

Phylogenetic trees for 32 HPV genotypes

Figures S1-S32:

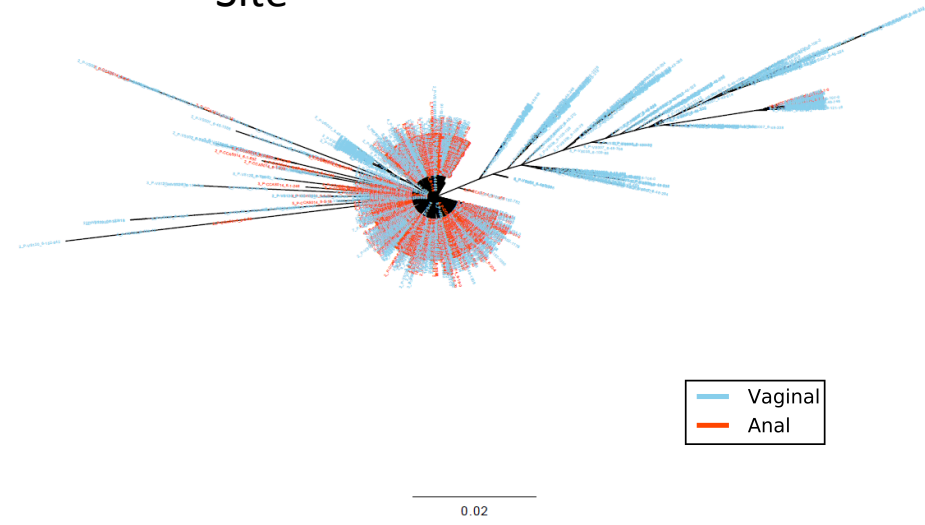
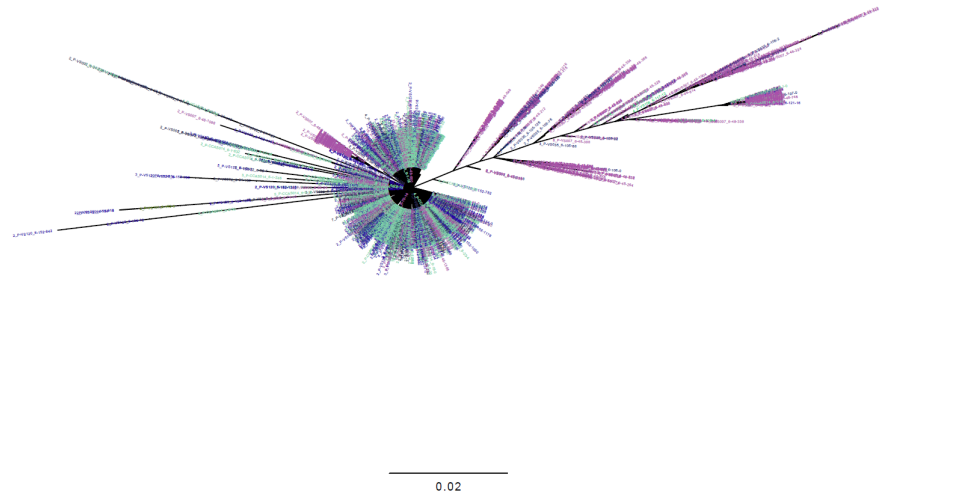
Phylogenetic trees constructed using maximum likelihood method (RAxML). Best trees were created from four multiple runs and 10 000 bootstraps. Trees are presented in 'Fan' mode. Each tree were color based on four variables; sample, site (vaginal or anal), cervical cytology outcome and HIV status. Cytology outcome were encoded; Negative = Negative for intra-epithelial lesions and malignancy (NILM), High grade = High grade squamous intra-epithelial lesions (HGSIL) and Atypical squamous cells, cannot exclude HGSIL (ASC-H), Low grade = Low-grade squamous intraepithelial lesion (LGSIL) and Atypical squamous cells of undetermined significance (ASC-US) and Unsatisfactory = slide was not satisfactory for evaluation ie had no distinct endothelial cells, poorly stained and/or smear poorly collected.

Fig S1: HPV 6b

Sample

Site

- VS042
- VS024
- VS026
- VS028
- CCAS084
- VS008
- CCAS067
- VS007
- VS006
- VS002
- VS003
- VS108
- VS142
- VS120
- VS126
- VS035
- VS056
- CCAS014
- VS032
- VS031
- CCAS120
- VS137

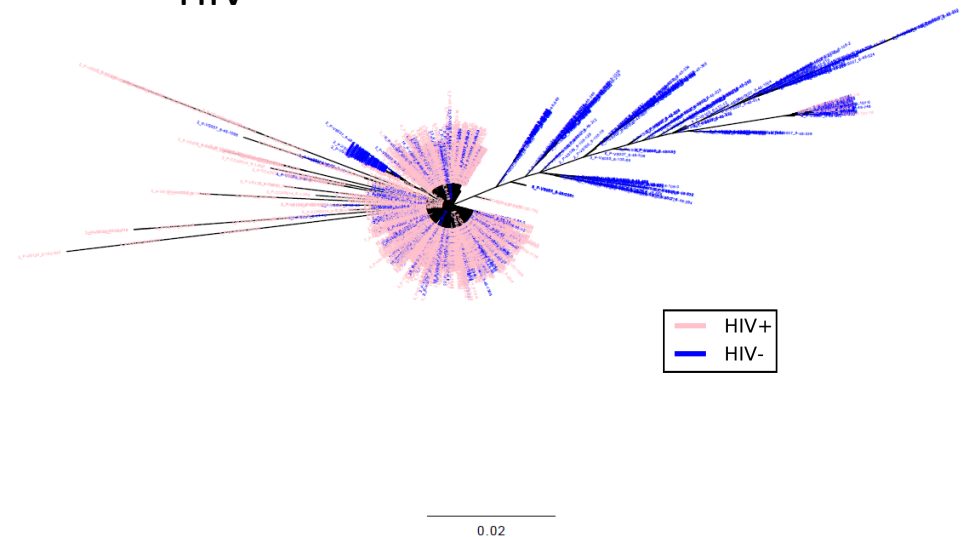
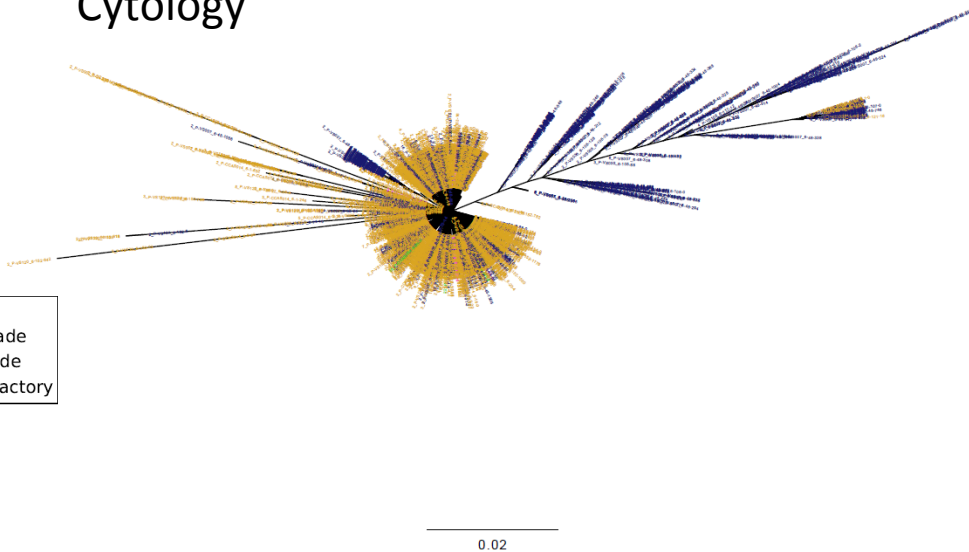


- Vaginal
- Anal

Cytology

HIV

- Normal
- High Grade
- Low Grade
- Unsatisfactory



- HIV+
- HIV-

Fig S2:HPV 11

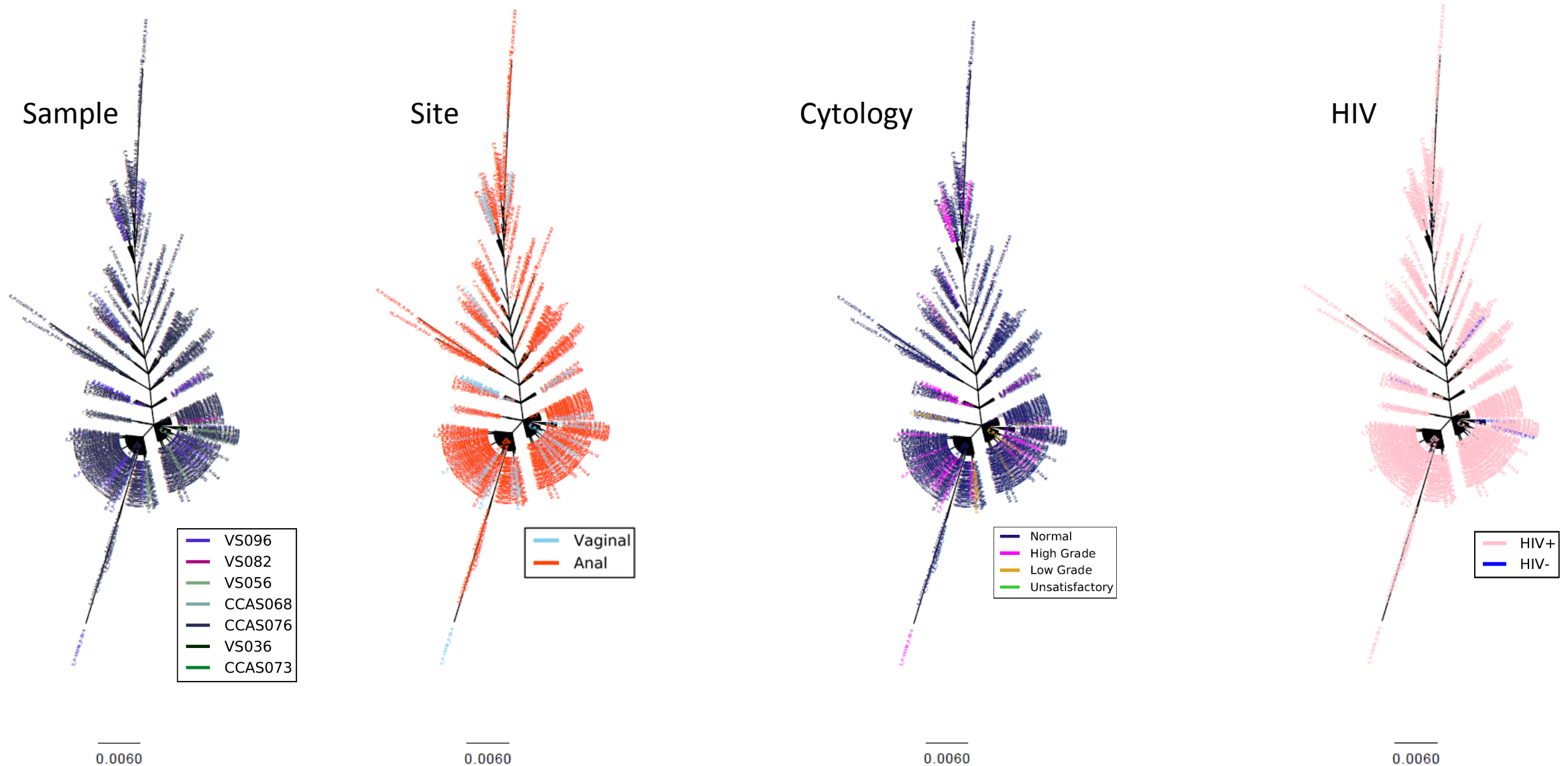


Fig S3: HPV 26

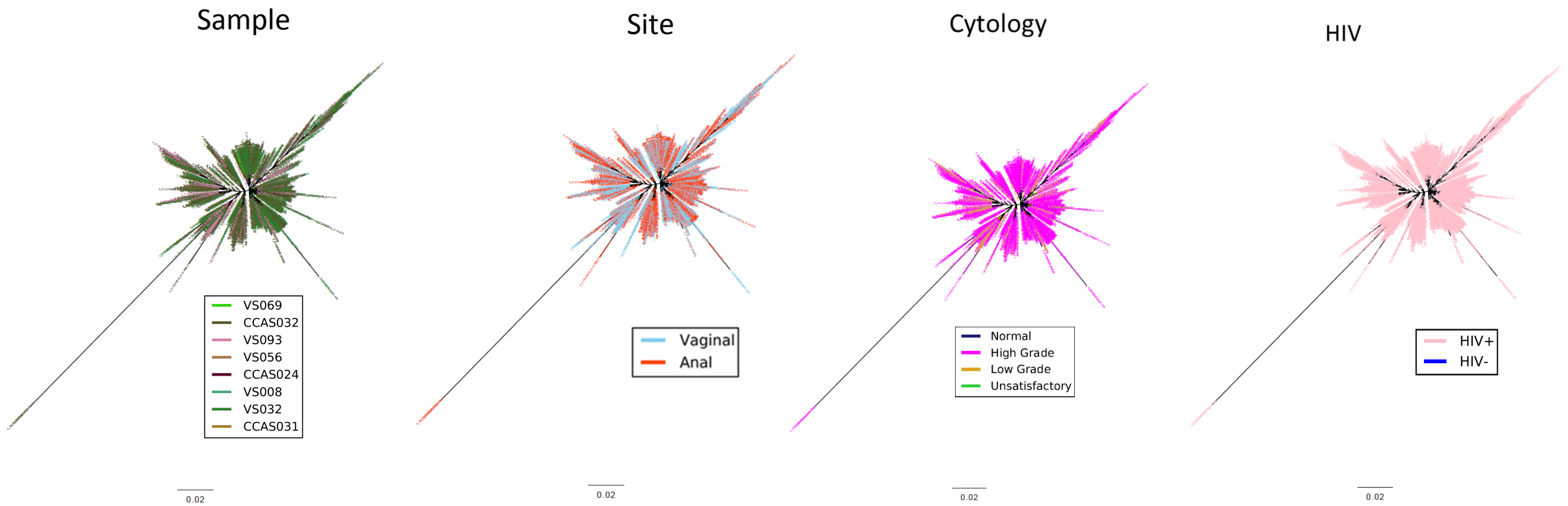


Fig S4: HPV 31

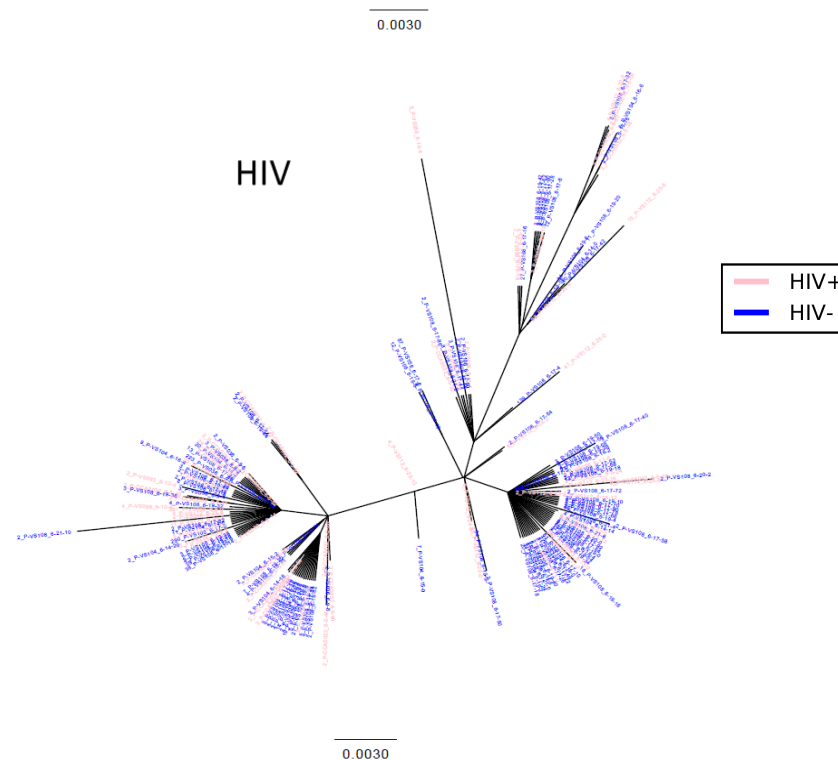
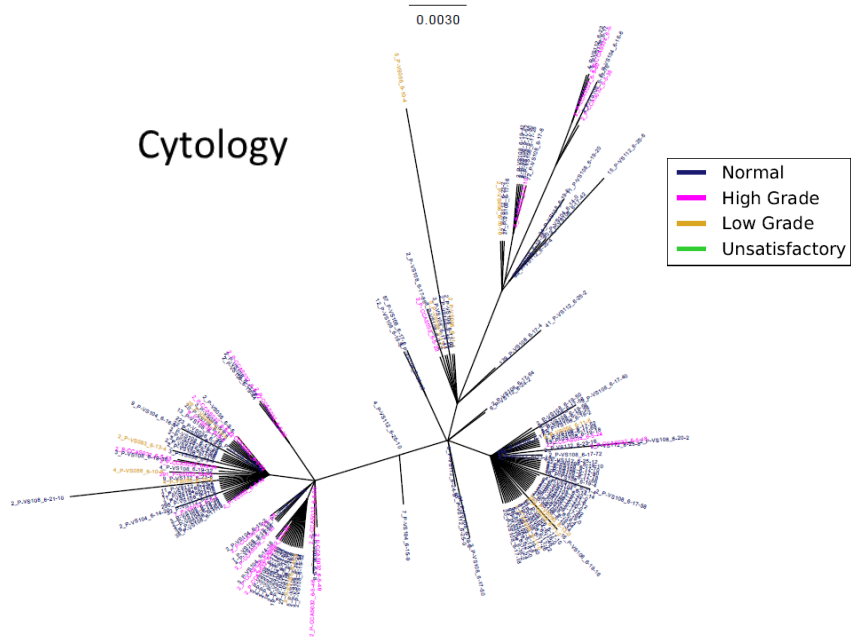
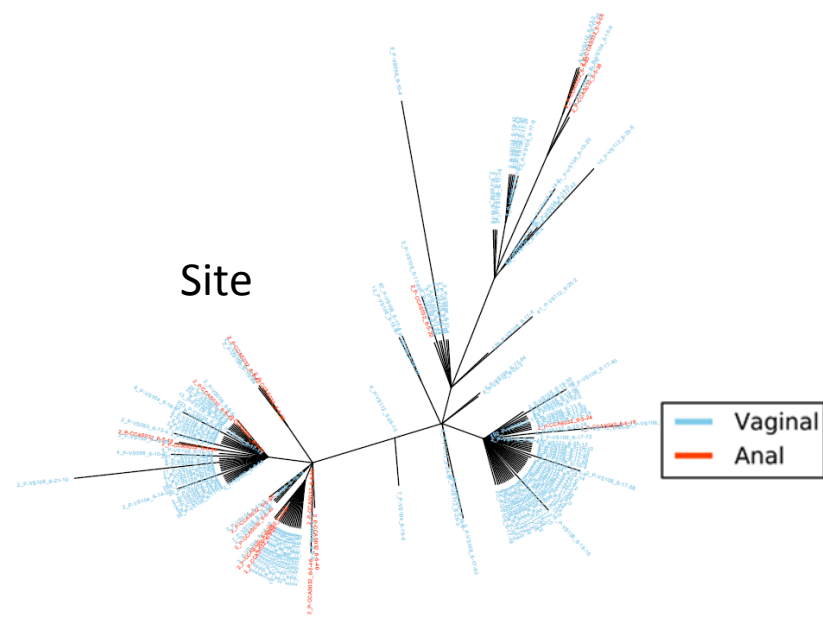
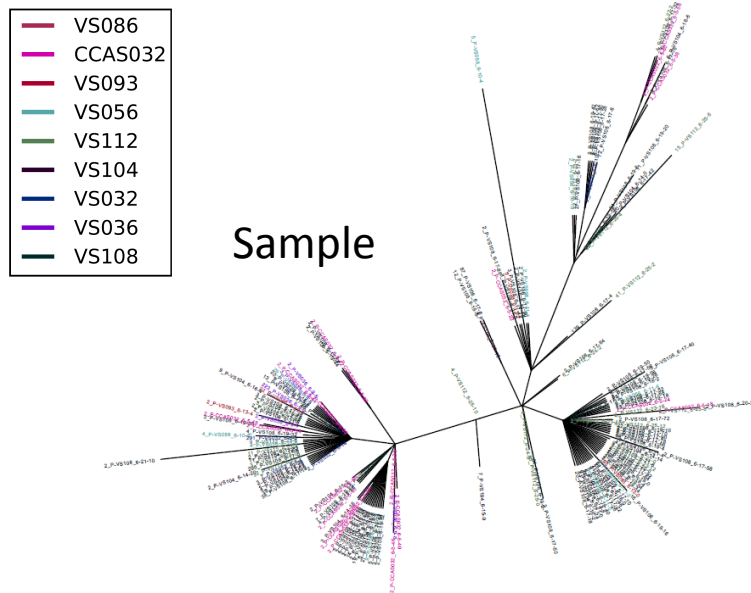


