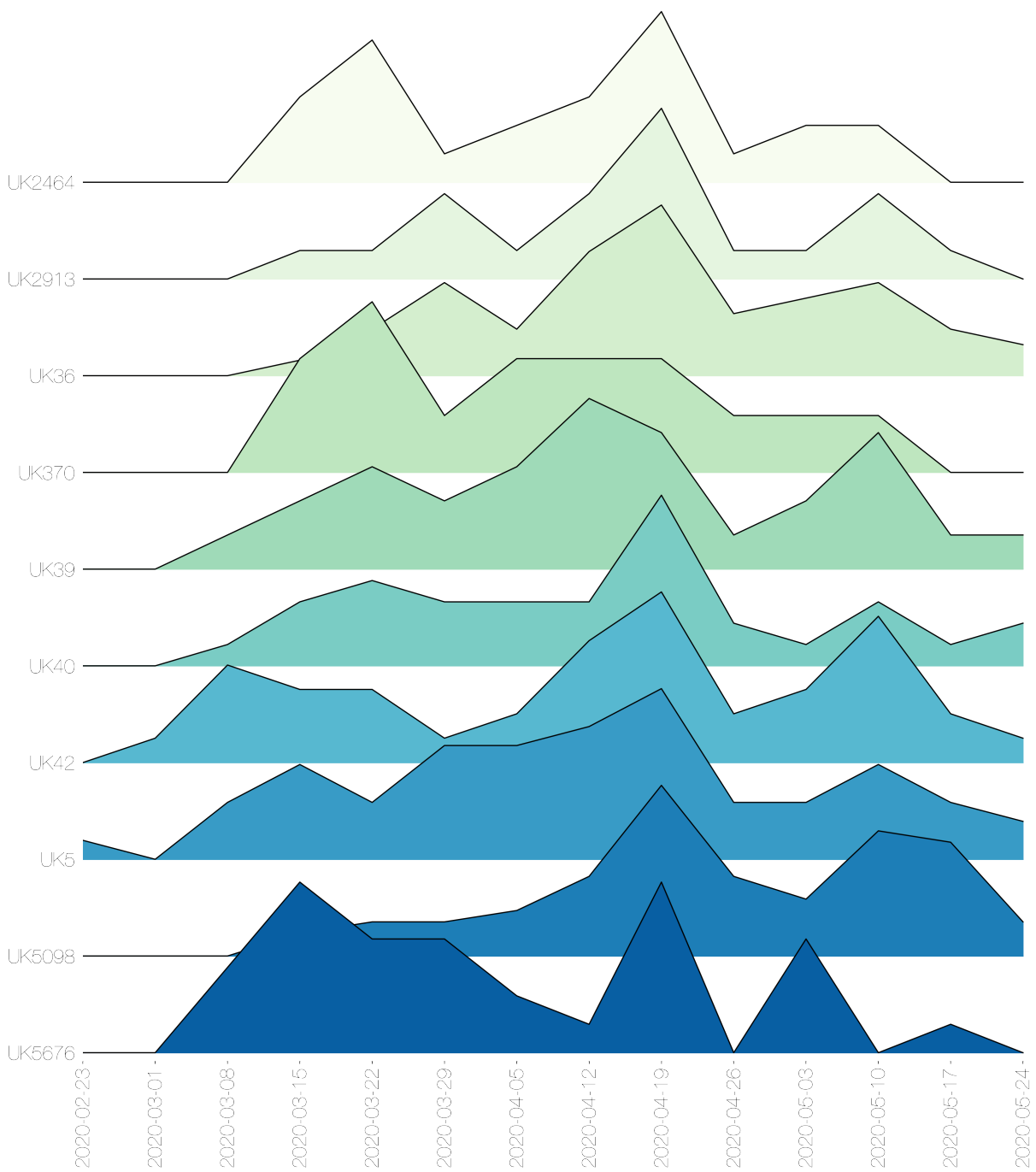


Figure 2: Lineages by number of adm2 regions present by epiweek

These lineages are shown on the timeline. Each line represents the length of the cluster, from oldest to most recent sampling date. The dots are sized by the number of sequences taken on that date, and again are colour coded by country. The raw data has been written to a summary file.

