Clustal W Multiple Sequence Alignments by Group for 6,565 Peptides

Multiple sequence alignments for the 81 groups identified in the hierarchical clustering of the top peptide sequences using Clustal W. A consensus amino acid was present in at least 50% of the group for a given amino acid position.

Key:

R -> Polar Positive

D -> Polar Negative

S -> Polar Uncharged

A -> Nonpolar Aliphatic

F -> Aromatic

C -> Cysteine

Group 1

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 37 rows and 24 columns
##       aln                      names
##   [1] -ARADRACRASAAAAASRSSR--- 1
##   [2] -ADADRACAASAAAAADRAAS--- 2
##   [3] --AADAAAARSAASAADDDSSR-- 5
##   [4] -ARRASAAAAASRSAASAASC--- 25
##   [5] RADSARCDSRSASAASADRA---- 9
##   [6] -ADRARASARSSAASSAASAA--- 28
##   [7] SDARSAADACARSAAAAAAS--- 11
##   [8] -SARARASARSRSAAAAADAR--- 29
##   [9] ARRAADAAARAAAAASASAS---- 16
##   ... ...
## [30] --SAAAAAAARASRSSARSAD-- 31
## [31] -ARRRAARAASRSAARRRASA--- 36
## [32] -RARRAASAASRSSARSRAAA--- 37
## [33] AAARAAASAASR-AARRRARA--- 35
## [34] -ARRRAC-RCCSARAAARSDAS-- 3
## [35] SARRAAA-AACSAASACRRRA--- 34
## [36] -AD-AAC-RASSACASAAASDASS 4
## [37] RADCAACSRAASACSAARAS---- 8
##  Con -?R?A?AAAA??A?A?A?AA?--- Consensus
```

Group 2

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 55 rows and 26 columns
```

```
##         aln                       names
##   [1]  ----SRASAASAASRAARCASARA-- 10
##   [2]  ---SSRRSAASAAASAAADASAR--- 18
##   [3]  ----SR-SAASASRSRARCDSARAS- 11
##   [4]  ---DSCASSSRARASAASSASAS--- 45
##   [5]  ----SCASSARAAAS-ASSASA---- 46
##   [6]  ----SCRSASAAAAADDRRSARSS-- 16
##   [7]  ----SCDSASAASAARRRASAASS-- 22
##   [8]  ---ASRRAASRAAAAAAARAAAS--- 14
##   [9]  ---RRRSAASCAAASAAARRSAS--- 15
##   ...  ...
##  [48]  --ASSDS--CSSAASARSAASSSAS- 25
##  [49]  --SRADS--ARRACAASSAASSSA-- 27
##  [50]  --SCARA--ASAASADRASAAASS-- 21
##  [51]  ----CSS--ASDRSAASDASARSSSS 31
##  [52]  --SRCSS--AADRSAASAASAASS-- 32
##  [53]  --SSCSS--ASDAAAASAASAASS-- 33
##  [54]  ---RCASSRARDASAASAARSAS--- 44
##  [55]  ---RDAS-RARAASDARAADSASC-- 51
##   Con  ---????AAA?AA??AA???S?S?-- Consensus
```

Group 3

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 150 rows and 29 columns
##         aln                       names
##    [1]  -----CSACSAS-RC--AASAAARDASS- 46
##    [2]  ------SARSAS-AS--AADAARSDADRC 144
##    [3]  -----CSAAAAARAS--SAAAARSDDD-- 114
##    [4]  ----RRSSAAAASRA--ASAAAARAAS-- 97
##    [5]  ----RCRSSAAASRA--ASAAARSRA--- 98
##    [6]  -------SSAARAAA--DRAASASAAAAD 14
##    [7]  -------SSAARAAS--DDAARADDASA- 75
##    [8]  -----SSSSRASARC--ASAARAAARDA- 41
##    [9]  ------SSS-ASARC--CRAARADARSAS 43
##    ...  ...
##  [143]  ---ASRARSSASASD--AAASCRAA---- 127
##  [144]  ---SSARRAAAAAAA--AAAASARAS--- 55
##  [145]  ----AASRARACAAA--AAAASARAR--- 121
##  [146]  ----DSSRAAAAAAA--AAAASSRAA--- 54
##  [147]  ---SSSAAASRAASA--AAAAAAASS--- 61
##  [148]  ----ASSAASRAAAA--AARAAAASS--- 63
##  [149]  ----ASAAASAAAAS--ARAAAAAASS-- 62
##  [150]  -----SAAASRAAAR--ASAAAAAASCS- 66
##    Con  ----???AAAAAAAA--A?AA?AA??--- Consensus
```

Group 4