Fig S5:HPV 32

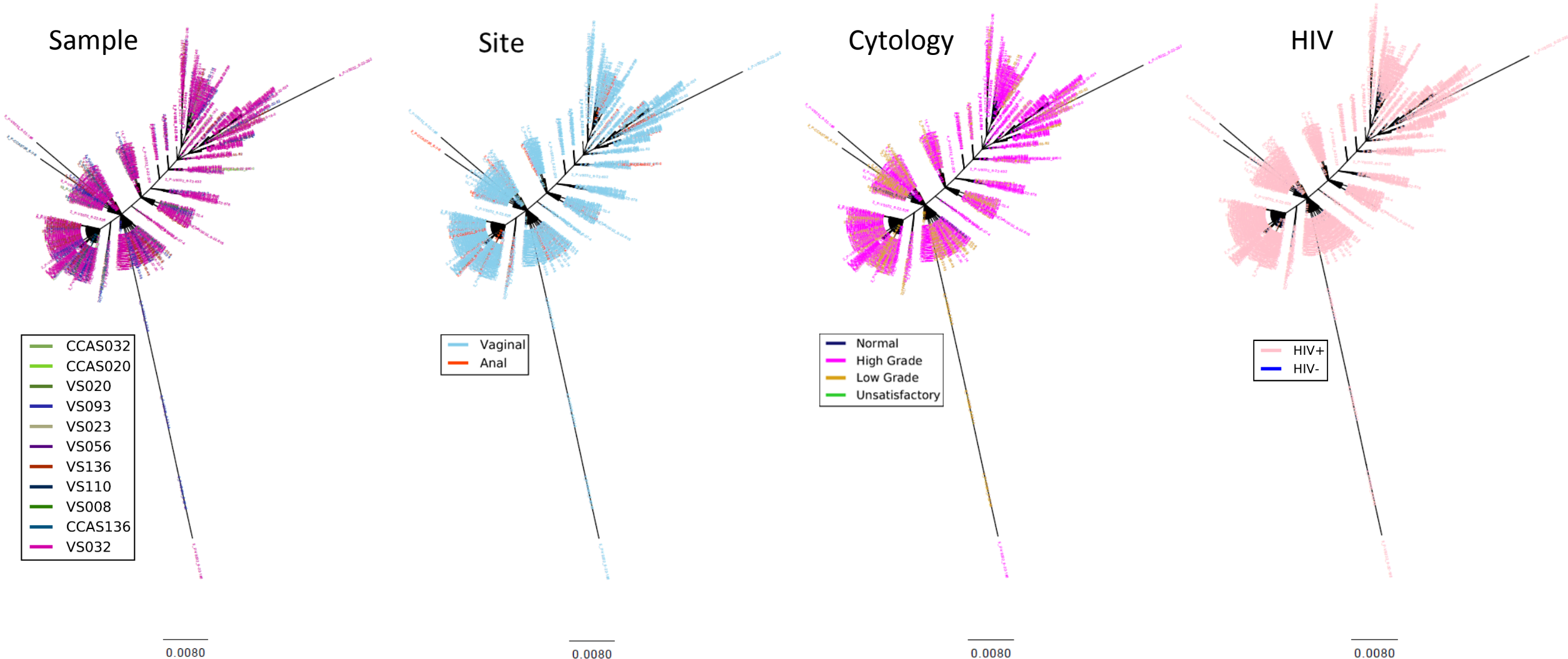


Fig S6: HPV 35H

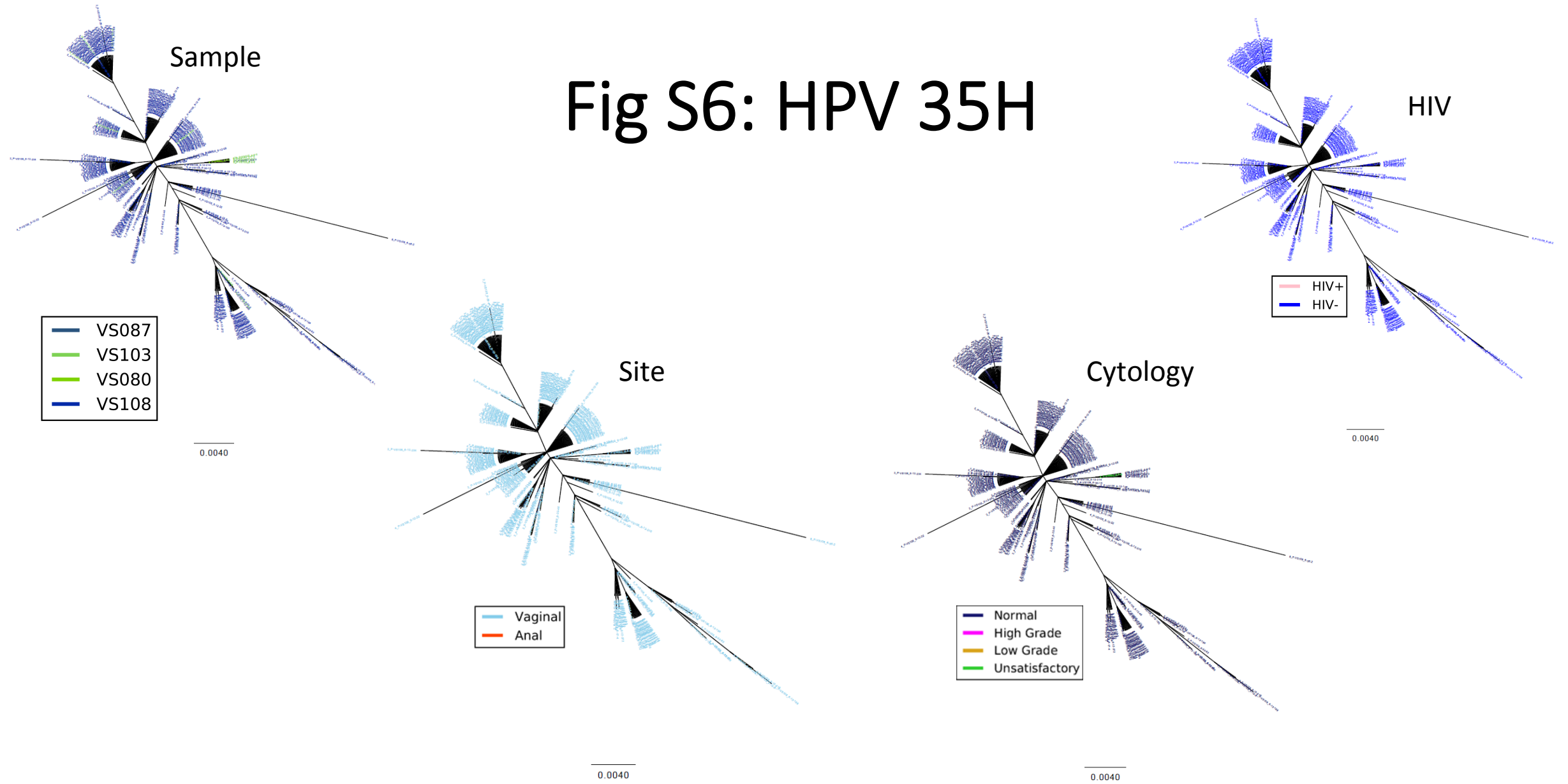


Fig S7: HPV 39

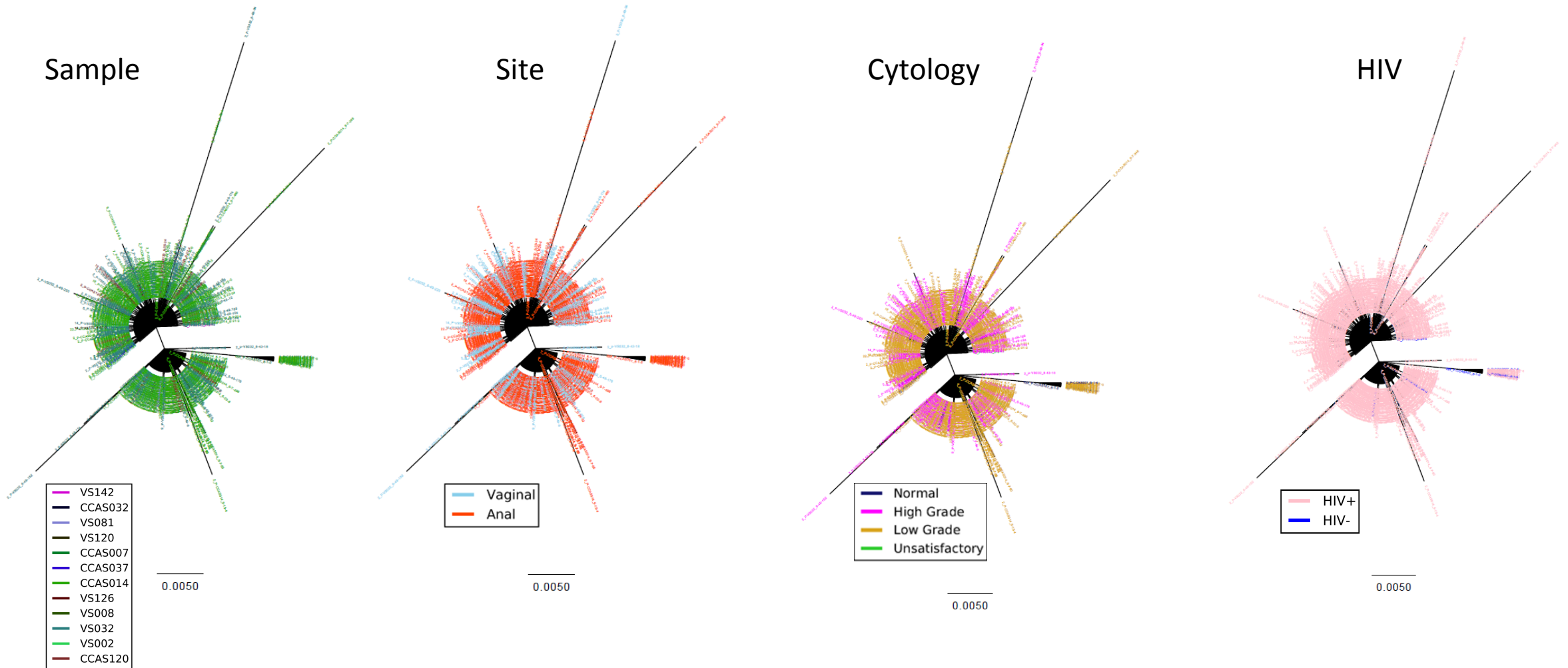
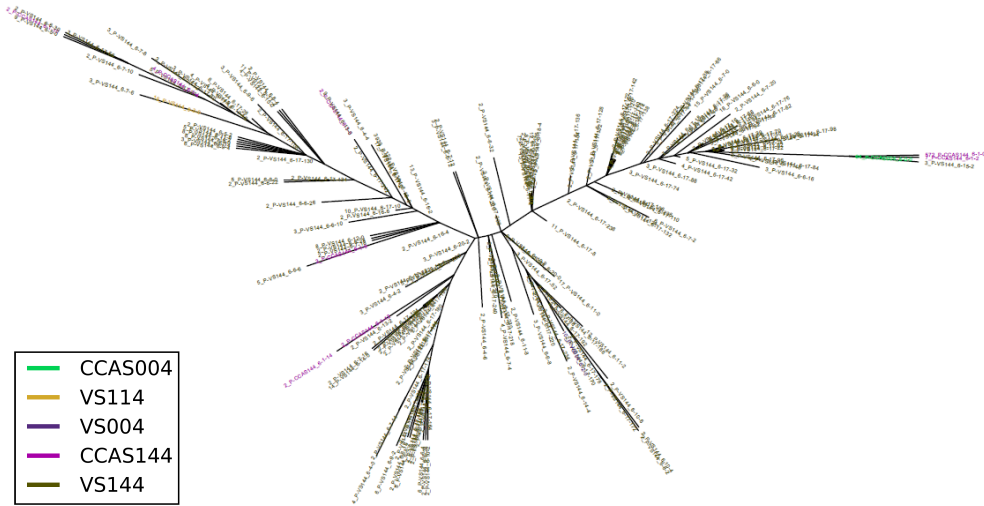
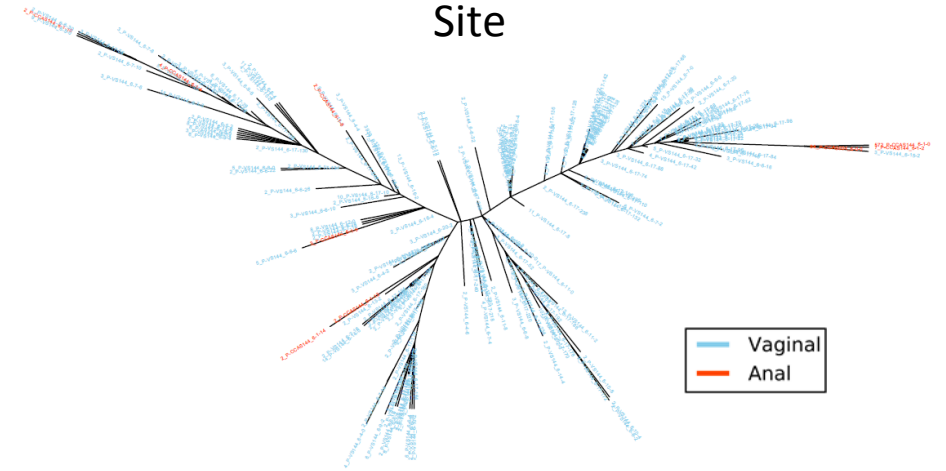