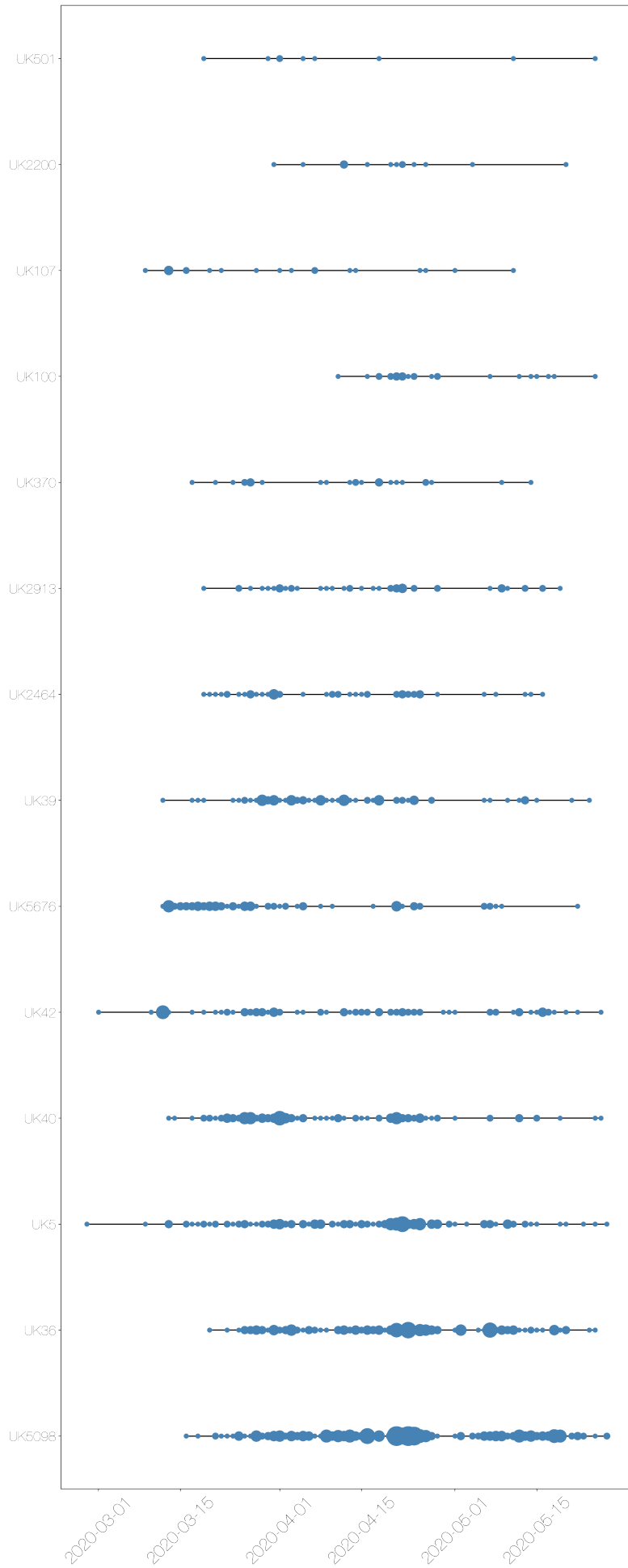


Figure 3: Timeline of lineages, sized by number of sequences from each country.

The date of first sequence in the cluster is shown in figure five for every cluster with date information.