```
## use default substitution matrix
```

```
##
```

2

```
## MsaAAMultipleAlignment with 12 rows and 23 columns
##       aln                     names
##  [1] -SSRASAARDAARAAADAAAA-- 1
##  [2] --SRAAACRDAAAAACAAACAR- 2
##  [3] AADRSRARRDARCAAAAASA--- 3
##  [4] --SAAAASRRASARAAAARASR- 4
##  [5] --RAAAASRAARAAAAAAASSS- 5
##  [6] -RRADAAARSCSSACDAARAS-- 7
##  [7] -SSADSAARSASACCAASRCAS- 8
##  [8] --SRDCACSSASAACSASAARS- 9
##  [9] -SSRRDASRSRRAACAASAAS-- 11
## [10] SSRRRRCSRRSARAASASRAS-- 12
## [11] --SADACRRACRSACASSSDAS- 6
## [12] --SRRACSSASSSASAASAAAAS 10
##  Con --SR?AA?R?A?AAAAA?AA??- Consensus
```

Group 5

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 59 rows and 26 columns
##       aln                     names
##  [1] -----SSDRCAASAAAARARAAAS--- 2
##  [2] -----ASDDAARSAAACARRDASAS- 6
##  [3] ----SSSSDSAASADAAADRAAAC-- 3
##  [4] ----SRSS-AAASADAAAARAAASAS 30
##  [5] ---SCSSDRDARSAASARAAASS--- 10
##  [6] ---ASSSDRDDRSSASAAAAADS--- 11
##  [7] --SSSSADRSSRSAAAAAAAAAS--- 4
##  [8] -----SASRSSASAAAAASRARS--- 40
##  [9] ----SAASRSSSSAAAAAASASSS-- 42
##  ... ...
## [52] -----AAARAASAAAAAASAARCSA- 43
## [53] ----RASARSASASAAARSAASAS-- 28
## [54] -----ACASSARASASAARSSRAAA- 31
## [55] -----ARASSADRAASAASSSRASA- 32
## [56] -----DAARAASAAASAAAAASSSAS 37
## [57] -------AADAA-ACASAAAAASSS-- 38
## [58] ---RRARAAASASASRAARAAAASAS-- 29
## [59] ----AAAARSAASRAAAASASDSA-- 44
##  Con ----?????????AAAAAA?A???-- Consensus
```

Group 6

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 48 rows and 24 columns
##       aln                     names
##  [1] --ASRRRARCCASAARCRARA--- 1
##  [2] --AAARRARCAASAAASAADDA-- 9
```

```
## [3] --ASRSASRRASSAARADASAA-- 17
## [4] --AARSSARCCSAAARSSSARA-- 2
## [5] --AARSAARRACAARRSDSAA--- 18
## [6] ---ASRSAARA-RACAAASSAASD 13
## [7] ---CRRRSSRADRARRAASSAAS- 27
## [8] ---CRARSRRA----RAASSASA- 28
## [9] --ASRSSARRS-RCARAASAAAS- 14
## ... ...
## [41] --SSAARASAAAAARRRAARAA-- 39
## [42] --AAARSAACAAAASRAAAAAA-- 10
## [43] --ASASRASAASAARSCAAARA-- 43
## [44] --ASARRRSAACAARDAAAARS-- 44
## [45] --AAARR-SAACAARAAAAARAA- 46
## [46] -SRSARSCSRSCAARARAAAD--- 3
## [47] -S-SDASASASCASRAACCARA-- 48
## [48] -S-ARRSRAAACA-RASCAARAR- 42
## Con --?????A?RA?AAAA?AAAAA-- Consensus
```

Group 7

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 30 rows and 23 columns
##     aln                     names
## [1] ----AADRAARAACSARARSR-- 1
## [2] -SARRARRAARAACDACSRRA-- 19
## [3] --SAAADRAARARRSDSCRRSR- 5
## [4] --SAAARSAARSRSSASCRSAR- 6
## [5] --SRAASRAARRSRAADSRRAA- 11
## [6] --SAAASASACACRSAARCRDR- 7
## [7] SSSAAASSASAAAASARRC-D-- 25
## [8] --SAASSAARSACSAASARSAR- 2
## [9] -SRACSARASRRARSRRRASR-- 12
## ... ...
## [23] -SSSCAAR-ASARAASSSAARA- 22
## [24] -SSSAAARSARAASSASAAAC-- 23
## [25] -SSSAAARRARASSDARCAAS-- 26
## [26] ----SADRRRRADAAADRR---- 14
## [27] --SSSASARCRARASADARARAA 27
## [28] -SASRSRAS-RCARARDACSCR- 18
## [29] --ASSSDADDRSARARDRCCCR- 20
## [30] ---SSSASRARAARAARCSAARA 28
## Con -S??AA?RAARAA??AR?????- Consensus
```

Group 8

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 8 rows and 21 columns
##     aln                     names
```

```
## [1] -SASASAAARAARARRSRCRA 1
## [2] -SSASSAAARASRARRRRRRA 2
## [3] -SSRSSASSAARRAADARRRA 3
## [4] -SRSAACSAARSRAARARRRR 4
## [5] -SAASSSASACRRRCRRRAAR 8
## [6] -AASSACSSRADRRAASRCAA 5
## [7] SAAASASSSDADCR-ASRAAA 6
## [8] SAASSACARADARRCCSRAR- 7
## Con -SASS???SAA?R??RSR?RA Consensus
```

Group 9

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 52 rows and 25 columns
##       aln                      names
##  [1] --ARSSSSR-AAASACASRARSS-- 19
##  [2] ---R--DAR-ASASAASSRARSR-- 31
##  [3] --SDSSSSR-RARSRASAR------ 24
##  [4] --RASRSSR-SARSARSARRRAC-- 25
##  [5] -RRAAASSD-SASSRASARAR---- 33
##  [6] AASDSRSSR-RADS-RSARASA--- 22
##  [7] -SADSASSRARARS-RAARASS--- 23
##  [8] --SSSSRAR--ASSARSSARRSRA- 27
##  [9] ---SSSAAR--ARSARSSS----A- 28
##  ... ...
## [45] -RSARASSRCADRSSCSRRAS---- 6
## [46] ---CACAAAAADRSRCRSSSARA-- 9
## [47] --ARAASAAAAACSAARSSSAA--- 10
## [48] ---AASAAAAAACSCSARASAAR-- 7
## [49] ---AAAARSASRRASADRADRSA-- 48
## [50] ---SASASAAAACSSRRSSAADR-- 8
## [51] -SASSRAASAAASSSSS-R------ 15
## [52] --ASARASSAAASASSSDRSSC--- 17
##  Con --?AA??????A?S??SS?????-- Consensus
```