Fig S8: HPV 40

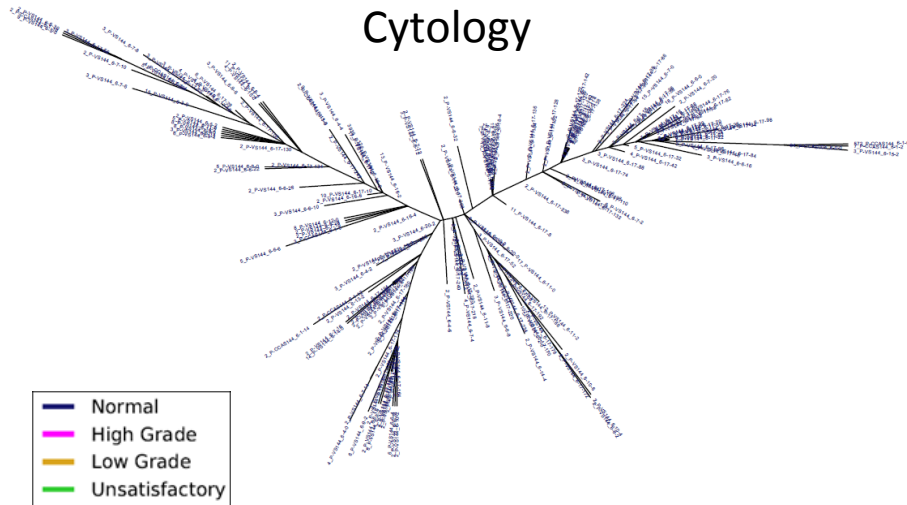
Sample



Site



Cytology



HIV

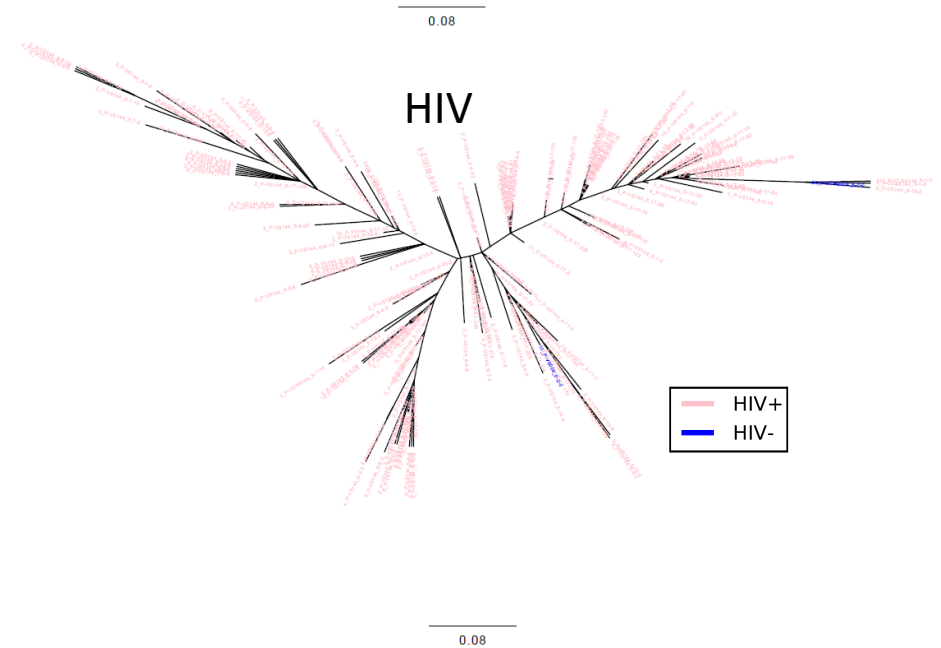


Fig S9: HPV 42A

Sample

Site

Cytology

HIV

- CCAS009
- VS037
- CCAS028
- VS028
- VS113
- CCAS113
- CCAS068
- VS017
- VS009

- Vaginal
- Anal

- Normal
- High Grade
- Low Grade
- Unsatisfactory

- HIV+
- HIV-

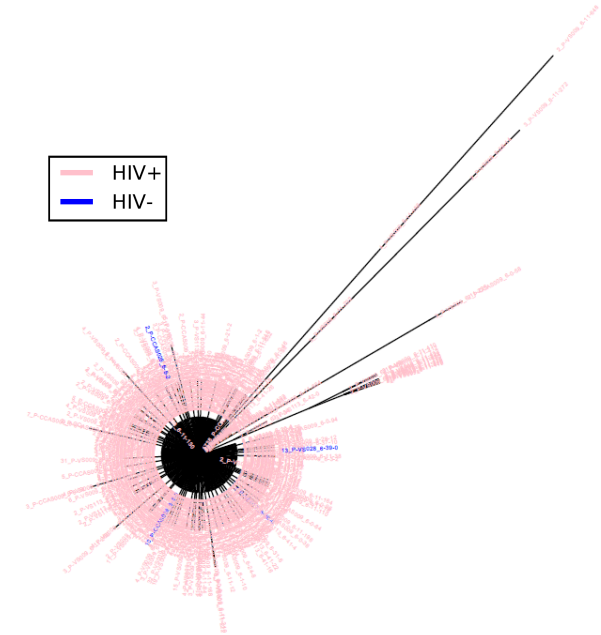
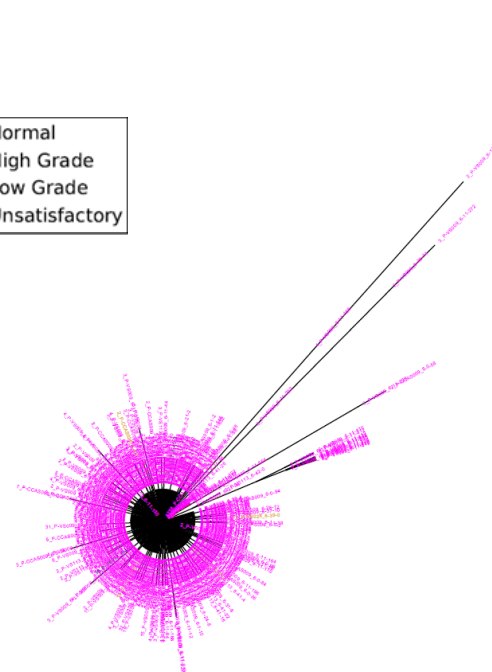
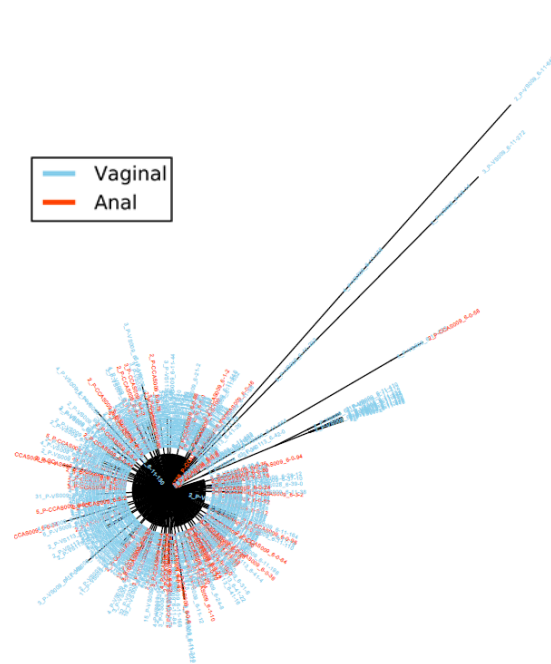
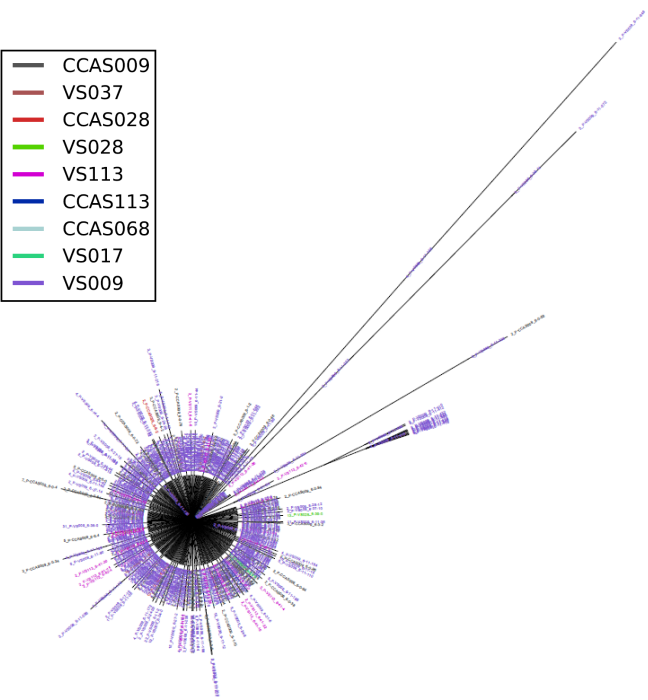


Fig S10: HPV 44

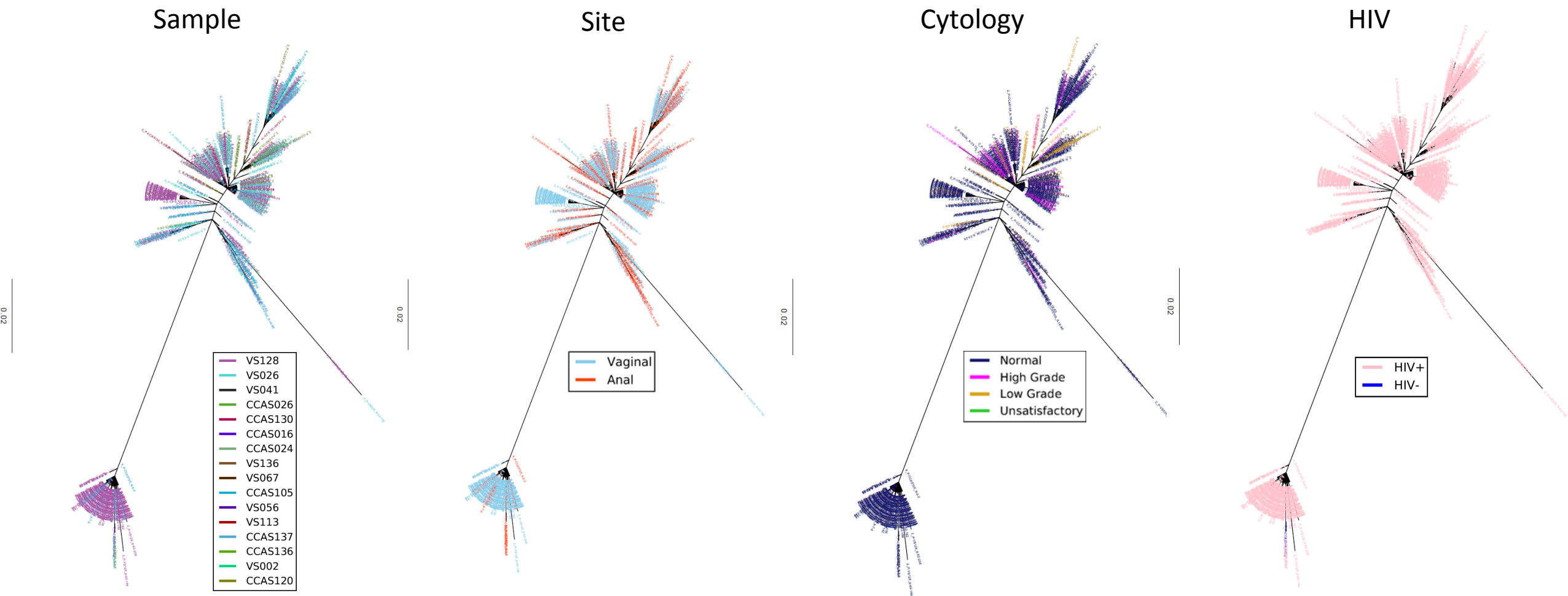
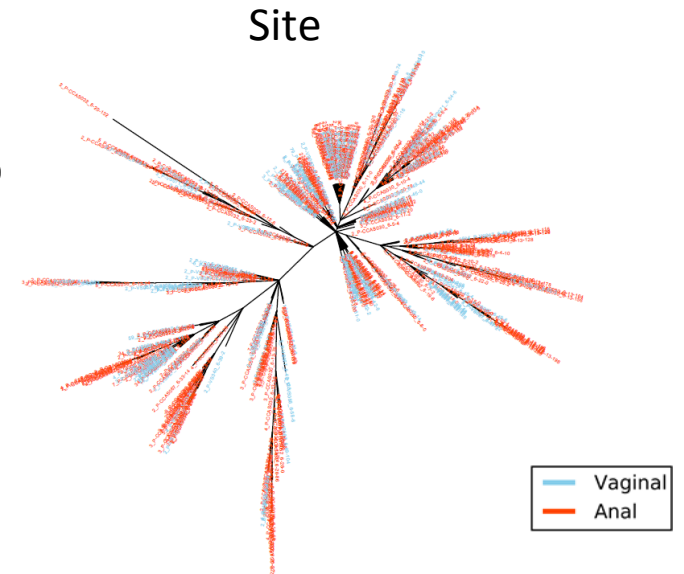
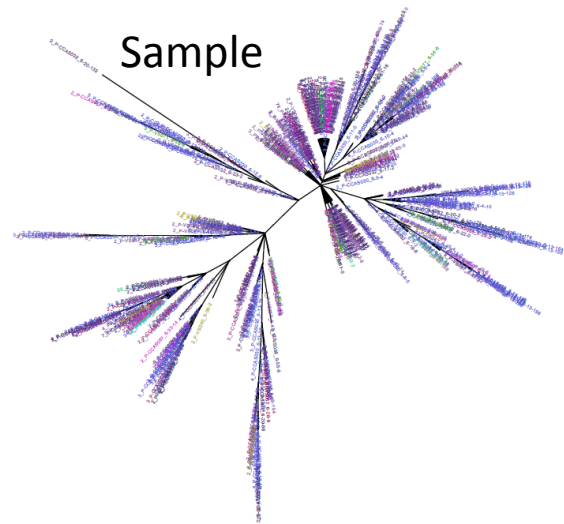


Fig S11: HPV 45

- CCAS030
- CCAS032
- VS052
- CCAS052
- VS083
- VS056
- VS120
- VS099
- VS040
- CCAS058
- VS067
- VS107
- VS071
- VS133
- CCAS067
- CCAS143
- CCAS071
- VS088



- Normal
- High Grade
- Low Grade
- Unsatisfactory

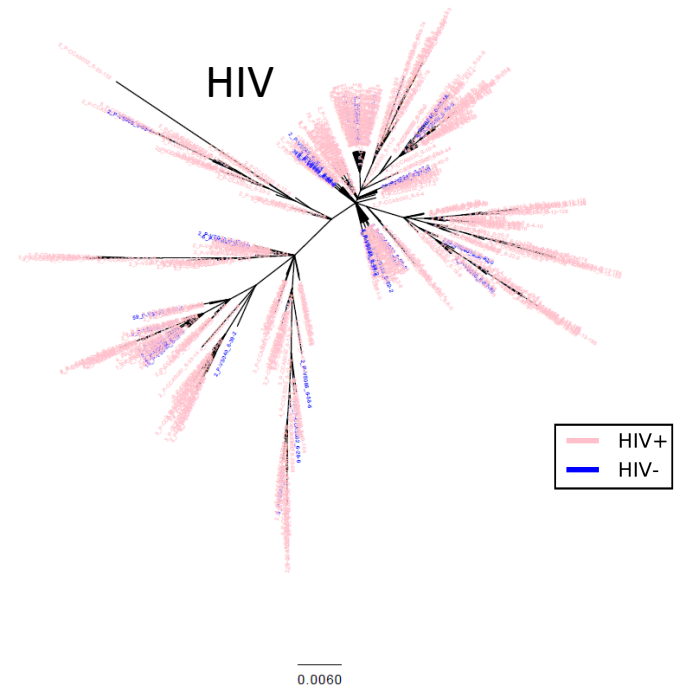
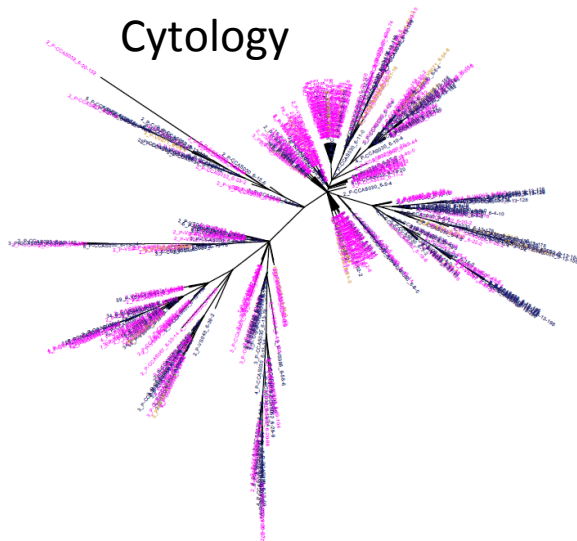
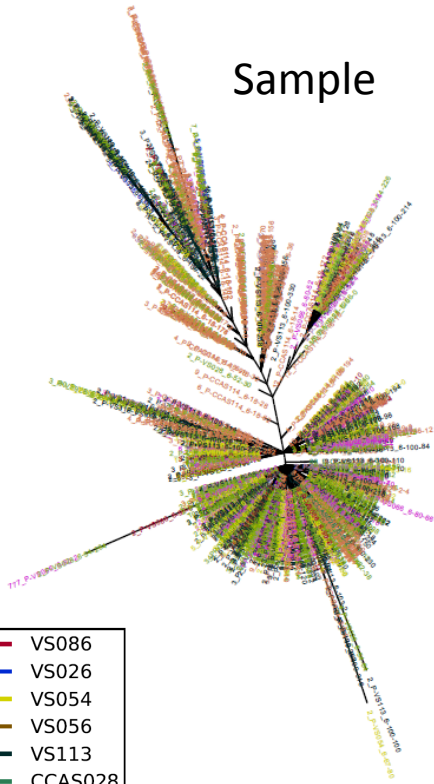
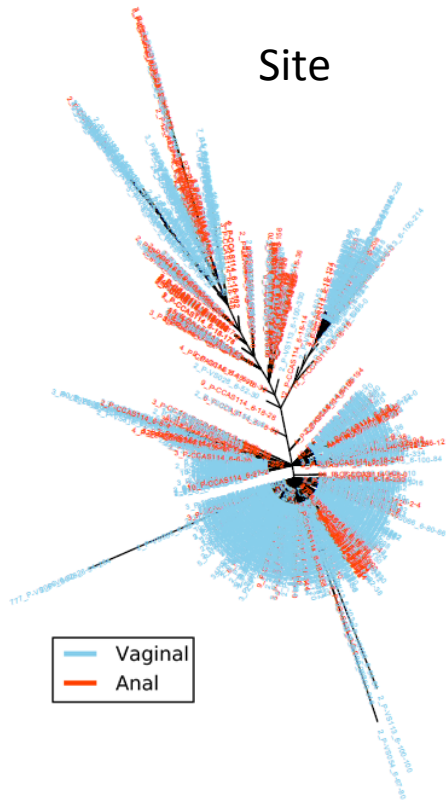


Fig S12: HPV 51

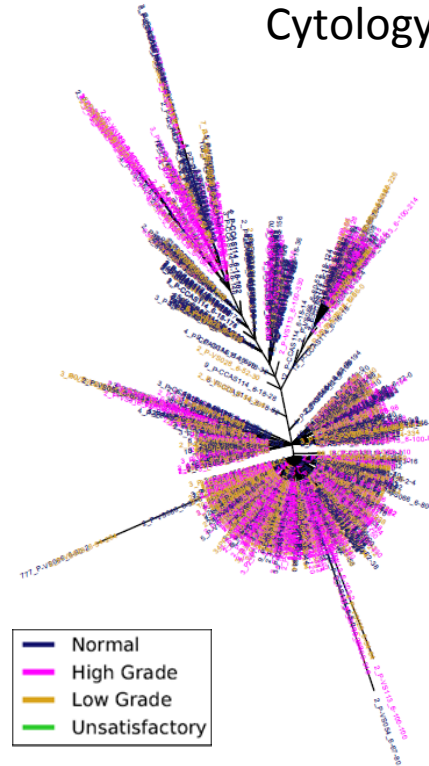
Sample



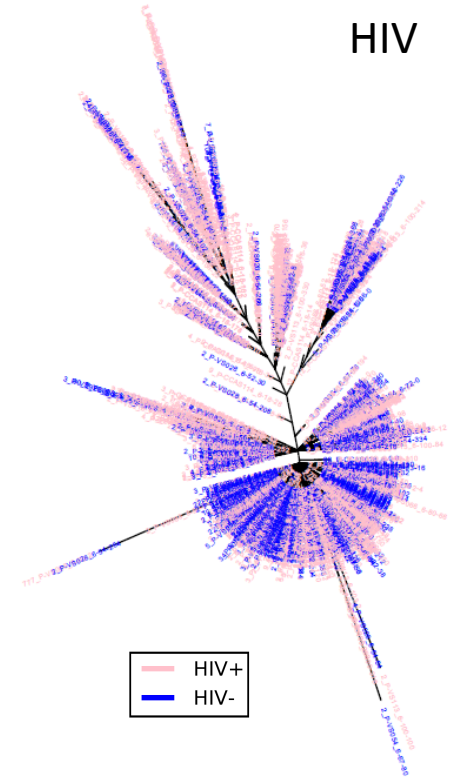
Site



Cytology



HIV



- VS086
- VS026
- VS054
- VS056
- VS113
- CCAS028
- VS028
- VS098
- VS066
- CCAS114
- CCAS113
- VS013
- VS116
- VS004
- VS034
- VS035
- VS108