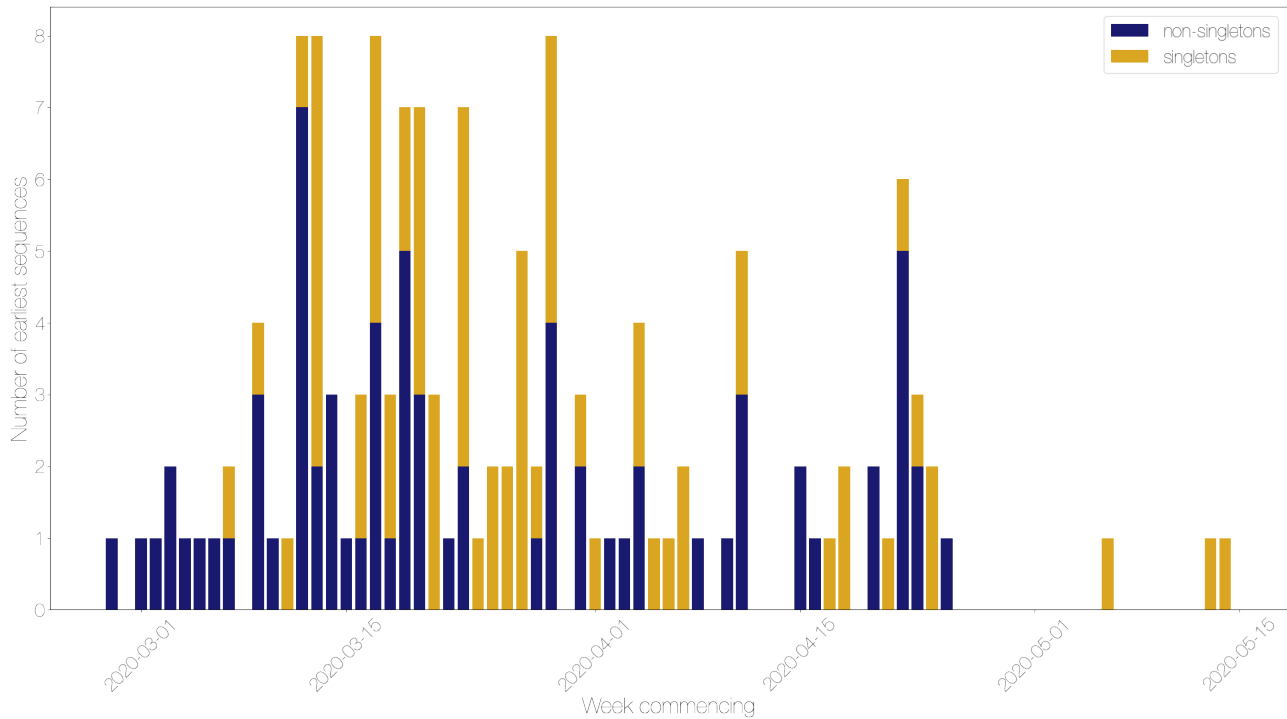


Figure 4: Lineage starts per week, split by singletons and non-singletons

For comparison, here is a plot of the day that every sequence was taken, coloured by country. Note that sequences without dates were not included.