Group 10

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 132 rows and 26 columns
##       aln                      names
##   [1] ---SAARRCSCS--CADSAAS----- 5
##   [2] -DSSARRRCSSASRASDASAA----- 30
##   [3] ---ASARACSSARAASRASADAR--- 103
##   [4] -SAADARRASSS--ASR-SDD----- 18
##   [5] -SARAARRASSD--ASDDAADCA--- 20
##   [6] --SDRASRARCCCRRSAS-RAARA-- 1
##   [7] --SRRASRARDCSSAAASDRAA---- 3
##   [8] --SARAASARDAASSSAS-RAAA--- 2
```

```
##   [9] ---CSSSRRRSAACSSDDSAA----- 31
##   ... ...
## [125] --SSARRSASAARRARDCASAR---- 54
## [126] --AAS-AARRSRASSDR-SASACD-- 46
## [127] -RASSDAARRSDRRSSR-SAS----- 48
## [128] -RARS-AARASRRSSCRASASA---- 47
## [129] ---SS--ARDRRRDSASCSAASSRR- 22
## [130] -DAAS----ASRRASADRSADS--R- 26
## [131] --SAS----ASRRASARASRDSSCRA 119
## [132] --AAS----ACARSSARRARDAD--- 66
##   Con --?ASA?A??????????S?A??--- Consensus
```

Group 11

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 82 rows and 28 columns
##      aln                         names
##  [1] -SSRRRACRSS-AARA-ASA---AAR-- 1
##  [2] ----RRSAAAR-AARA-ASS---AARA- 8
##  [3] --SRAARCRSS-AARASACS---RAR-- 2
##  [4] --SRASAAASSRDARA-ACA---RAR-- 3
##  [5] --ARRARAAAS-ARAASARA---DAR-- 66
##  [6] -SARRARAAAS-A-SASSRA---ASR-- 68
##  [7] --ARSADCARS-RSAASAAR---RAA-- 36
##  [8] -ASRSADRARS-ASAASAAS---CA--- 37
##  [9] -SDASAADARA-ASAASAAR---RA--- 35
##  ... ...
## [75] ---ASDARAAAACSADSAAD---CSS-- 14
## [76] ---ASSARSARCASDSSRAD---RSS-- 19
## [77] ---ASSRRSASSARSAAARA---RSS-- 18
## [78] ---ASSRRDSARASAAARAA---RSS-- 20
## [79] ---SAAADRDSSCSRDSSRA---DAR-- 4
## [80] -AASDAAARAARASRCRSRA---A---- 30
## [81] --ASDDDASARASSRAASRS---RA--- 31
## [82] --ASADRRSAARSDRAAARS---RA--- 32
##   Con --????AAA??????A??AA---?A?-- Consensus
```

Group 12

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 31 rows and 24 columns
##      aln                     names
##  [1] ---SSRASRRACSRRAADASASSS 8
##  [2] ----SRAARAARSRAACASRDSSS 10
##  [3] ---RARAARRAASAAASSRSRS- 1
##  [4] ---RARARASARRARSSSSRSRS- 2
##  [5] --SSARCDDASSRAASRSA--SAA 19
##  [6] --SSARADAASRRAASARS--AAA 20
```

6

```
## [7] ---SARADAAARRCADADSRRSSS 6
## [8] ---RARRDSASARCAASSDSDRS- 5
## [9] ---SASSRSRARASSAAAS----- 29
## ... ...
## [24] ----SRSRDDDDRARRSSSASA-- 13
## [25] ---SSSARADADACRSASSASAS- 15
## [26] ---SRSARD-SDASCSASSSASAA 14
## [27] ---SSAARDDSSASCSASASSAA- 22
## [28] ----SRARDRSSRARAASSSARAA 16
## [29] ----SSAR---ARARSSDASAASS 31
## [30] ----SSASRSRASDADASSSARSA 17
## [31] ----SSARSSAADAASASSSARSA 18
##  Con ---??RAR??A????AASSS???- Consensus
```

Group 13

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 26 rows and 26 columns
##       aln                      names
## [1] --ARAASACDAARAARAASA--SA-- 3
## [2] --SARRSACDASRAARSASA--AA-- 4
## [3] -RDDSACARAAARRSRSASA--A--- 5
## [4] -R-SSASACSAARRSRSASA--SA-- 6
## [5] --ADRDAAADARSAARRASA--AA-- 2
## [6] ------RCASDAAARAAASA---RA- 13
## [7] ---RASRCASDAAA-AAARS---R-- 14
## [8] SACRDSACASAARARAARAA------ 1
## [9] --DRRSARARAARAAAASSR--AR-- 8
## ... ...
## [19] ---RDDDDASDSRAARCRAA--SSD- 25
## [20] -RADCRA-AASSRARAAAASSA---- 20
## [21] ASSDDR--AASSRAAAAAADSA---- 21
## [22] -SDSCRDRRASSRS-AAAASRA---- 15
## [23] SDCSAASRRASSSAAASSAA------ 16
## [24] DASSCAADRADSDADAASAA------ 17
## [25] SAASCDARADSRRCAASAAA------ 18
## [26] -ADDCDDASDRRDRAAAAAAR----- 26
##  Con -?????A?A??ARAAAAASA--??-- Consensus
```