0.0080

0.0080

0.0080

0.0080

Fig S13: HPV 53

- VS086
- CCAS022
- VS096
- CCAS026
- CCAS037
- VS037
- VS130
- CCAS114
- VS127
- VS070
- VS111
- CCAS130
- VS114
- VS136
- CCAS023
- CCAS136
- CCAS067
- CCAS075
- CCAS002
- VS005
- VS002

Sample

Site

Cytology

HIV

- Vaginal
- Anal

- Normal
- High Grade
- Low Grade
- Unsatisfactory

- HIV+
- HIV-

0.0080

0.0080

0.0080

0.0080

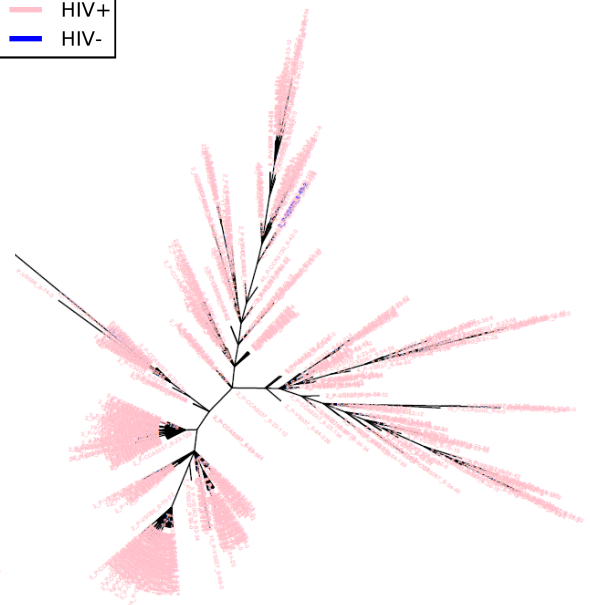
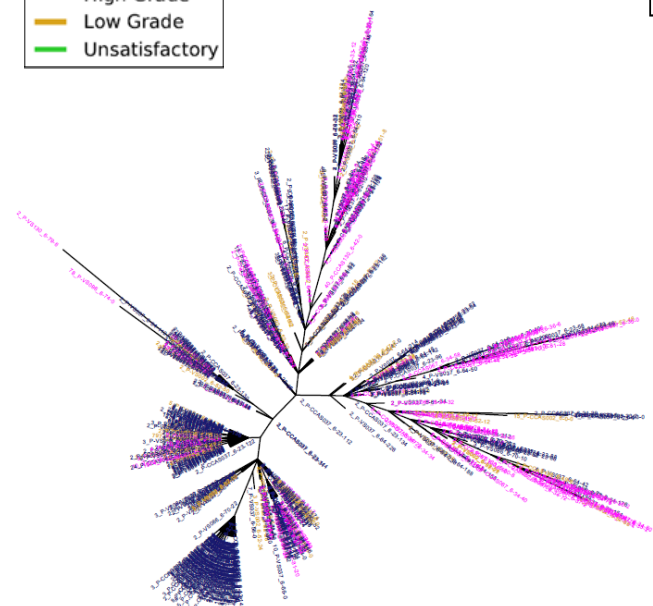
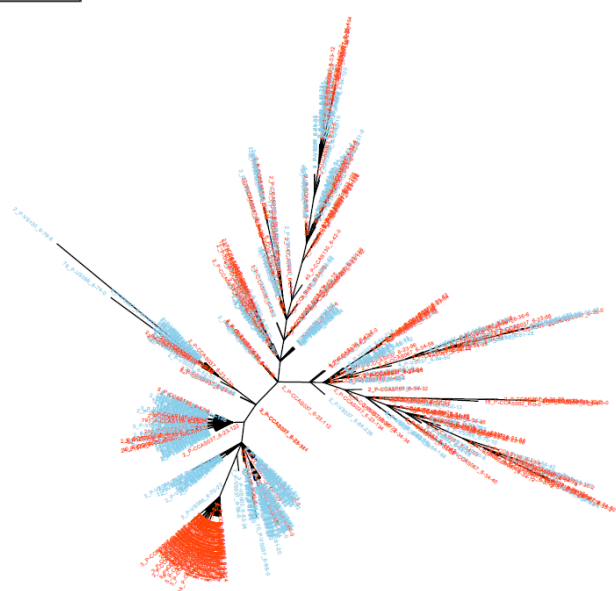
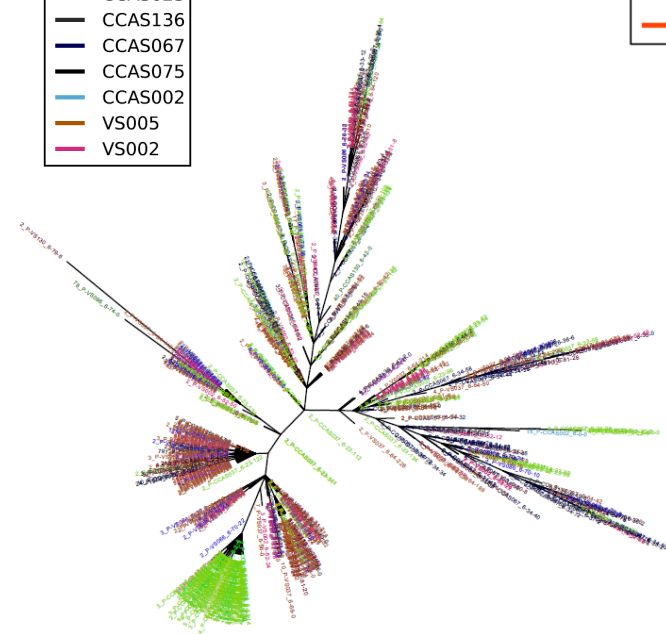


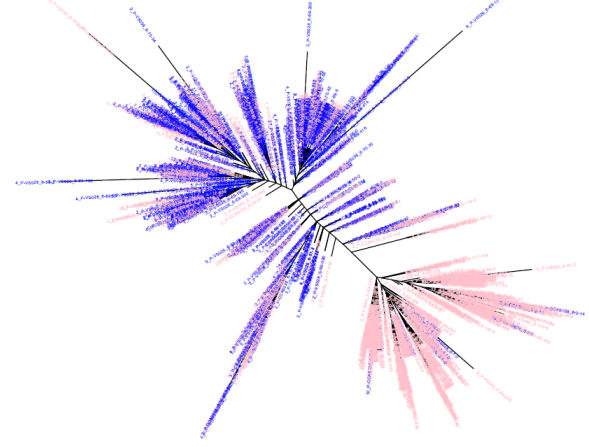
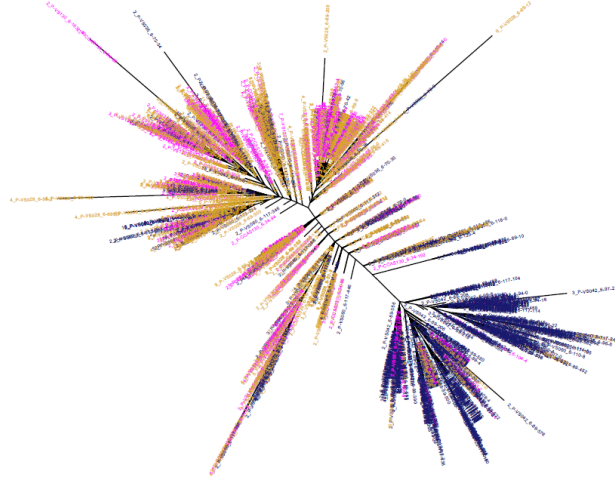
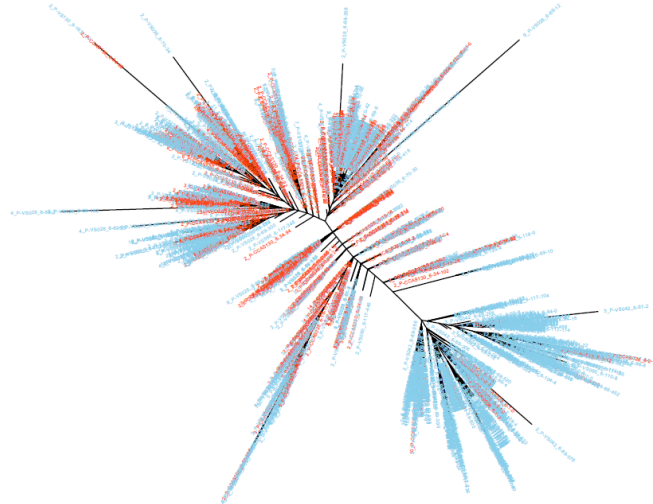
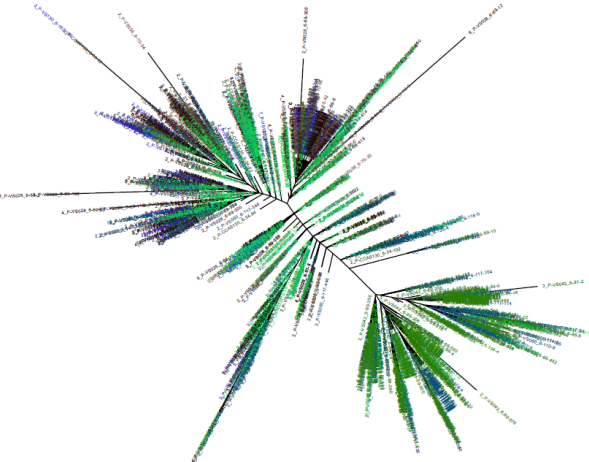
Fig S14: HPV 58

Sample

Site

Cytology

HIV



- VS042
- VS043
- VS037
- CCAS026
- VS060
- VS056
- VS051
- VS064
- VS130
- CCAS028
- VS028
- VS107
- CCAS130
- VS113
- VS008
- CCAS136
- VS104
- VS004
- VS011
- VS036

0.07

0.07

0.07

0.07

- Vaginal
- Anal

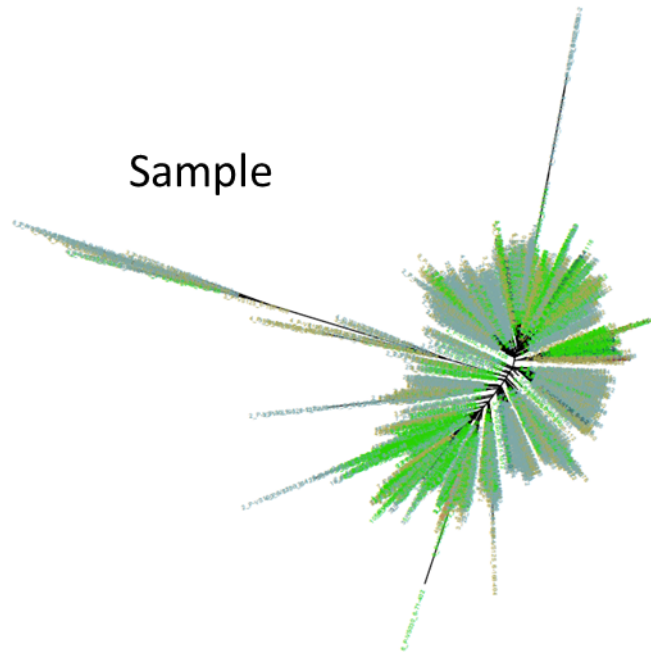
- Normal
- High Grade
- Low Grade
- Unsatisfactory

- HIV+
- HIV-

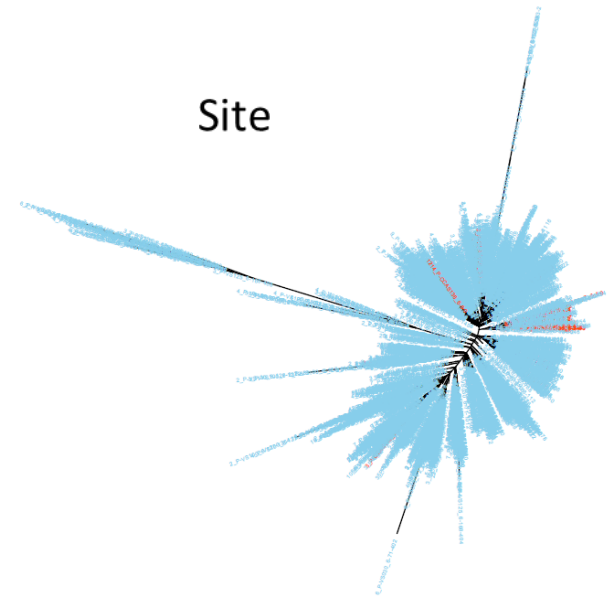
Fig S15: HPV 59

- CCAS030
- CCAS013
- VS084
- VS122
- VS046
- VS056
- VS060
- VS136
- CCAS136
- VS125
- CCAS032
- VS144
- CCAS021
- VS038
- CCAS100
- VS116
- VS100
- VS006
- CCAS037
- VS030
- VS109

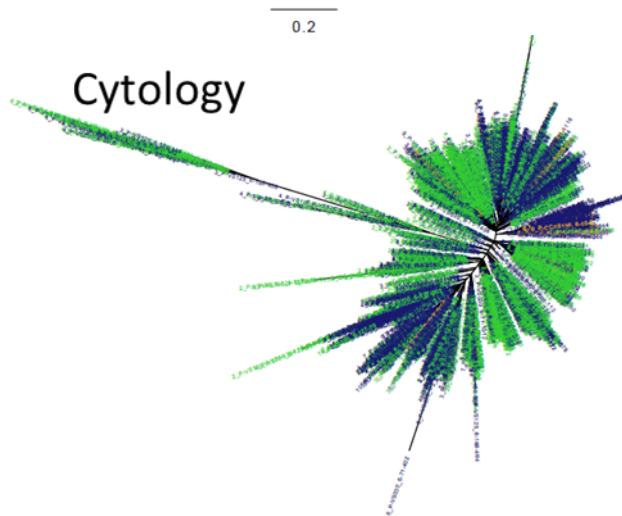
Sample



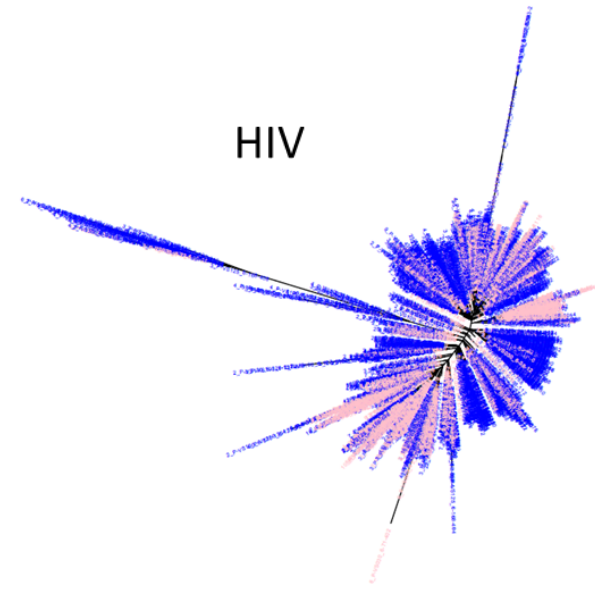
Site



Cytology



HIV



- Normal
- High Grade
- Low Grade
- Unsatisfactory

- Vaginal
- Anal

- HIV+
- HIV-

Fig S16: HPV 61

Sample

Site

Cytology

HIV

- VS040
- CCAS026
- VS044
- CCAS002
- VS006
- VS109
- VS125
- CCAS018
- CCAS034
- CCAS037
- CCAS010
- VS114
- VS115
- CCAS076
- VS037
- VS036
- VS034
- VS138
- VS096
- VS093
- VS130
- VS131
- VS098

0.09

0.09

0.09

0.09

- Vaginal
- Anal

- Normal
- High Grade
- Low Grade
- Unsatisfactory

- HIV+
- HIV-

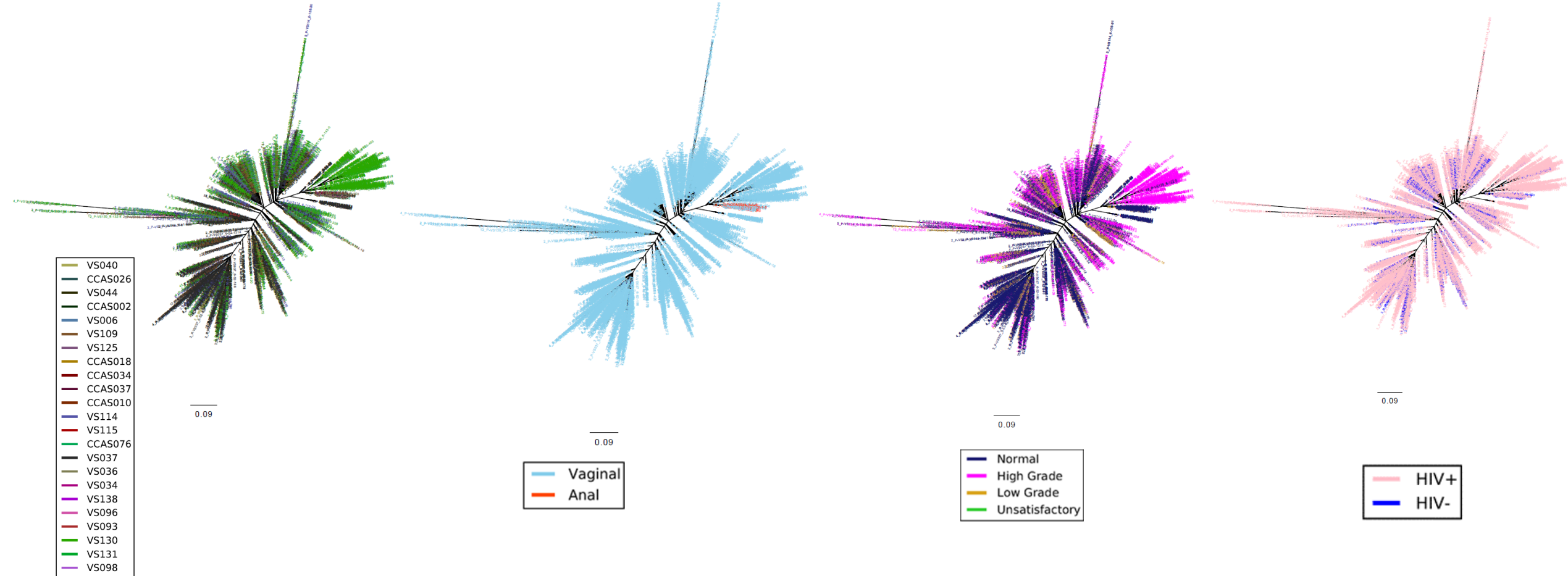
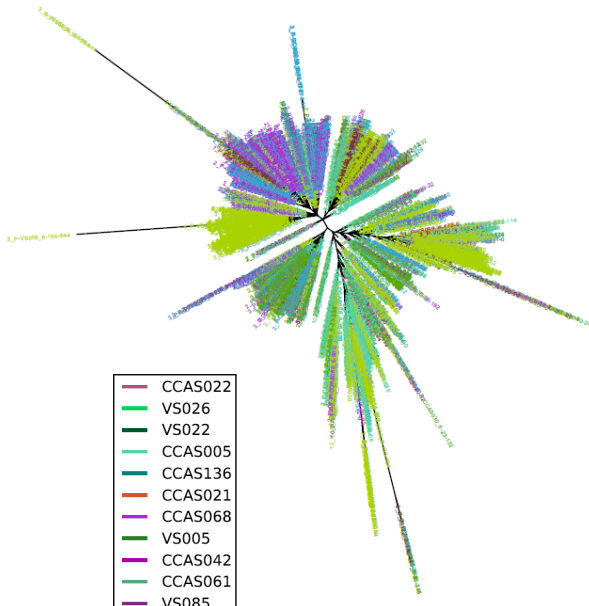