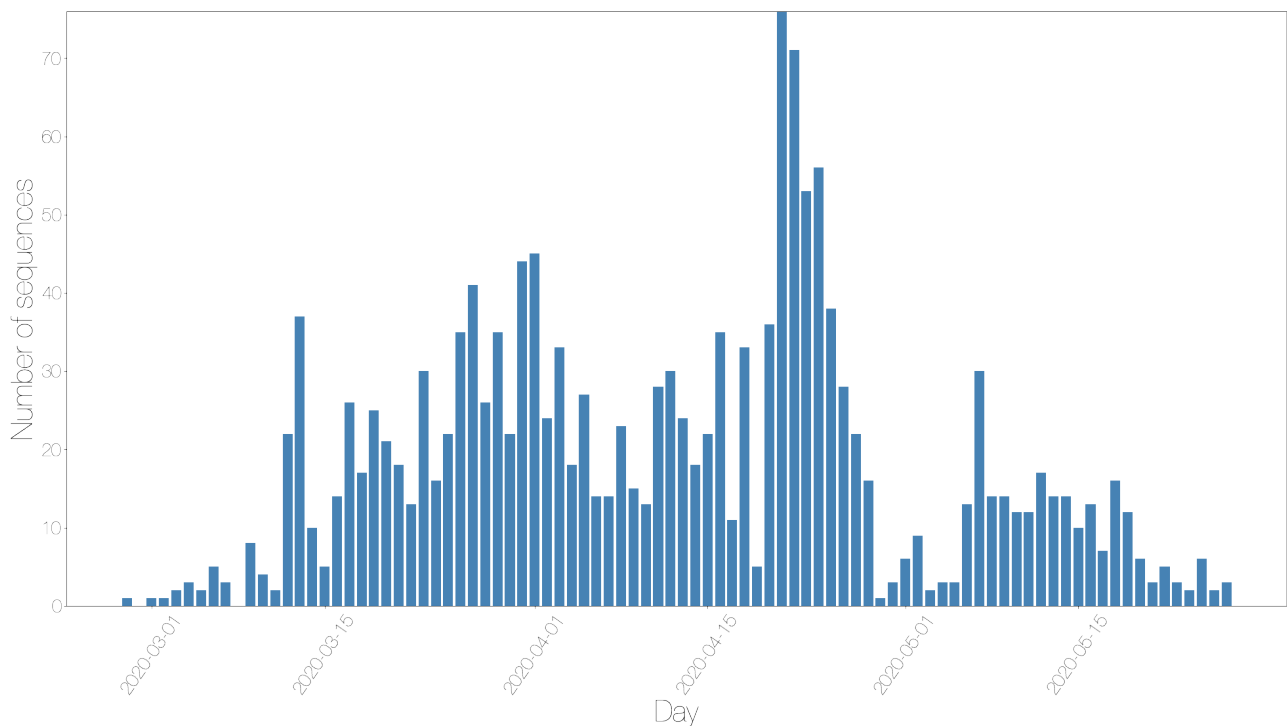


Figure 5: Sequences taken on each day by country

The map shows the number of sequences sampled in each admin2 region in the UK. The colour scale is the same for all four countries, but with different underlying base colours.

All sequences have been assigned clean adm2 data this week.



Figure 6: Map showing the number of sequences sampled by adm2 region

There are some sequences with locations that are not matched to real Admin2 regions, some manual curation required.

Other results modules for UK lineage analysis can be added in here if required.

## Appendix

Below are the raw data tables for each of the figures in the report.

**Table S1** Description of all lineages that have been circulating in the last month, and have more than 5 sequences.

Lineage name	Scotland	Date range	Total sequences	Global lineage	Time since last sample (days)	Activity score
UK5098	294 (100.0%)	Mar-16, May-27	294	B.1.p73	0	active today
UK36	176 (100.0%)	Mar-20, May-25	176	B.1	2	0.1886
UK5	152 (100.0%)	Feb-28, May-27	152	B.1.1.p11, B.1.1.1, B.1.1.13, B.1.1.14, B.1.1	0	active today
UK40	120 (100.0%)	Mar-13, May-26	120	B.16, B	1	0.6218
UK42	91 (100.0%)	Mar-01, May-26	91	B.1.p73, B.1.5, B.1	1	0.9556
UK39	83 (100.0%)	Mar-12, May-24	83	A.2	3	0.2967
UK5676	83 (100.0%)	Mar-12, May-22	83	B.2	5	0.1732
UK2464	50 (100.0%)	Mar-19, May-16	50	B.1.p11	11	0.1076
UK2913	46 (100.0%)	Mar-19, May-19	46	B.1.p11	8	0.1694
UK199	35 (100.0%)	Mar-05, Apr-27	35	B.1.p73, B.1, B.1.5	30	0.052
UK370	26 (100.0%)	Mar-17, May-14	26	B.1.1.10	13	0.1785
UK100	25 (100.0%)	Apr-11, May-25	25	B.1, B.1.5	2	0.9167
UK87	22 (100.0%)	Mar-13, Apr-24	22	B.1.70	33	0.0606
UK198	21 (100.0%)	Mar-17, Apr-24	21	B.1, B.1.5	33	0.0576
UK15	20 (100.0%)	Mar-12, Apr-28	20	B.1.1	29	0.0853
UK107	20 (100.0%)	Mar-09, May-11	20	B.2.1	16	0.2072
UK502	16 (100.0%)	Mar-06, Mar-20	16	B.1.69	68	0.0137
UK14	16 (100.0%)	Mar-14, Apr-08	16	B	49	0.034
UK72	15 (100.0%)	Mar-07, Apr-02	15	B	55	0.0338
UK2200	14 (100.0%)	Mar-31, May-20	14	B.1.5	7	0.5495
UK43	12 (100.0%)	Mar-23, Apr-26	12	A.5	31	0.0997
UK261	12 (100.0%)	Mar-15, Apr-08	12	A.3	49	0.0445
UK44	11 (100.0%)	Mar-17, Apr-13	11	B	44	0.0614
UK120	10 (100.0%)	Mar-02, Apr-16	10	B	41	0.122
UK501	9 (100.0%)	Mar-19, May-25	9	B.1	2	4.1875
UK137	8 (100.0%)	Mar-09, Mar-29	8	B.1.1	59	0.0484