Group 14

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 10 rows and 24 columns
##       aln                    names
## [1] RSASSARRSSSASASARASS---- 8
## [2] RSASRRSASSDSSDAARSSC---- 10
## [3] SSASDAASSASADARSASSA---- 7
## [4] RSASDDSAASAAAASSRCDRA--- 6
```

```
##  [5] -SAS---ACSAASRSSRADAASSA 9
##  [6] RRARR-AAASASSACSRADDA--- 5
##  [7] --SRAARADSADAAAARS-C---- 2
##  [8] -RSRCARASAARAAAAACDCA--- 3
##  [9] -SSRSARSCSDAAAAAASAAA--- 4
## [10] RRCARSSSSAADAAAARASA---- 1
##  Con RSAS?A?ASSAAAAAAR????--- Consensus
```

Group 15

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 38 rows and 27 columns
##      aln                      names
##  [1] ---SRAACCCARD----ARSARAAARA 1
##  [2] AADSRAACS-AR------RSASSAAAA 20
##  [3] SASDRAARDCCSA----CRAAASA--- 3
##  [4] -SSSRASACACSA----RRSAASCA-- 4
##  [5] --ASSAARRAAADA---ASSCAAAD-- 33
##  [6] --ASSAASSAAAAD---SSSAAAAD-- 34
##  [7] --RSSSDDRSAASA---RSDCAADA-- 28
##  [8] --RAACDARAARAAD--CSACAAA--- 29
##  [9] --RASCDARRAACAD--RSASAASA-- 30
##  ... ...
## [31] -ARDSARRSSSDS----AASCAASA-- 14
## [32] AASSSARASASDS----ARAASAC--- 38
## [33] -CSRDDASSSSSA----ASAADASAS- 9
## [34] --S-ADASRSSRA----ADASDASASS 10
## [35] --SSARADASSAA----ASAADASRA- 11
## [36] --SCAADRS-SRS----SSAADADASA 8
## [37] --ASAACRARSRS----SASASAAAS- 21
## [38] --SSASDCCRADS----SCSAARARA- 2
##  Con --??A?????A??----??AAAAAA?- Consensus
```

Group 16

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 111 rows and 24 columns
##      aln                      names
##  [1] ---CSASASARRARDRAAAARAR-- 7
##  [2] ---SRAAASASRSARRAAARACS- 70
##  [3] ---SSADASASAARARDAARSAC- 8
##  [4] ---SAAAASSAAACARAAARAAC- 102
##  [5] --CAAASSASSAARAARSSSAA-- 84
##  [6] --CSAAADSSSAARAARASSAA-- 85
##  [7] ---DSASRASSAARAARASSASS- 45
##  [8] --SS-ASSSARAARRSDASASCS- 53
##  [9] --SSRASSSARAARDARASRAC-- 68
##  ... ...
```

```
## [104] ---SAASSASRAACARAAASSSS- 43
## [105] ---CSASSASAAACARASRASSCR 44
## [106] -RDSADASRSDAAACSRRAAS--- 13
## [107] ---SAAASRSDAARCARSASSAS- 15
## [108] ---RASSSRADAAACSARSSSAS- 14
## [109] ---SDASSRSRAAACAARSSSSS- 42
## [110] --ASR-SR-SSACARCAARRSSRC 1
## [111] --CSRDSRRDSAAARRASCR-AR- 9
##   Con --????S?????AA?AA?????-- Consensus
```

Group 17

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 71 rows and 27 columns
##       aln                    names
## [1]   ----SSSASDRSAARRASSASSSS--- 24
## [2]   ----RCAASARAAARAAAAASSSS--- 67
## [3]   -----SAASAAASSRRACRASSSSD-- 5
## [4]   ----ASSASSAADARAAAAARSSS--- 30
## [5]   ----ASSAASAAAASADASASSSSS-- 34
## [6]   ----ASSASSAAAASARSASSSSR--- 33
## [7]   ---AASDAASARAACASSASSSS---- 36
## [8]   -----SAAASRAASSRRRASSSASR-- 6
## [9]   ---SSSCAASRAARRARSASSSA---- 23
##   ... ...
## [64]  ---CSDRASSAAASAAASASASSA--- 68
## [65]  --ACSDRASSAASRSAASS--SSA--- 69
## [66]  ---ADDRASSARSSRRASAAASS---- 70
## [67]  ----AACSRRSSAR-CSRASASSSR-- 7
## [68]  ----SRASSSSSSRDCSSCSSSRS--- 11
## [69]  ----SDASDARSDSRRDARSSSRR--- 9
## [70]  ----SRRARASSRSRCSCRSSSRR--- 10
## [71]  --SCSAASSARSCSRAASR-ASR---- 8
##   Con ----???A?AAAA?-?AAA??SS?--- Consensus
```

Group 18

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 44 rows and 23 columns
##       aln                 names
## [1]   -SSSACAAAAAAARSA-CSASA- 31
## [2]   -SCAAAAAARSDAASS-RACSS- 40
## [3]   -SRSDASAAASSRARS-AADSS- 19
## [4]   -SSSAAADAAARSSDCSSDRSS- 6
## [5]   -ASSAAASAAASAAAAASRRSS- 9
## [6]   -SRRAAAAARSARSRR-SRRSS- 21
## [7]   -SSSAAAAAACARSRC-CRRAS- 32
## [8]   -AASAAAAAASASCSC-SRRSS- 8
```

9