Fig S17: HPV 62

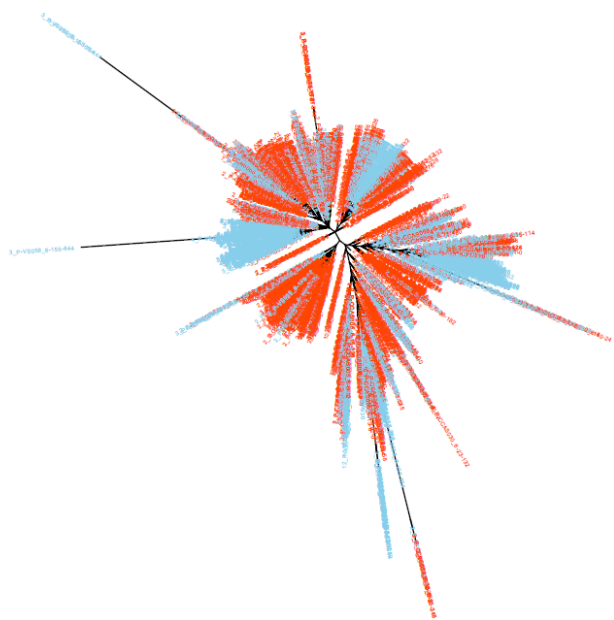
Sample



- CCAS022
- VS026
- VS022
- CCAS005
- CCAS136
- CCAS021
- CCAS068
- VS005
- CCAS042
- CCAS061
- VS085
- VS122
- CCAS030
- CCAS050
- VS059
- VS058
- CCAS058
- VS113
- CCAS128
- CCAS074
- VS030
- CCAS120
- VS133
- VS136
- VS137

0.09

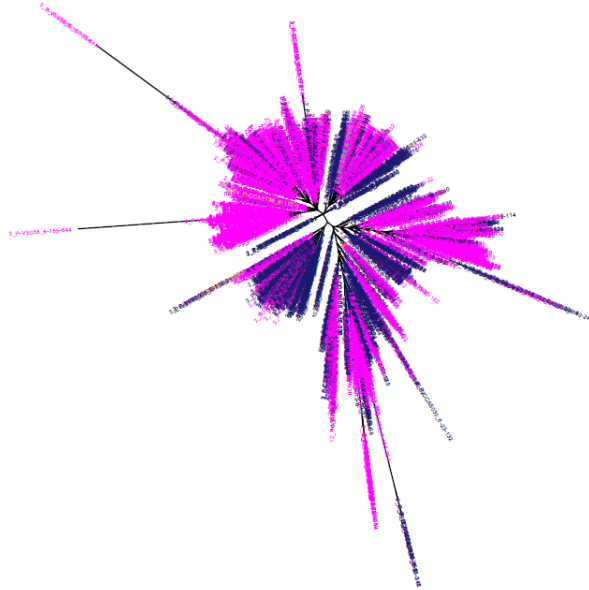
Site



- Vaginal
- Anal

0.09

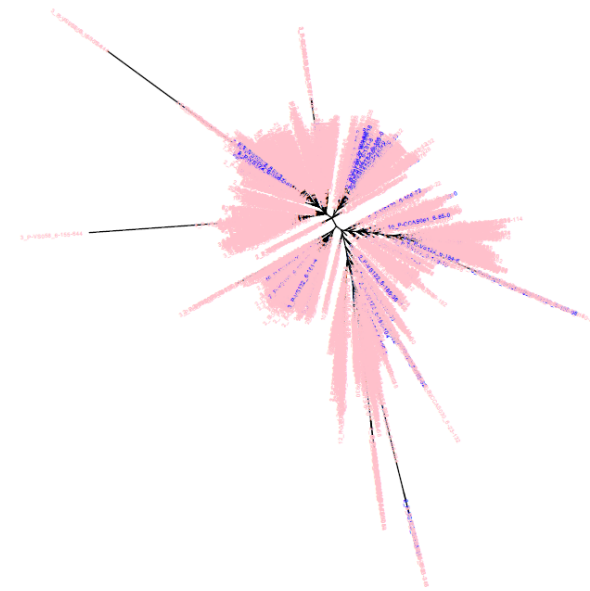
Cytology



0.09

- Normal
- High Grade
- Low Grade
- Unsatisfactory

HIV



0.09

- HIV+
- HIV-

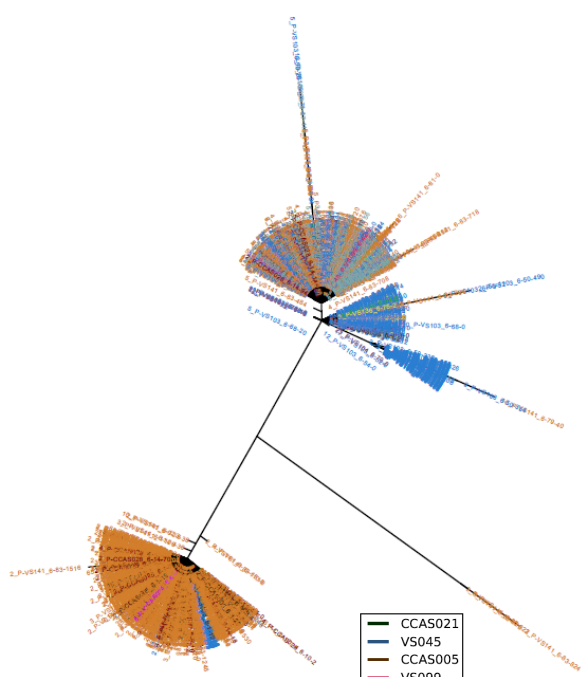
Fig S18:HPV 66

Sample

Site

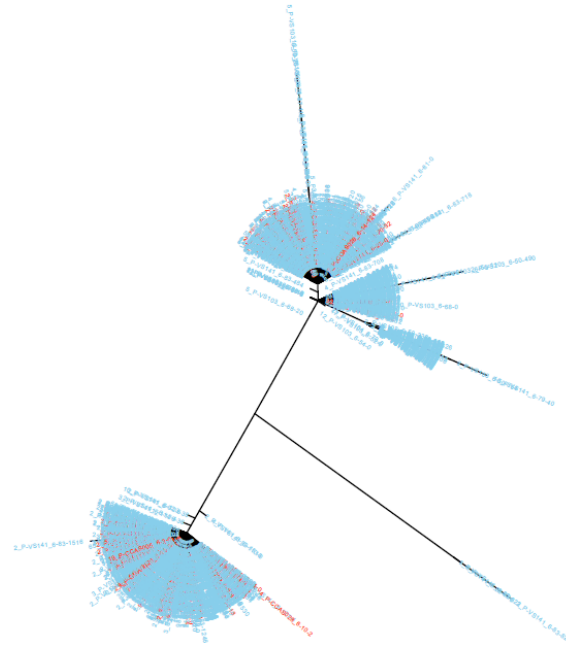
Cytology

HIV



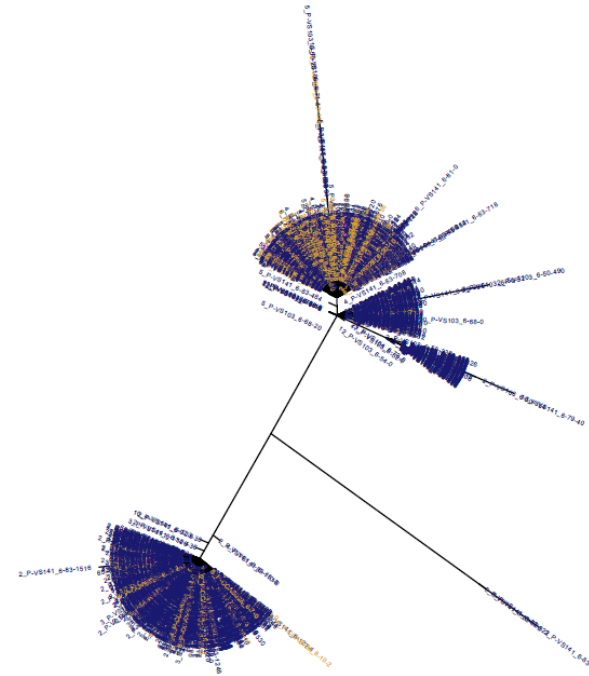
- CCAS021
- VS045
- CCAS005
- VS099
- CCAS028
- VS028
- CCAS003
- VS104
- VS103
- VS102
- VS101
- CCAS141
- VS004
- VS108
- VS087
- VS141
- CCAS024
- VS119
- CCAS120
- VS138
- VS096
- VS133
- VS136

0.02



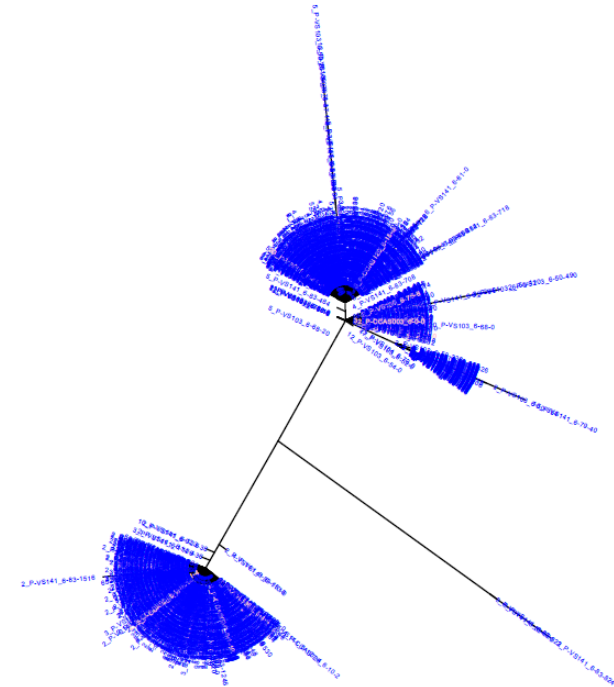
0.02

- Vaginal
- Anal



0.02

- Normal
- High Grade
- Low Grade
- Unsatisfactory

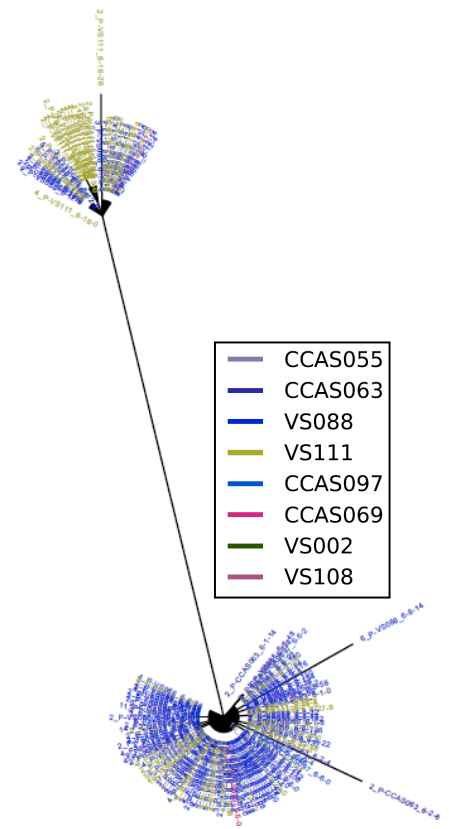


0.02

- HIV+
- HIV-

Fig S19: HPV 68

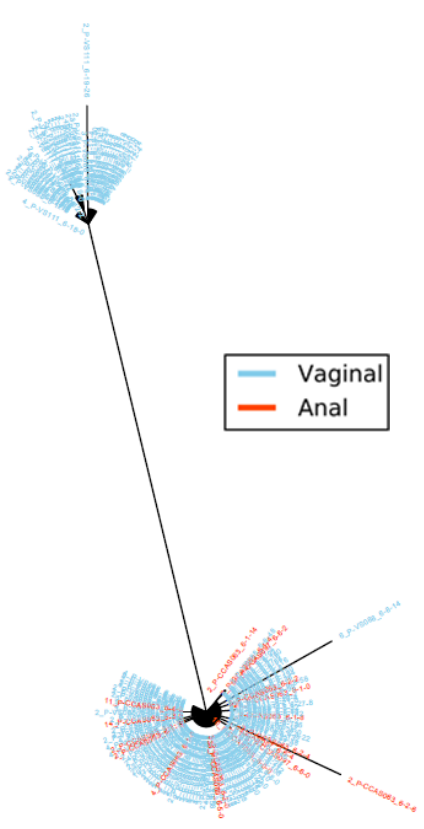
Sample



- CCAS055
- CCAS063
- VS088
- VS111
- CCAS097
- CCAS069
- VS002
- VS108

0.02

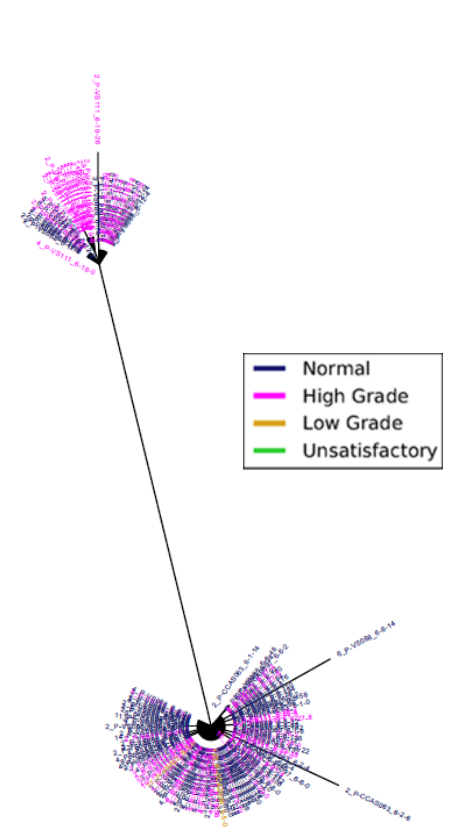
Site



- Vaginal
- Anal

0.02

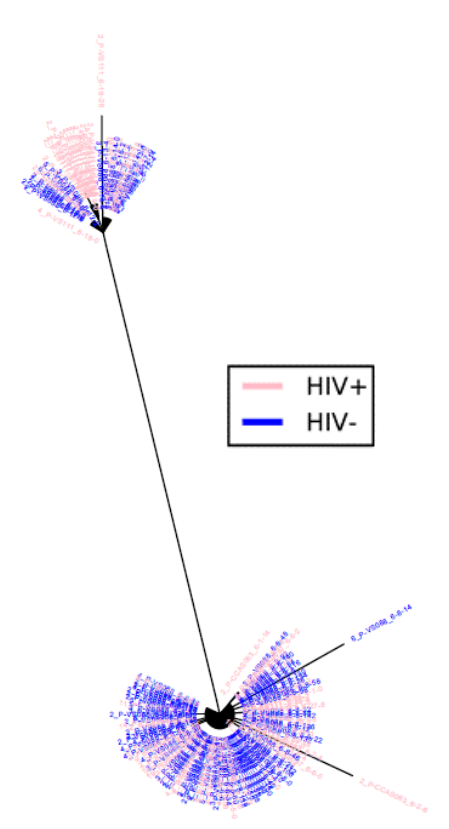
Cytology



- Normal
- High Grade
- Low Grade
- Unsatisfactory

0.02

HIV



- HIV+
- HIV-

0.02

Fig S20: HPV 69

Sample

Site

Cytology

HIV

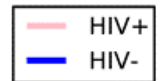
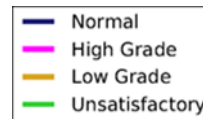
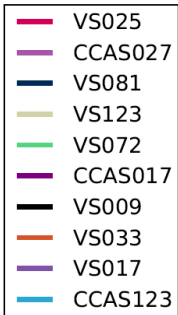
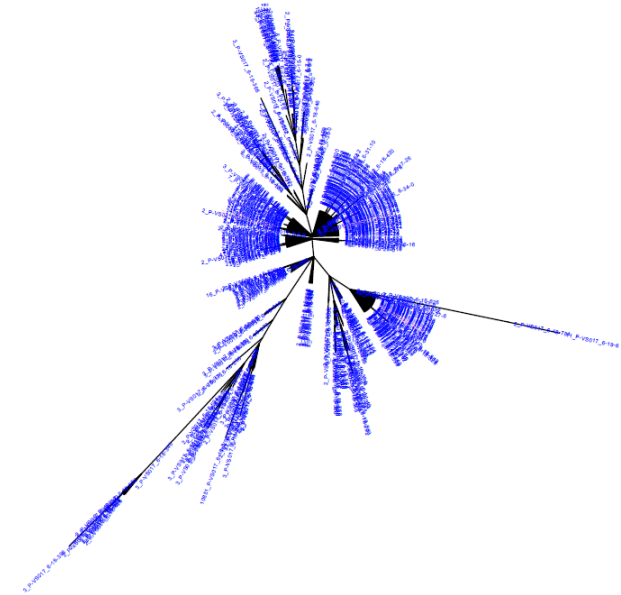
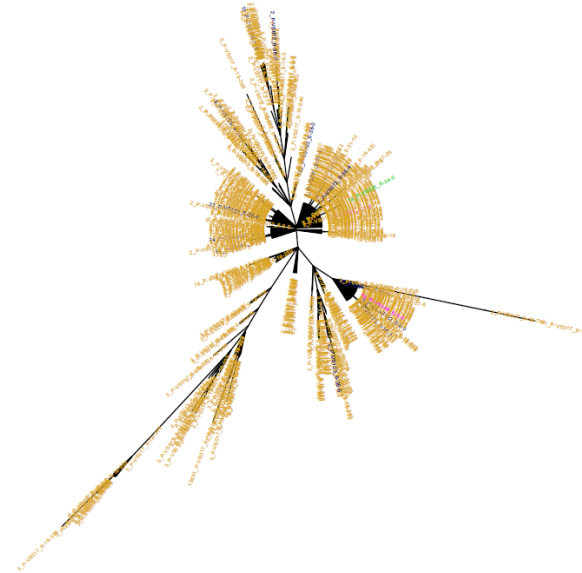
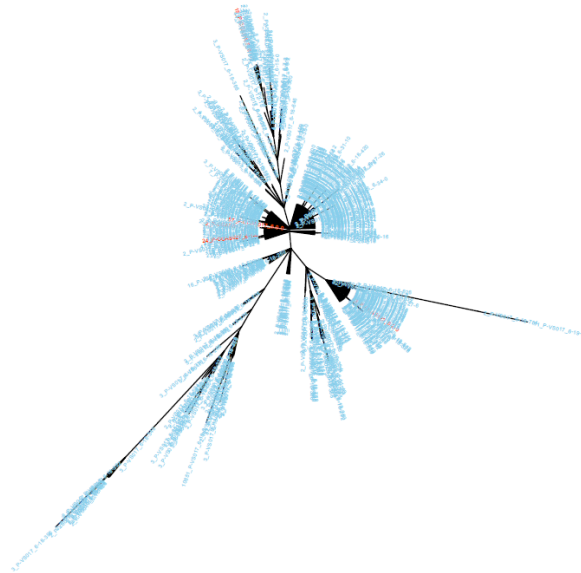