Lineage name	Scotland	Date range	Total sequences	Global lineage	Time since last sample (days)	Activity score
UK271	7 (100.0%)	Apr-15, Apr-26	7	B.1	31	0.0591
UK167	7 (100.0%)	Mar-12, Apr-26	7	B.1	31	0.2419
UK601	6 (100.0%)	Mar-14, Apr-01	6	B.10	56	0.0643



**Table S2** Raw data for figure two showing lags between the most recent sequence and current date for each sequencing centre

	Centre	Lag in days
0	GLAS	23

**Table S3** Raw data for figure three showing the number of admin2 regions a lineage is present in over time

Week commencing	UK5098	UK36	UK5	UK40	UK42	UK5676	UK39	UK2464	UK2913	UK370
2020-02-23	0	0	1	0	0	0	0	0	0	0
2020-03-01	0	0	0	0	1	0	0	0	0	0
2020-03-08	0	0	3	1	4	3	1	0	0	0
2020-03-15	2	1	5	3	3	6	2	3	1	2
2020-03-22	3	3	3	4	3	4	3	5	1	3
2020-03-29	3	6	6	3	1	4	2	1	3	1
2020-04-05	4	3	6	3	2	2	3	2	1	2
2020-04-12	7	8	7	3	5	1	5	3	3	2
2020-04-19	15	11	9	8	7	6	4	6	6	2
2020-04-26	7	4	3	2	2	0	1	1	1	1
2020-05-03	5	5	3	1	3	4	2	2	1	1
2020-05-10	11	6	5	3	6	0	4	2	3	1
2020-05-17	10	3	3	1	2	1	1	0	1	0
2020-05-24	3	2	2	2	1	0	1	0	0	0

Table S4 is not appropriate for this report and so has been omitted.

**Table S5** Raw data for figure five showing when lineages started per day, divided by singletons and non-singletons

Day	Number of singleton starts	Number of non-singleton starts	Total
2020-02-28	0	1	1
2020-03-01	0	1	1
2020-03-02	0	1	1
2020-03-03	0	2	2
2020-03-04	0	1	1
2020-03-05	0	1	1
2020-03-06	0	1	1
2020-03-07	1	1	2
2020-03-09	1	3	4
2020-03-10	0	1	1
2020-03-11	1	0	1
2020-03-12	1	7	8
2020-03-13	6	2	8
2020-03-14	0	3	3
2020-03-15	0	1	1
2020-03-16	2	1	3
2020-03-17	4	4	8
2020-03-18	2	1	3
2020-03-19	2	5	7
2020-03-20	4	3	7
2020-03-21	3	0	3
2020-03-22	0	1	1
2020-03-23	5	2	7
2020-03-24	1	0	1
2020-03-25	2	0	2
2020-03-26	2	0	2
2020-03-27	5	0	5
2020-03-28	1	1	2
2020-03-29	4	4	8
2020-03-31	1	2	3
2020-04-01	1	0	1
2020-04-02	0	1	1
2020-04-03	0	1	1
2020-04-04	2	2	4
2020-04-05	1	0	1
2020-04-06	1	0	1
2020-04-07	2	0	2
2020-04-08	0	1	1
2020-04-10	0	1	1
2020-04-11	2	3	5
2020-04-15	0	2	2
2020-04-16	0	1	1
2020-04-17	1	0	1
2020-04-18	2	0	2
2020-04-20	0	2	2
2020-04-21	1	0	1
2020-04-22	1	5	6
2020-04-23	1	2	3
2020-04-24	2	0	2
2020-04-25	0	1	1
2020-05-06	1	0	1
2020-05-13	1	0	1
2020-05-14	1	0	1