```
## [9]  -SRSDSAASAARDDSRSRASS-- 23
## ... ...
## [37] -SSDAAAAAAASSRARACCSS-- 20
## [38] SSAAAAAAAAAASSARACSAS-- 41
## [39] SRCASAAAAAAACSSRASASS-- 18
## [40] ---AAAAAAAAARAARCRADASA 26
## [41] ---ASAAAAAAAAAARCRRSASS 39
## [42] SACAAARAAAAARASRCRRS--- 37
## [43] --AACADAASDDACCRCRSSDD- 1
## [44] -RCAAADAAAADACCAARSRA-- 2
##  Con -???AAAAAAAAAAA?????S?- Consensus
```

Group 19

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 16 rows and 23 columns
##      aln                     names
##  [1] --AADAAAAAADRSDSAASACC- 4
##  [2] --AADRARAAACRACARSSACS- 5
##  [3] -RDRARASRRAARSADSASCC-- 1
##  [4] -SARARADACAADASDDSSAC-- 2
##  [5] RDASAAAC-AAARCSDASSSC-- 3
##  [6] --AAASRCDSAARASDASSSSA- 11
##  [7] --ASAAAS-RAARACDAASSACA 6
##  [8] --AAS-SAAAAADARAADRAAAA 8
##  [9] -AAAD-CASAAAAARSAARARA- 14
## [10] -SAAR-AACAAARRAASDAARA- 13
## [11] -ARSR-CDDASADRSCASAASA- 9
## [12] -AASD-CASRAARCSCASSASA- 10
## [13] DAASRACADAAARSSCAAAA--- 12
## [14] -AAAAASACAAARDSCSARSA-- 15
## [15] -AASSASASASAAARRSDSAASA-- 16
## [16] -AASAAAAADAARRAADASSC-- 7
##  Con -?A???AA?AAAR?S?AASA??- Consensus
```

Group 20

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 50 rows and 26 columns
##      aln                       names
##  [1] ---DSARSSARADASRASAS-ACA-- 17
##  [2] ----SARSSCDARAADASASSARA-- 18
##  [3] --RASARAAAASRASSASAAAA---- 36
##  [4] --SAAARAAADARASSASASSA---- 38
##  [5] ----RSCSRASSCADAAARCSSAA-- 20
##  [6] ----SSCSSAASAASAAAASSSAA-- 27
##  [7] ---SRRASSARSCAAARSRASAA--- 26
##  [8] -SCSRSASAASSASAAAASRAS----- 32
```

```
## [9] --AAASSSAARCSC-AAASSCAA--- 41
## ... ...
## [43] ----RAASASSSASA--AAADSAD--- 8
## [44] -RACR-AAASSARASAR-SDAAA--- 4
## [45] --SCRAAAASAARAAAR-SDSAA--- 5
## [46] ---CR-AASSSASAAASDSDSADA-- 7
## [47] ---ARRSSAAAAAARSRAAAA----- 24
## [48] -SRARASSAAAAAAARRASAS----- 25
## [49] --ARRASSAACAAAASRADRRA---- 23
## [50] -RSARASSASADAAACRSSDR----- 19
## Con ---????SAAAAAAA?????SA?--- Consensus
```

Group 21

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 33 rows and 24 columns
##     aln                 names
## [1] -ARAAACAAAAASASARRADAS-- 1
## [2] --DDAAAAAAAAAASARRARAC-- 31
## [3] -RRSADAAAAAAAASARSADS--- 6
## [4] ARRSAAASAAAASASARDAS---- 7
## [5] -ASASRAAAAAAASADRRSAS--- 3
## [6] -ACAARAAAAAASASRSARSS-- 4
## [7] --DAACARDCAAADAARDARSA-- 32
## [8] ---ARRAARSSAAAADADASSAS- 21
## [9] ---ARRASRSAAAASAAAA----- 28
## ... ...
## [26] --RAAAADAAAAASARARSASC-- 5
## [27] --RAAAAAADAARAARACARSS-- 15
## [28] --RASAAAAAARR-RASSRRSD- 12
## [29] --SAASADAAAAS-RASSRASA- 13
## [30] -ADCRDARAASAAAAAASASAS-- 16
## [31] -ADAASSRAASAADASASACAS-- 19
## [32] --DAASCRRASAAARADRASAA-- 33
## [33] -DDAASSAAAAAAASAARARS--- 30
## Con --?AAAAAAAAAAAA?A?A?A?-- Consensus
```

Group 22

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 14 rows and 23 columns
##     aln                 names
## [1] SDAASSASRDRRCCSSSASAA-- 1
## [2] SDAASRCRAARRCCRRSAAS--- 13
## [3] SAACSSACAASRCSSSAAAS--- 12
## [4] AADSASAASCRRCCRAAARA--- 9
## [5] SAASCRAADSR-CARAAS----- 14
## [6] SDRDADASCSRAASASASASAA--- 6
```