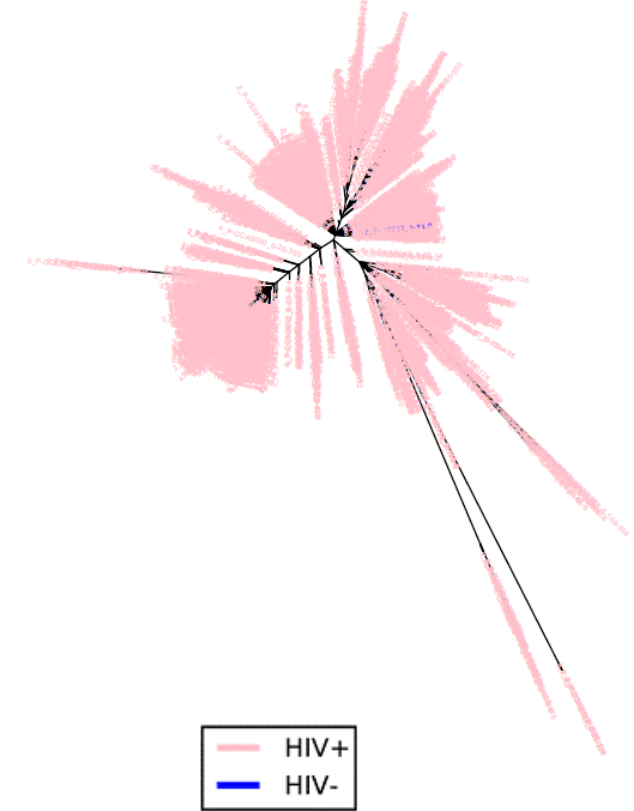
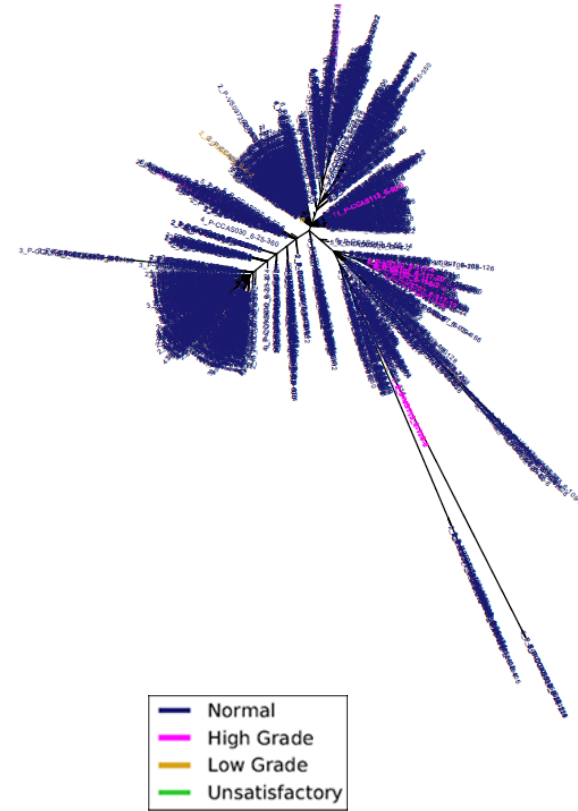
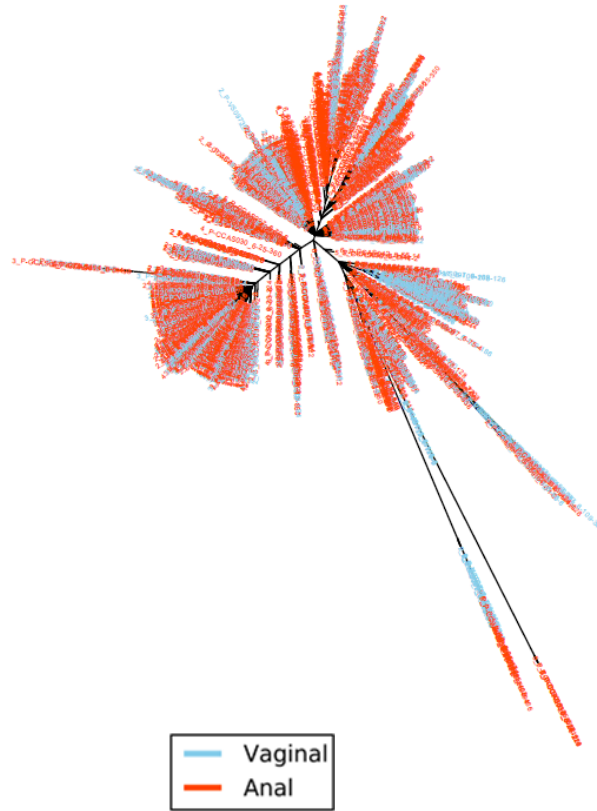
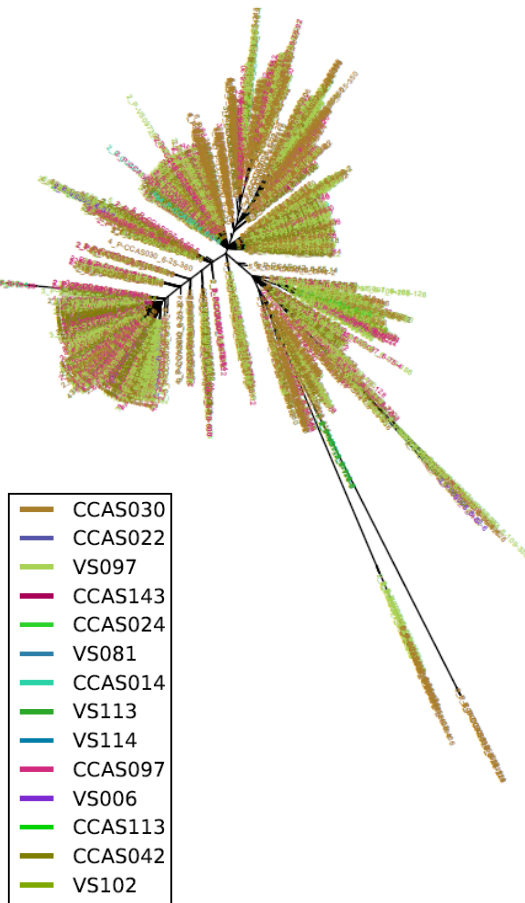
Fig S21: HPV 70