**Table S6** Raw data for figure six showing the number of sequences taken over time.

Day	Scotland
2020-02-28	1
2020-03-01	1
2020-03-02	1
2020-03-03	2
2020-03-04	3
2020-03-05	2
2020-03-06	5
2020-03-07	3
2020-03-09	8
2020-03-10	4
2020-03-11	2
2020-03-12	22
2020-03-13	37
2020-03-14	10
2020-03-15	5
2020-03-16	14
2020-03-17	26
2020-03-18	17
2020-03-19	25
2020-03-20	21
2020-03-21	18
2020-03-22	13
2020-03-23	30
2020-03-24	16
2020-03-25	22
2020-03-26	35
2020-03-27	41
2020-03-28	26
2020-03-29	35
2020-03-30	22
2020-03-31	44
2020-04-01	45
2020-04-02	24
2020-04-03	33
2020-04-04	18
2020-04-05	27
2020-04-06	14
2020-04-07	14
2020-04-08	23
2020-04-09	15
2020-04-10	13
2020-04-11	28
2020-04-12	30
2020-04-13	24
2020-04-14	18
2020-04-15	22
2020-04-16	35
2020-04-17	11
2020-04-18	33
2020-04-19	5
2020-04-20	36
2020-04-21	76
2020-04-22	71
2020-04-23	53
2020-04-24	56
2020-04-25	38
2020-04-26	28

Day	Scotland
2020-04-27	22
2020-04-28	16
2020-04-29	1
2020-04-30	3
2020-05-01	6
2020-05-02	9
2020-05-03	2
2020-05-04	3
2020-05-05	3
2020-05-06	13
2020-05-07	30
2020-05-08	14
2020-05-09	14
2020-05-10	12
2020-05-11	12
2020-05-12	17
2020-05-13	14
2020-05-14	14
2020-05-15	10
2020-05-16	13
2020-05-17	7
2020-05-18	16
2020-05-19	12
2020-05-20	6
2020-05-21	3
2020-05-22	5
2020-05-23	3
2020-05-24	2
2020-05-25	6
2020-05-26	2
2020-05-27	3

**Table S7** Raw data for the figure seven with the number of sequences assigned to each admin2 region.

Admin2	Country	Number of sequences	Sequence group
ABERDEEN	Scotland	19	10-50
ARGYLL AND BUTE	Scotland	6	1-10
DUMFRIES AND GALLOWAY	Scotland	41	10-50
DUNDEE	Scotland	11	10-50
EAST AYRSHIRE	Scotland	53	50-100
EAST DUNBARTONSHIRE	Scotland	36	10-50
EAST RENFREWSHIRE	Scotland	21	10-50
EDINBURGH	Scotland	9	1-10
EILEAN SIAR	Scotland	2	1-10
FALKIRK	Scotland	66	50-100
GLASGOW	Scotland	828	>500
HIGHLAND	Scotland	9	1-10
INVERCLYDE	Scotland	15	10-50
NORTH AYRSHIRE	Scotland	5	1-10
NORTH LANARKSHIRE	Scotland	145	100-150
NORTHAMPTONSHIRE	England	1	1-10
ORKNEY ISLANDS	Scotland	1	1-10
PERTHSHIRE AND KINROSS	Scotland	2	1-10
RENFREWSHIRE	Scotland	241	200-250
SCOTTISH BORDERS	Scotland	1	1-10
SHETLAND ISLANDS	Scotland	14	10-50
SOUTH AYRSHIRE	Scotland	3	1-10
SOUTH LANARKSHIRE	Scotland	24	10-50
STIRLING	Scotland	11	10-50
WEST DUNBARTONSHIRE	Scotland	20	10-50