```
## [7] SADSDAAASARSCRDSRARA--- 8
## [8] --SA-AADSSSDCARSSSADSAA 2
## [9] --SA-ASASADSCARSSSSDSAS 3
## [10] -SAARASASDRACSRSASAAS-- 10
## [11] --SARASACSAAC-RSASAAASA 11
## [12] --ARDSASDSAACSRSSSSRAA- 4
## [13] --ARDDASSSAAADCSSAASAA- 5
## [14] -SAADDAAASRAAASASSSSA-- 7
## Con -?AA??AA?SR?C?RSSSA??-- Consensus
```

Group 23

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 76 rows and 25 columns
##      aln                      names
## [1] -----SASASAAASSAAS-AA---- 35
## [2] -SSAASASASCAASSAAS-AAA--- 43
## [3] -SSADSASRSAAADSCCS-AAS--- 2
## [4] CSSDASAARSASARSSSA-AA---- 41
## [5] CSCAASASSSAAAASSSA-AA---- 42
## [6] -SSASAASDCAAASAAAS-ASS--- 15
## [7] -AAAAASSDCAAACSAASCASS--- 16
## [8] ARSASAASDAAAASSAAARA----- 66
## [9] -ASAAAASSSAAASRSSS-AAA--- 18
## ... ...
## [69] --SACAACASAC-CSAAAASSRA-- 23
## [70] --ASCSA-ACAAAAAASSAASAA-- 65
## [71] ---SASAASACACSSSAACAADA-- 68
## [72] ---SSSAASASACSRACSCAAD--- 69
## [73] ---SSSAASACCCRASAACCSSA-- 20
## [74] ------ACSSAAAASSASRSAAA-- 40
## [75] -------DSSAAAASSCSASAAS-- 46
## [76] ---SCAADSSCACASACRRSSAD-- 21
## Con --???SA?S??AA?AAAA?AAA?-- Consensus
```

Group 24

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 20 rows and 23 columns
##      aln                      names
## [1] --SADRACSCRRADAARSAAAD- 15
## [2] -ASRASAASSAAAAAARS-AAD- 17
## [3] SARSSARSRRRRRSRAARAS--- 6
## [4] -AASSSRSARRRRRRAACSCA-- 10
## [5] -ARSSAAARRDRASAAADSAS-- 5
## [6] -ARASRRRARARRRADASSSS-- 9
## [7] -ARACRRRASAARRAAR------ 16
## [8] --RASSASASDRRRASAACDRD- 8
```

```
## [9] -DASSARAAAADRRASA-AAAR- 7
## ... ...
## [13] -RSSADASRAARRCRSACDSA-- 1
## [14] --SAASASRCARRCRSACASDR- 2
## [15] ---SASSSRRARRRSSARADASS 3
## [16] --SAASSSRRARRRASA-ARCAS 4
## [17] --AAADASACAADAARCRAARS- 11
## [18] -SAAADSAASAARAARRRAAR-- 12
## [19] --RAASRSSSAACASARRAASS- 13
## [20] --RADSRADSAAASSRRAARRS- 14
##  Con --?A??????ARR?A?A?AA??- Consensus
```

Group 25

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 30 rows and 23 columns
##       aln                   names
##   [1] ---SRSSACAAAARRSAAAASA- 18
##   [2] --ASASSRCAASSARSADSASA- 29
##   [3] --SARSSRCAAAAARAASASAA- 30
##   [4] -SDARSSAAAAASACASAAAA-- 22
##   [5] --AARSSRAACDSARASADAAS- 28
##   [6] -SADRSSAARAAAAADSASAS-- 26
##   [7] -SAARSSASSAARAADSARAS-- 27
##   [8] ---SRSSSRSASACAADAASD-- 10
##   [9] ---SRSSSSDSAAAAADSASCAS 12
##  ... ...
## [23] -RSRSRSSAAARSSAADRSRR-- 1
## [24] -RSASRSSARCASSCAASSAR-- 2
## [25] --SR-SSCRAAAAASAAASRRSA 19
## [26] --SC-RSAAAAAASSASRSARCA 20
## [27] -CASRSSAAAAARASDAAACRA-- 5
## [28] SCARSSSAAAASASSADRSS--- 21
## [29] -RDSRSSRAAASSACAAACRR-- 6
## [30] -R--RSSACASSSAAAAACARDS 8
##  Con --S?RSS??AA?AA?AAA?A??- Consensus
```

Group 26

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 126 rows and 32 columns
##       aln                       names
##   [1] -ASSARSSSA----RACASASDARSS------ 61
##   [2] ------SSSA----RACSSASAAAS------- 104
##   [3] ----SRASSA----RASASCDAARSRAC---- 1
##   [4] ----SASCAA----RAAAASRDRRSASS---- 7
##   [5] ----AASSSA----RAAASDASRSSAAS---- 44
##   [6] ----SDASSA----RADAAAADASSASA---- 4
```