Sample

Site

Cytology

HIV



0.02

0.02

0.02

0.02

Fig S22: HPV 71

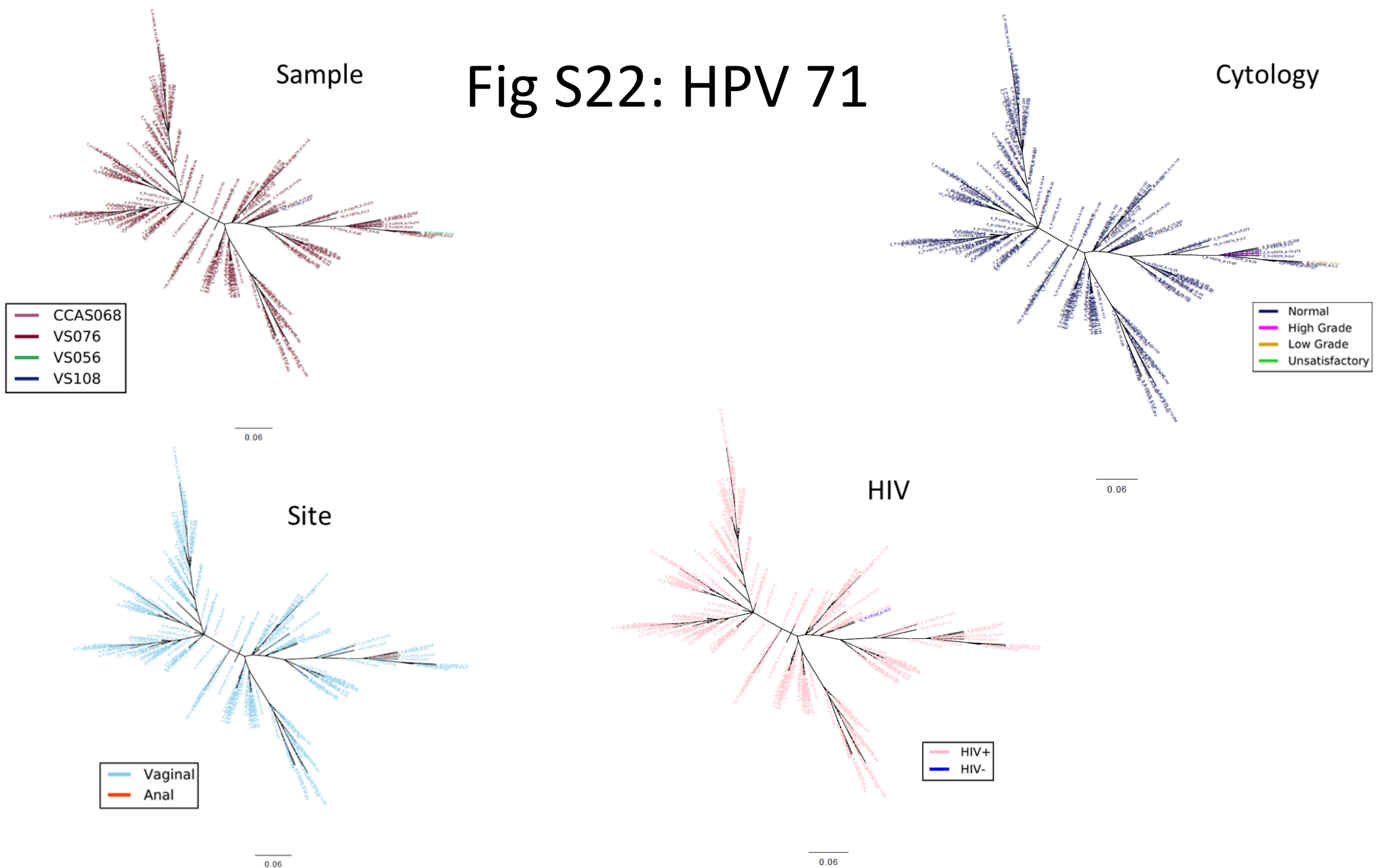


Fig S23: HPV 72

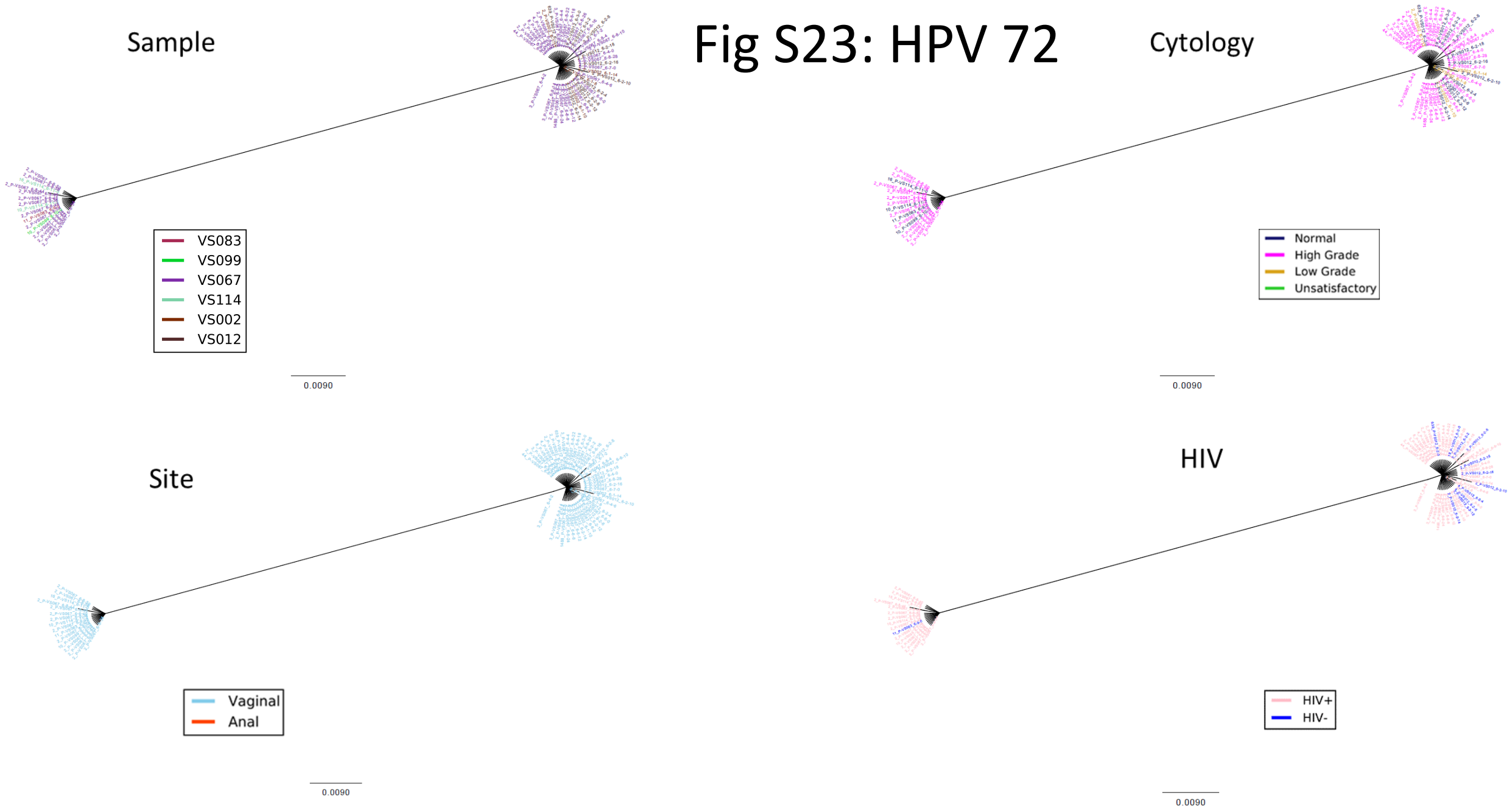


Fig S24: HPV 73

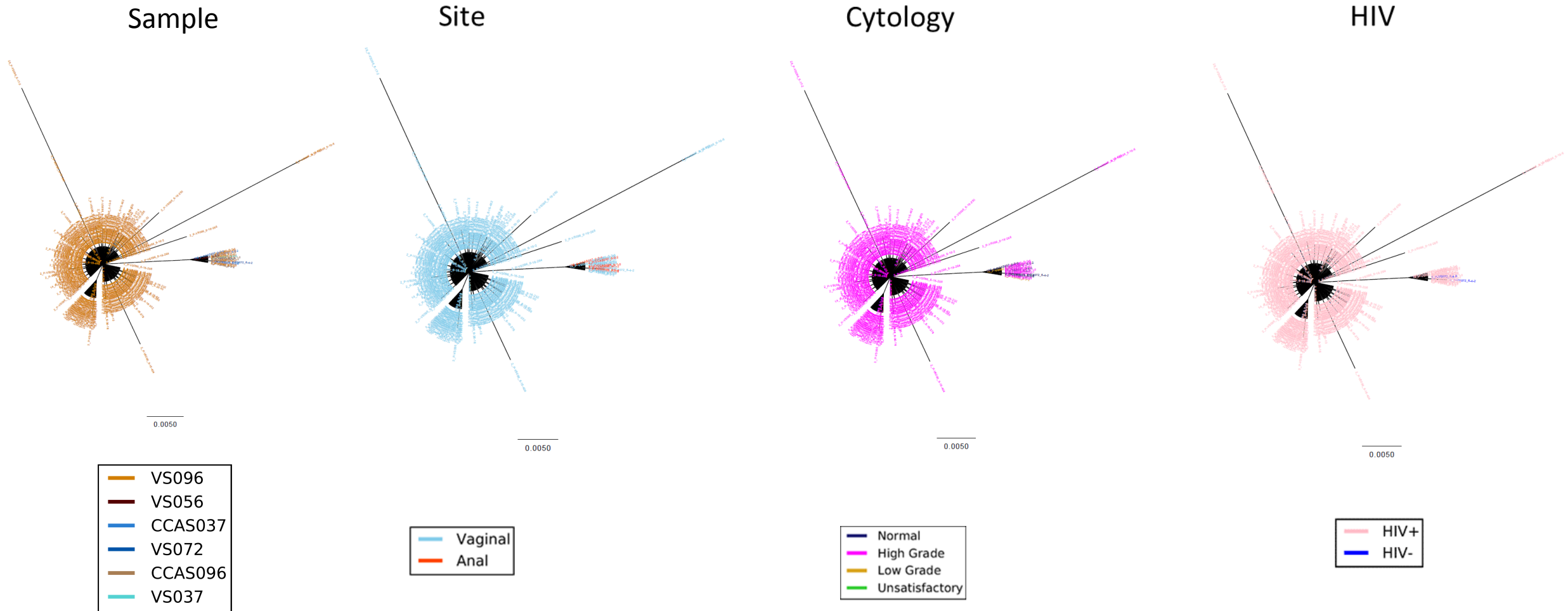


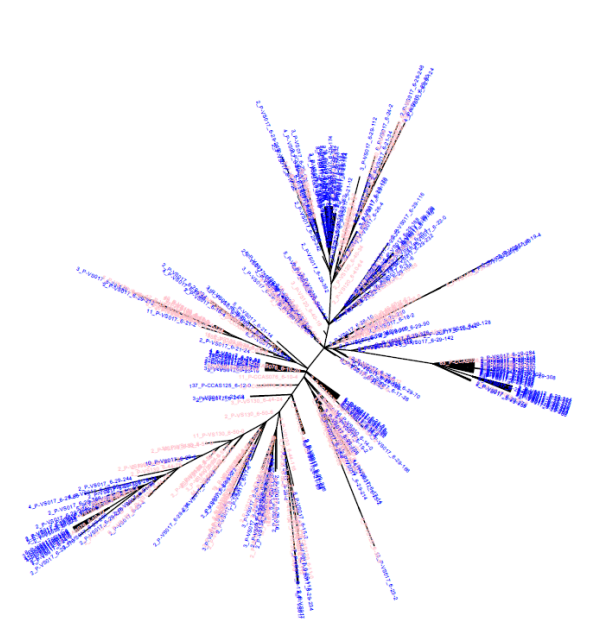
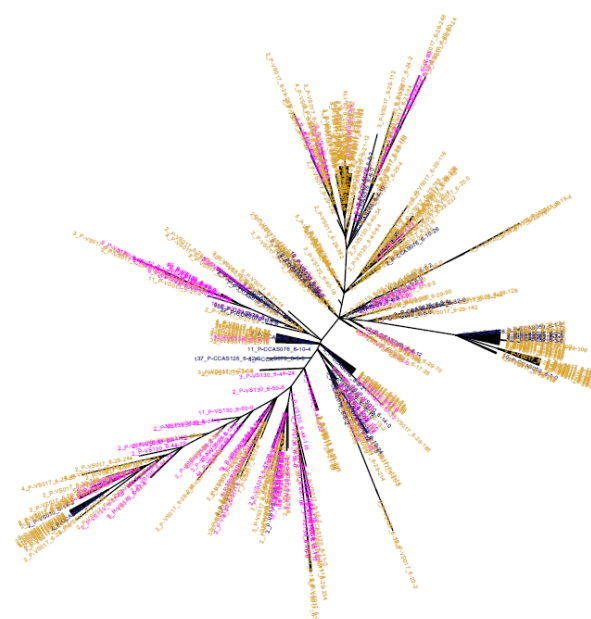
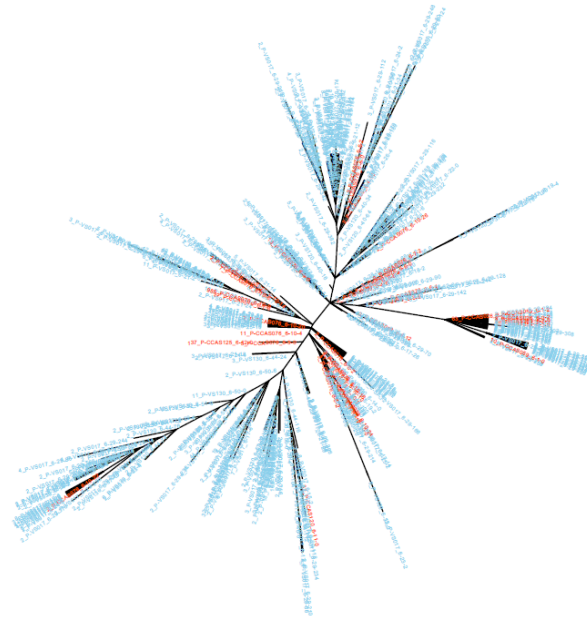
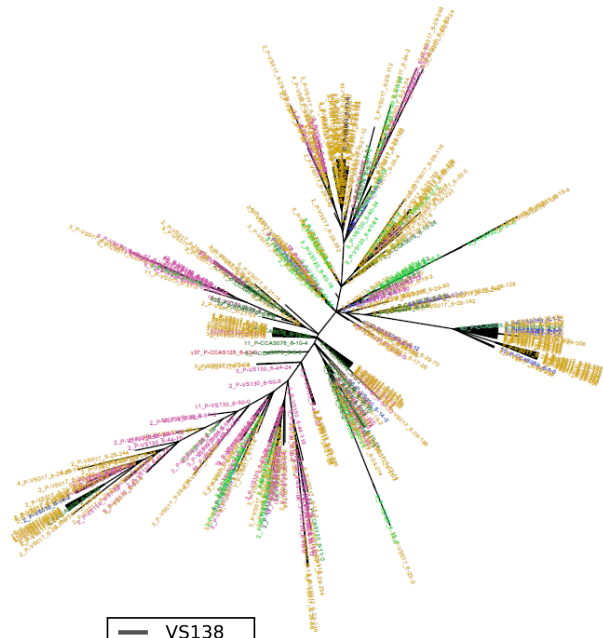
Fig S25: HPV 81

Sample

Site

Cytology

HIV



- VS138
- CCAS125
- CCAS026
- VS056
- VS120
- VS130
- VS010
- VS114
- VS009
- VS033
- CCAS076
- CCAS059
- VS017
- CCAS120

0.04

- Vaginal
- Anal

0.04

- Normal
- High Grade
- Low Grade
- Unsatisfactory

0.04

- HIV+
- HIV-

0.04

Fig S26: HPV 82

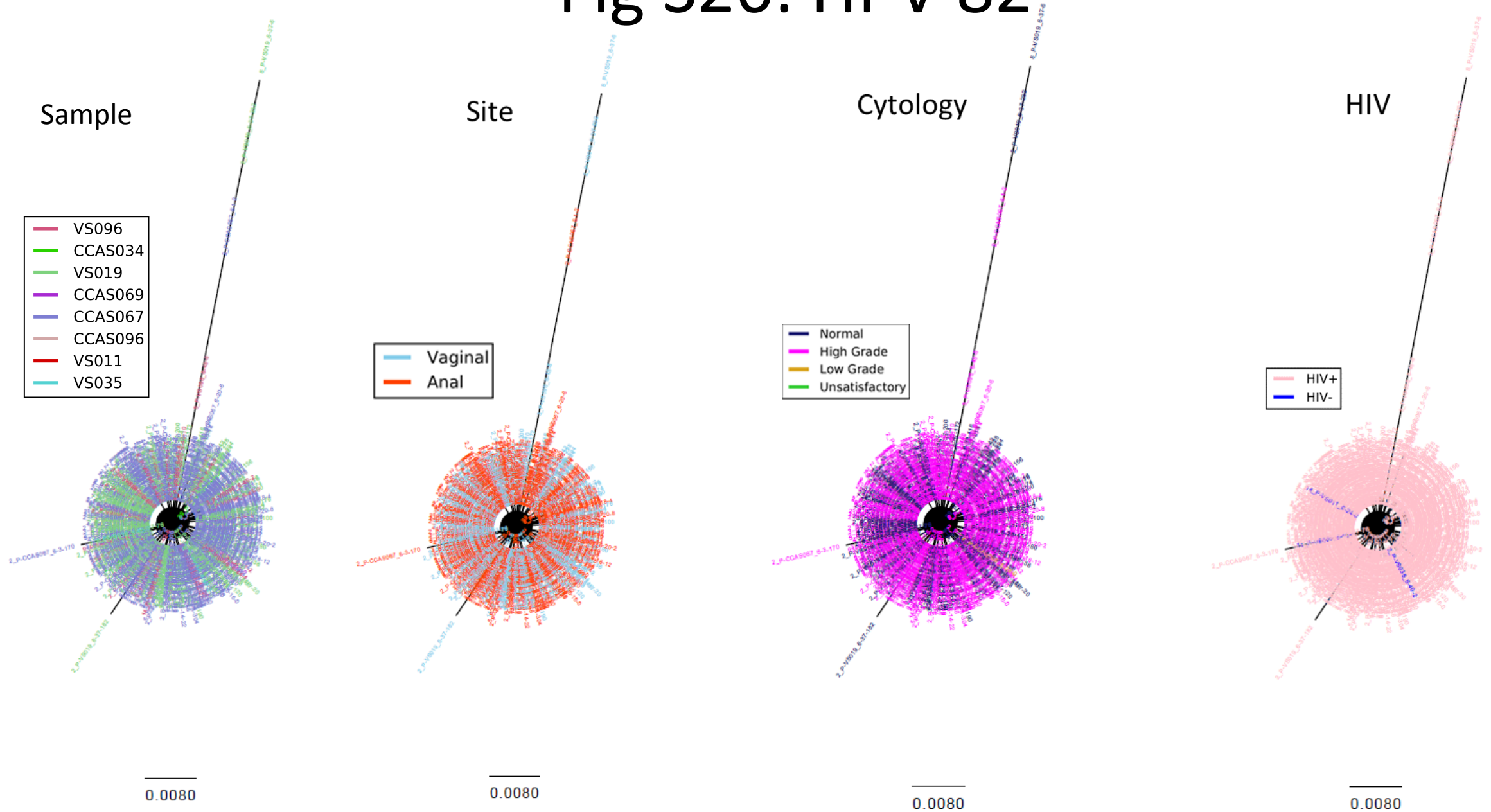


Fig S27: HPV 83

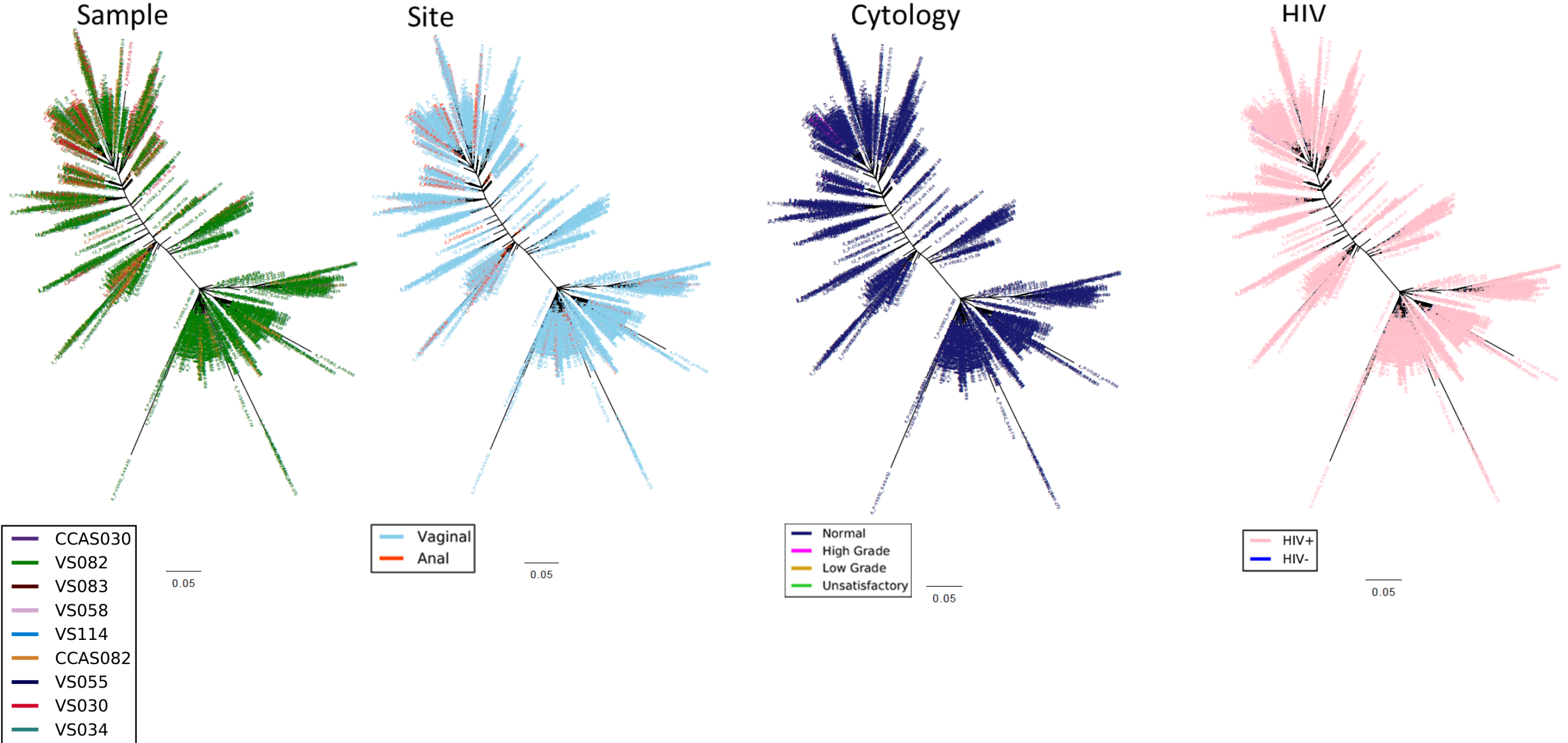


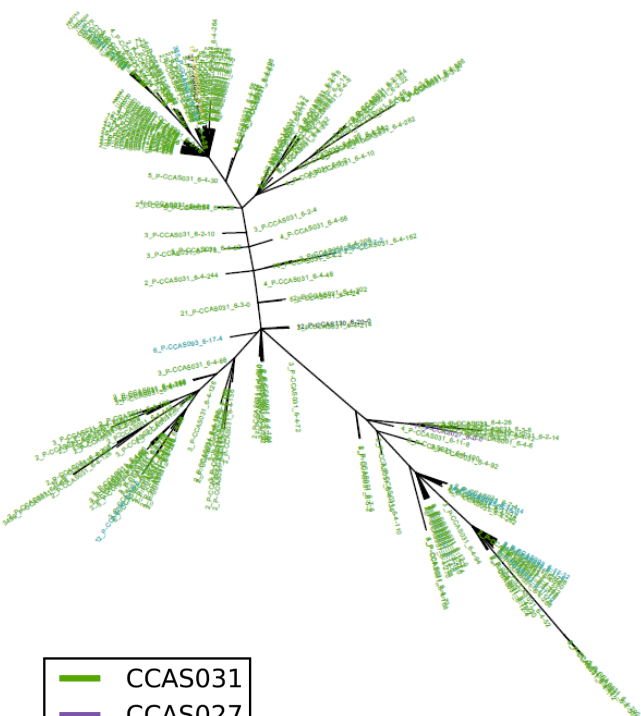
Fig S28: HPV 84

Sample

Site

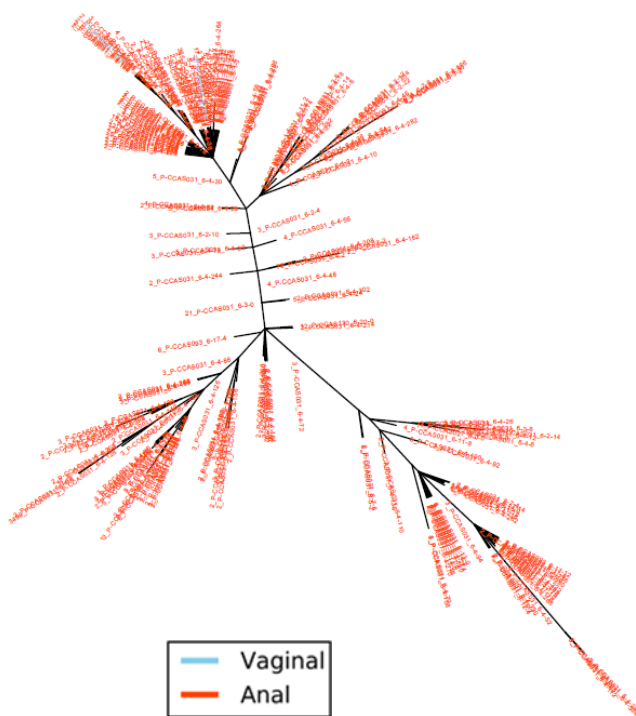
Cytology

HIV



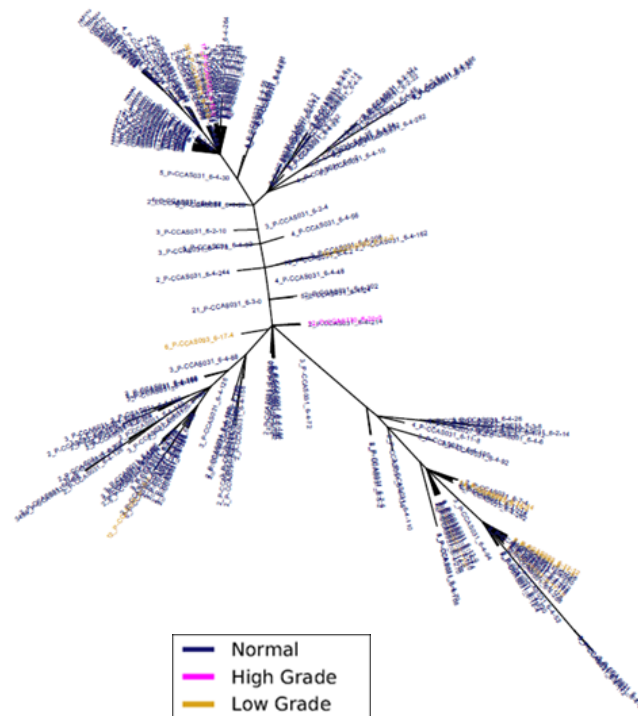
- CCAS031
- CCAS027
- VS093
- CCAS093
- CCAS130
- CCAS102
- VS031