```
##    [7] -----SSDSA----RASAAASASSSARSD--- 34
##    [8] ----SSSSSS----AASAAADASSRAAS---- 42
##    [9] ----SRSSSA----AAAAAAASSARASS---- 43
##    ... ...
## [119] -----RCCSS----DSCSSASDARASASS--- 89
## [120] --------AR----ASCSDASSARASA----- 117
## [121] ---RSADAAA----ASCSRASSSARSA----- 39
## [122] ----SASSAA----SSRSDASSS--------- 109
## [123] -----SASSS----AARASARASASSCRA--- 71
## [124] -------SSS----AACSSASSSAAS------ 103
## [125] --ARSSRSAS----RAARSASRSADS------ 88
## [126] ------RASS----RACSSASRSDDSS----- 124
##   Con ----???SS?----?A?????A??????---- Consensus
```

Group 27

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 93 rows and 26 columns
##       aln                    names
##   [1] --ACCSSASSRRSACS-RAAADA--- 5
##   [2] --SCSSRASDASSAAS-RAAASA--- 6
##   [3] --SCSASASARSSRRS-ARAASA--- 73
##   [4] ---SSRSACASASDRS-SAAAAAR-- 41
##   [5] ---CAASASARARDRS-SAAAAAA-- 79
##   [6] ----SDSASSRAARRSASAAACAA-- 52
##   [7] ---SSAADCAASSRSSASAASDA--- 58
##   [8] ---SSAA-AAASSRSSDSAARDRR-- 59
##   [9] --CSSASAADRRSRS-AADSAS---- 90
##   ... ...
##  [86] ------CSSSRCARSRAACSDAACSC 89
##  [87] ----DADSSADSARASAASAAAAA-- 83
##  [88] ---SSSSACSSRRASRSAARDAAS-- 65
##  [89] ----SSSACSSRRASASARDSSAA-- 66
##  [90] ---SSASACS-RRAAACASSRDAS-- 87
##  [91] ----SADARSARRARCARSAARAR-- 76
##  [92] ---ASADARSASSAASSASAAAA--- 81
##  [93] ----SADARSSASRRARASRSSA--- 78
##   Con ----S?S?S??????A???AAAA?-- Consensus
```

Group 28

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 95 rows and 28 columns
##       aln                    names
##   [1] --RSSAARRAADAA----SRRSACAA-- 68
##   [2] --RADAARRSSDAA----SASRACAA-- 70
##   [3] --RSACARARADAA----SRRRARRA-- 67
##   [4] -SCDSSARRAAAAA----SRR-ARRA-- 2
```

14

```
## [5] --SSSAAAAAASAA----DSSRASRS-- 3
## [6] -SACSRAAAAASAA----CCSRRAR--- 20
## [7] -RSSRAAAAARCRA----ARRRASR--- 84
## [8] -CSASARRSSASAA----SRASRSA--- 9
## [9] SARRAARASAASAS----SRSSRSA--- 12
## ... ...
## [88] -SSR-ASSASDASA----SARSARARA- 7
## [89] -SCR-DSASRDADC----SARRADAR-- 74
## [90] -SSRSASRADRADA----CARRAAA--- 75
## [91] -SSRSDASSSAARA----CRRRAAR--- 90
## [92] ASSSRRASRSDRRD----RAAASC---- 41
## [93] -RSSRAASAAARRD----RADCSAR--- 85
## [94] -SDSSAARAADRCS----RARAAAS--- 72
## [95] -SSSSRARASDRAC----SARAAAR--- 73
## Con -????A??A?????----?AR?A?A--- Consensus
```

Group 29

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 35 rows and 25 columns
##     aln                      names
## [1] ---RAADASRRAAARSAAAAADS-- 1
## [2] ---RASRACASAAARSASAASSS-- 9
## [3] --ARAACAASRARACSAAAASD--- 15
## [4] -SSADAARAARAAASAAAAAAS--- 5
## [5] -ASAAAASASRRAASAAAAAA---- 7
## [6] ----RAAAAARRAASAAASAAA--- 6
## [7] --AAAAAAAARAAAASAAAAAA--- 4
## [8] CRAADAA-ARRADSACAAAAS---- 3
## [9] ---ADAARAARADSASADDASSD-- 16
## ... ...
## [28] --AACSSADADSRRASAR-AAAR-- 22
## [29] ---AAASADSDSRRAAARSADAR-- 23
## [30] --AAASAADSSARRASSSAAAAS-- 35
## [31] -RADAASASCRSRASSSA--AAA-- 17
## [32] --SDAASASCASRARSSSRRAAA-- 18
## [33] --CDDAS-SCSRR-RADS-ASSSAS 20
## [34] --SRDAS-SCARA-RSDS-AASS-- 21
## [35] --CDADA-SCRRRARSDRRAASS-- 19
## Con --??AA?AA??????SAAAAA??-- Consensus
```

Group 30

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 106 rows and 28 columns
##     aln                        names
## [1] -SARDAARASAASSCCSCAAS------- 56
## [2] --DRAAASACAASSRDACAASS------ 66
```