0.0070



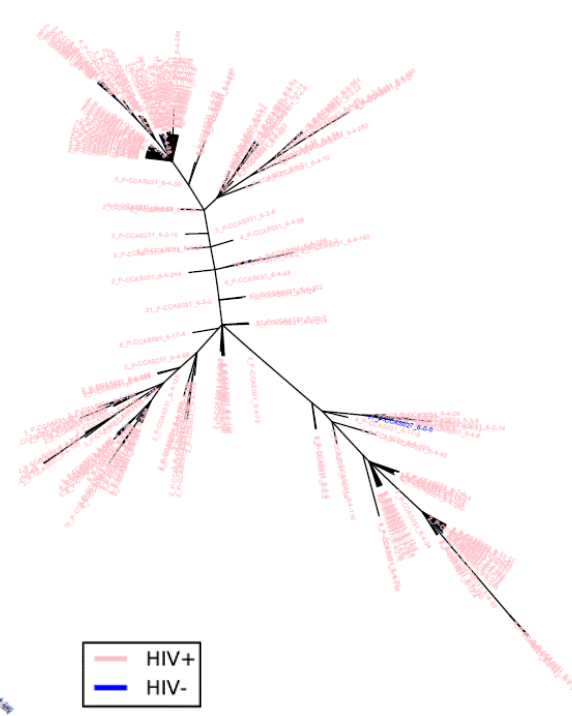
- Vaginal
- Anal

0.0070



- Normal
- High Grade
- Low Grade
- Unsatisfactory

0.0070



- HIV+
- HIV-

0.0070

Fig S29: HPV 86

Sample

Site

Cytology

HIV

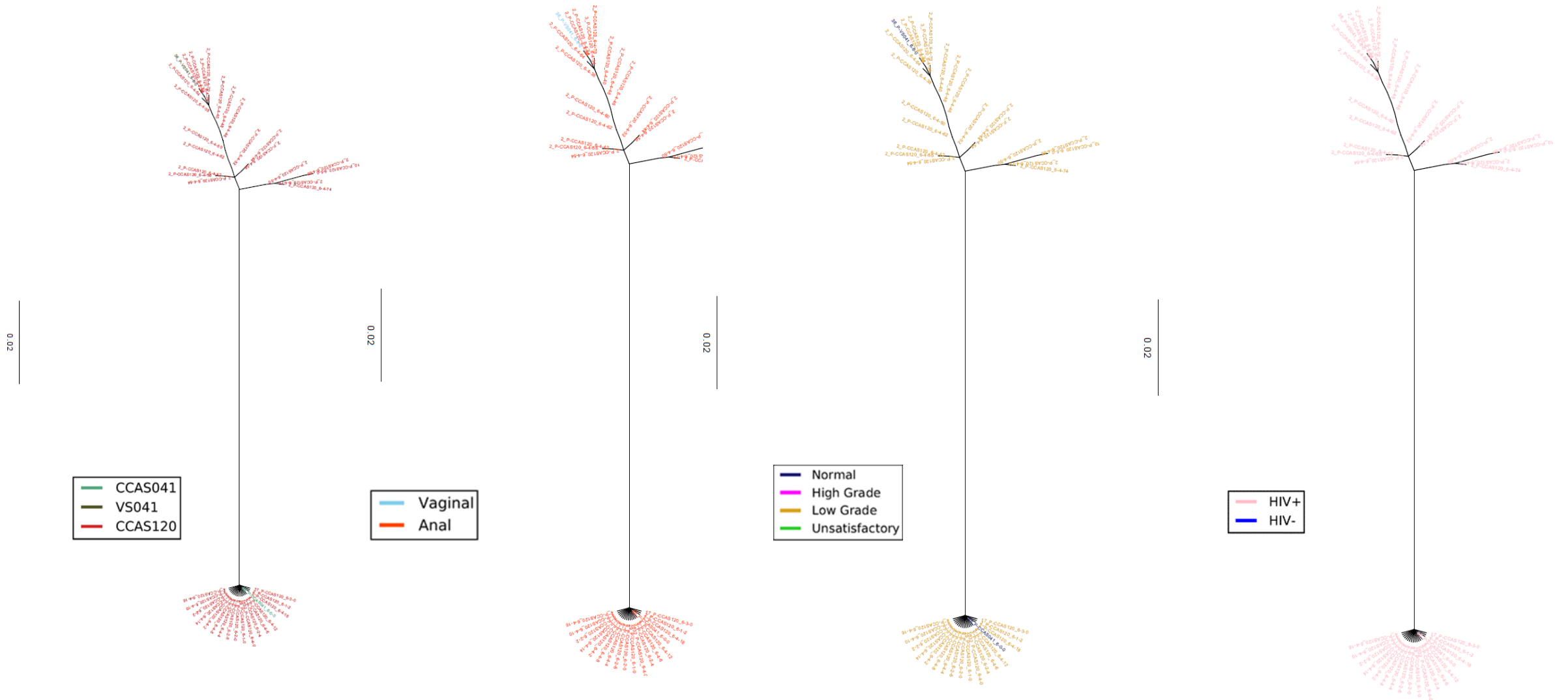
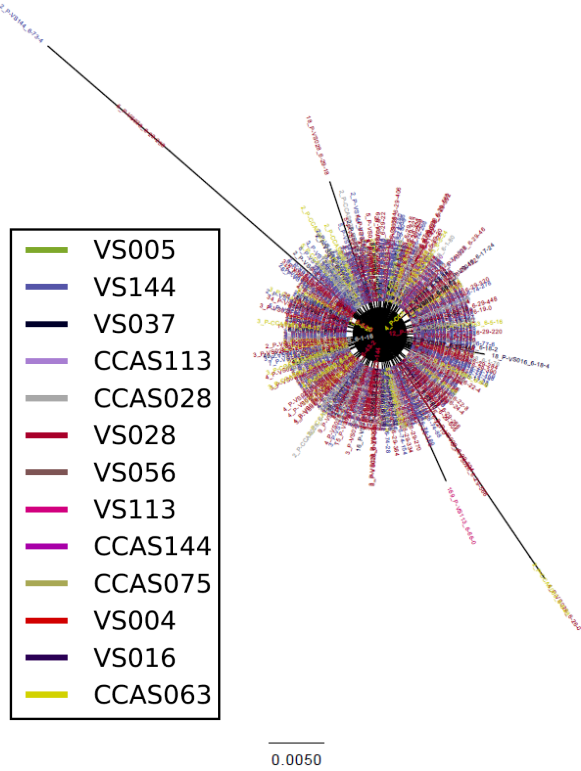
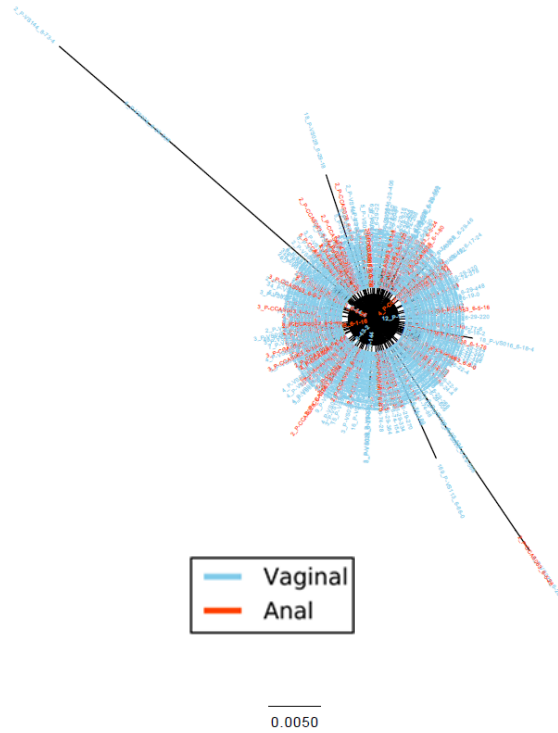


Fig S30: HPV 89

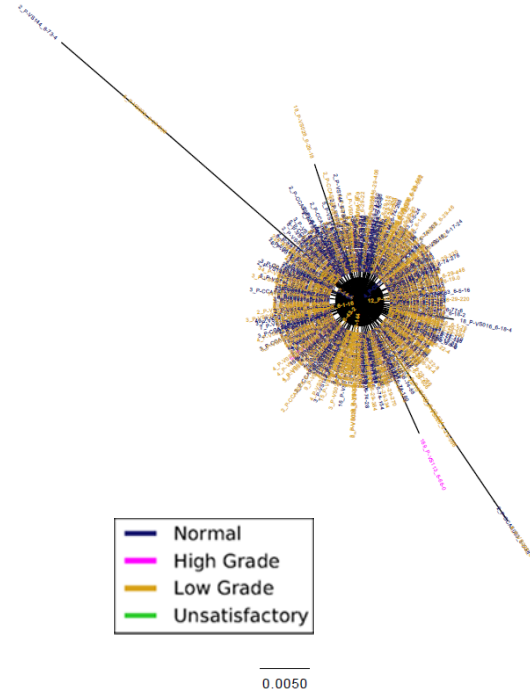
Sample



Site



Cytology



HIV

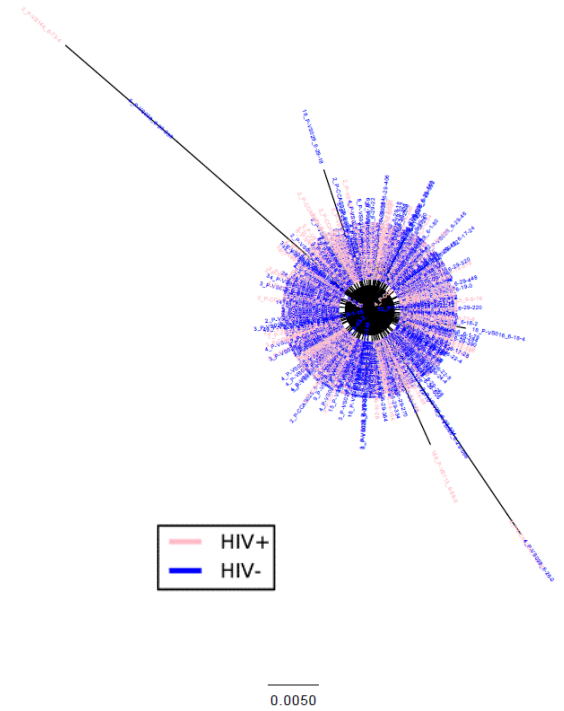
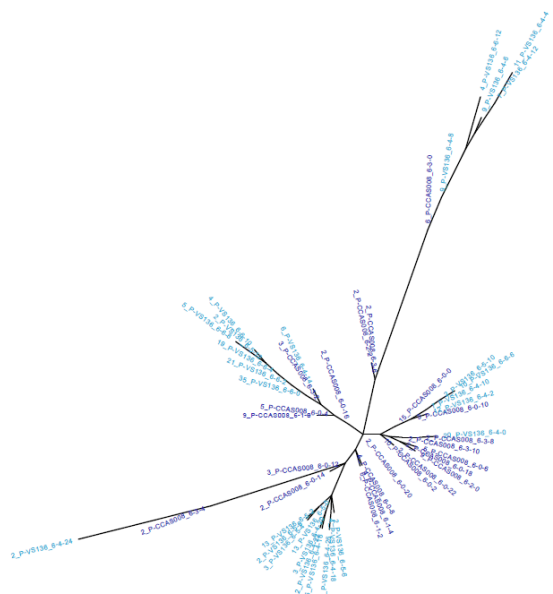
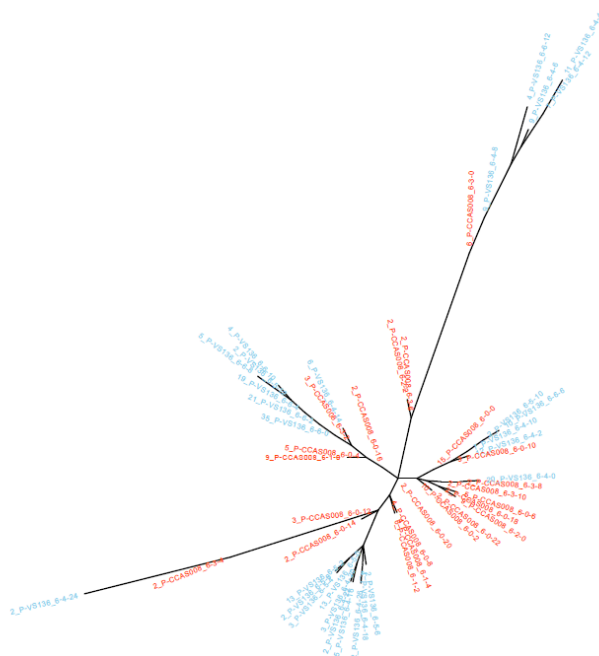


Fig S31: HPV 91

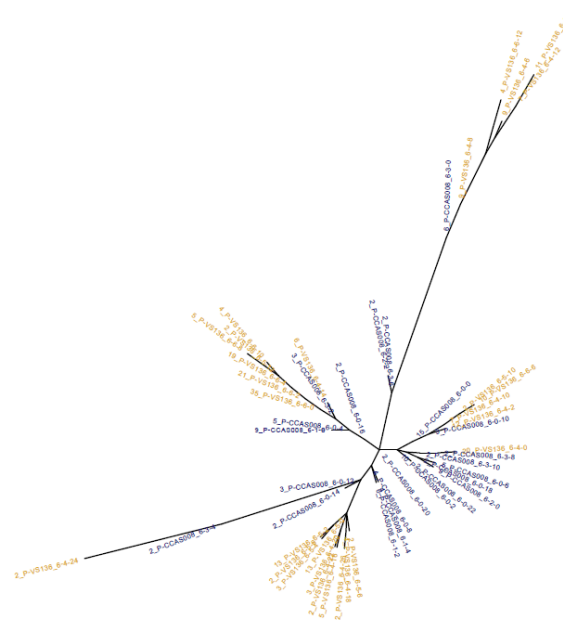
Sample



Site



Cytology



HIV

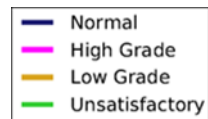
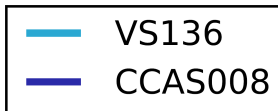
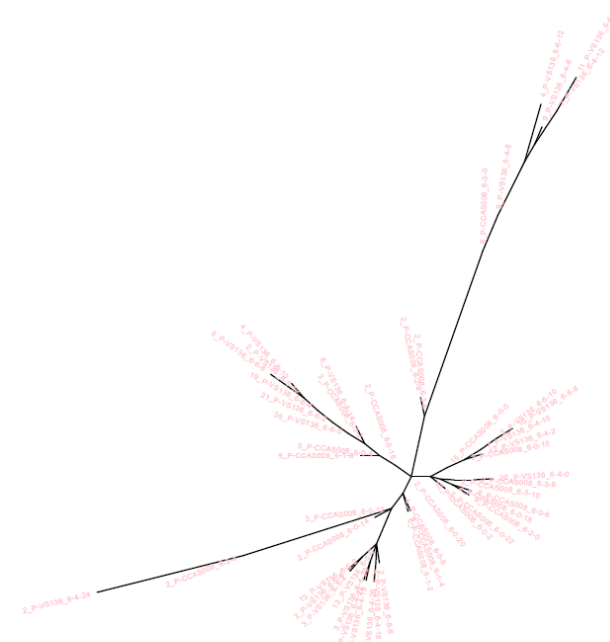
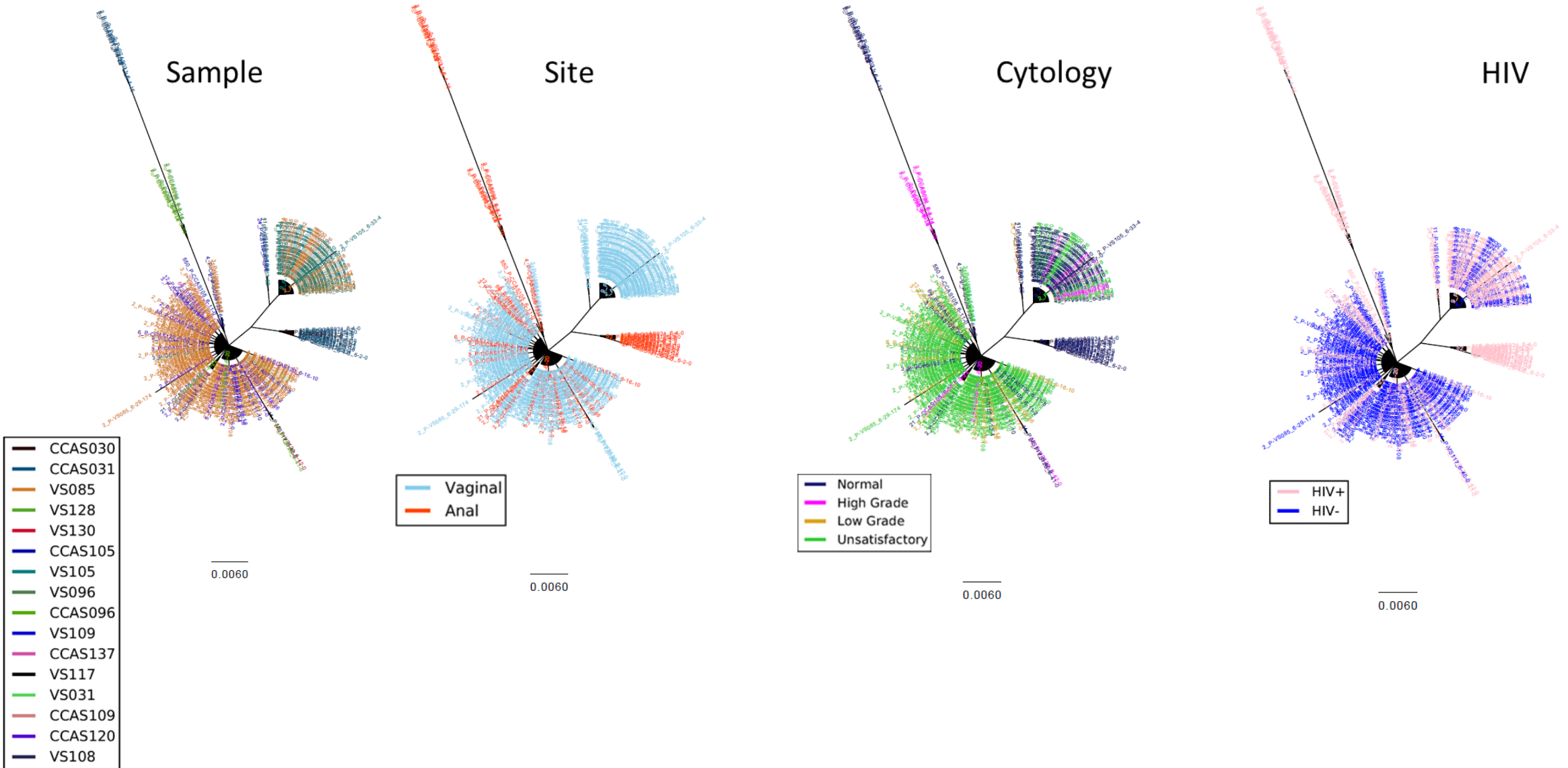


Fig S32:HPV 114



Summary of results

The total number of samples for each genotype ranged from 1-25. Genotypes with at least five samples were HPVs 35, 40, 71, 86 and 91. HPV 35 had a typical 'fishbone' phylogenetic tree. Although the phylogenetic distance was short, there were 3 distinct lineages and numerous intermediate variants. HPV 40 and 71 had 3 lineages. They had 195 and 183 sequence counts and numerous variants signified by the typical fishbone branching of the phylogenetic trees. HPV 91 phylogenetic tree was drawn from 2 samples with sequence count of 57. A fishbone pattern of 4 lineages and numerous variants was observed.

HPVs 42, 54, 73, 82 and 89 had unresolved evolution, with all the variants emanating from one node, as observed by the 'dandelion' shape of the phylogenetic tree. HPVs 39, 66, 68 and 72 had 2 distinct lineages emanating from one node, with each lineage showing no evolution. Numerous variants were observed in HPVs 11, 32, 44, 45, 53, 58, 61, 71, 81, 83, 84 and 91 phylogenetic trees, characterized by the typical 'fishbone' outlook of the tree.

HPVs 31, 32, 35, 40, 58, 59, 69, 71, 72, 73, 81 and 83 were predominantly of vaginal origin. HPV 84 was purely of anal origin and HPVs 11, 45 and 70 were predominantly of anal origin with a few variants of vaginal origin. Based on cervical cytology outcome HPVs 69 and 86 were predominantly from low-grade lesions. HPVs 26, 32, 33, 42 and 72 were predominantly from high-grade lesions. HPVs 35, 40, 66, 70, 71, 83 and 84 were predominantly from normal cytology.

Based on HIV status, phylogenetic trees for HPVs 31, 35, 58, 66 and 69 were predominantly from HIV negative samples. Nineteen HPV genotypes were predominantly from HIV positive samples; these included HPVs 11 and 33.

Summary of discussion

HPVs 11, 32, 44, 45, 53, 58, 61, 71, 81, 83, 84 and 91 from the 32 trees in the supplementary section had typical 'fish-bone' phylogenetic trees. HPVs 26, 32, 42, 66, 69, 71, 73, 83, 84 and 86 had some lineages predominantly from normal cervical cytology, High-grade and Low-grade lesions. These findings are in line with the HPV16,18 and 52 trees.