```
##    [3] ---RCCARASASSSSDACAASRS----- 67
##    [4] ---ASRDSDSAASCACASSRRS------ 58
##    [5] ---RSAASASARSAACASSASSS----- 69
##    [6] ---ASAASSRCAADASSSDSSRA----- 15
##    [7] ---ASACAASSSRAARAADRASA----- 3
##    [8] --SACASAARSSSAARAADSSS------ 78
##    [9] ---ADASARSSSSASRARDSASS----- 75
##    ... ...
##   [99] --SRRRRSSASRAASDASRAAA------ 2
##  [100] ------RSDSSRADRSAACAAASS---- 68
##  [101] --SRAASSSASRSDDRSSRDSA------ 35
##  [102] RSSAASRSAASCRRSSR--ASA------ 28
##  [103] -SCAASRSSASSAASSD--ASAS----- 82
##  [104] ---SSAASAASACRSSARDAASS----- 71
##  [105] --RSSSASAASADRSSA-SAASS----- 72
##  [106] -SRSASRSSASACRCSA--AASA----- 33
##    Con ---??A??A?S??????????S?----- Consensus
```

Group 31

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 62 rows and 26 columns
##       aln                        names
##   [1] ------ADACRSAS-SRCRSRR---- 1
##   [2] -----SADARDSAS-AAARARRSRRS 8
##   [3] ------ASAADAAC-RSRRSRS---- 3
##   [4] ----SDADAASAAS-ASRRSRSDDS- 31
##   [5] --ADSDASACAASC-ASRRRRRS--- 7
##   [6] ------ASAAASAC-SRRSARS---- 5
##   [7] -----AASASASAR-SRRRARSA--- 6
##   [8] ----SAASDSARAA-SRRARRSARS- 9
##   [9] --AAASAASAAAAS-SAARSASA--- 12
##   ... ...
##  [55] --SSSDAAARAAASASSRAAAS---- 26
##  [56] ---SRAAAARCAAAASSRARARRS-- 28
##  [57] --SARDAAARRAAAASSRRRSS---- 27
##  [58] ---SAAAAARASDAADSCRASSA--- 39
##  [59] -ASAACAAARASAAACARRARS---- 41
##  [60] ---RAASSAARSAARAARRASS--C- 55
##  [61] -----ASSAAASAARRSSRASSAAC- 57
##  [62] ----ASRSAAASAARRSRSCASSR-- 56
##   Con --??A?AAAAA?A?????R??S?--- Consensus
```

Group 32

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 55 rows and 28 columns
##       aln                          names
```

```
## [1]  ----AARAAASDRARARCASSAAS---- 4
## [2]  ----SAAASAADSSAASSASSAAS---- 48
## [3]  ---SSAASAASRSAAARAASSAA----- 37
## [4]  ----SAASASSDAAASSAASSAAS---- 49
## [5]  -------SAACDAAAAAAASSACDD--- 50
## [6]  ----AC-RSASAACSACACSAASAR--- 1
## [7]  ----AA-RSASARCRARSSAASSDDA-- 3
## [8]  ----AASASASCSAAARRSAAAAD---- 2
## [9]  ----AADRSASAAAAASRSAAARSS--- 10
## ... ...
## [48] ---ASRSDAAAAR-RCRSADASAA---- 8
## [49] ---AARASAAAAR-ACRSRSCRRC---- 6
## [50] ---AARSAAAAAR-RARARSAASA---- 5
## [51] ----RASAARAASSASRAASASDA---- 17
## [52] ----SDSAAASASSASRCAASSDA---- 18
## [53] ----SDSAAASASRAASAAAARRA---- 32
## [54] ---ASDSAAASACSAASASA-------- 33
## [55] RAACSASAAASAASASSAAS-------- 51
## Con ----??SSAA???AAARAAA?A??---- Consensus
```

Group 33

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 88 rows and 28 columns
##      aln                         names
## [1]  ----AADRCRAASAA--SDASRAASR-- 4
## [2]  ---SAAARARCASAA--ADA-------- 25
## [3]  ---SAADDAAAADSS--ADASRCDA--- 30
## [4]  ---RSASAASS-DSR--SDARRASSA-- 34
## [5]  ---RAAAAAAACRSA--SDARR-SSA-- 88
## [6]  ---RASAASAA-ASS--ADRRRASSA-- 35
## [7]  ---RRSAARAR-SAS--SDRRAAASA-- 37
## [8]  ------ASAADRASA--DSRASADAAAR 29
## [9]  ----RDAAAAAADRD--DSRSSADAA-- 72
## ... ...
## [81] ----ASASSRADSAA--RRACAAASA-- 46
## [82] ----ASAADAAACSR--ASACARASA-- 28
## [83] ----AARDAAASDCA--CSSSAA----- 18
## [84] ----AADSASASDCA--CSSCAACDR-- 19
## [85] --RCARASARASARA--CSSCASR---- 20
## [86] --RRAAASASASAAA--ASACAAA---- 63
## [87] --RAAAASARASADS--RAASAAAA--- 32
## [88] --R-AAASARASASA--RRCSAASA--- 33
## Con ---?AAA?AAA?A??--AS???AA?--- Consensus
```

Group 34

```
## use default substitution matrix


##
```

17

```
## MsaAAMultipleAlignment with 114 rows and 26 columns
##        aln                        names
##    [1] -----RAAADSADAADASASSRARA- 2
##    [2] ---AADAAADRARAAAAAASS-AR-- 107
##    [3] ----SAACSARRAAASSSSASSAA-- 15
##    [4] ----CAAASDRAARASSASASSRA-- 105
##    [5] -----AADSDDRAAASAASASSAAA- 62
##    [6] -----AACSDAAAAADAASSSSAAA- 63
##    [7] ----SAAASASAAAAASAASASRA-- 17
##    [8] ----RAAADASAAAADRAASRSSA-- 20
##    [9] ----SAAAAASAAAAACAAASSAS-- 18
##    ... ...
## [107] ----ASSRCSDADCRDARDSAASA-- 67
## [108] --RDASSSCCAAAASAASSADA---- 9
## [109] -----SSACAAAAASARSDAAA---- 85
## [110] --R-ASARCAAADARASASDASA--- 5
## [111] --RAASAACDAAAARACASSAA---- 12
## [112] ---AASAARSCA-ARAASRDSAAA-- 70
## [113] ----ASAACSCR-ARARCRASSARA- 71
## [114] ----SSAACSCAAARADSRSSAAA-- 69
##    Con ----??A?AA?AAA?????????--- Consensus
```

Group 35

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 40 rows and 25 columns
##        aln                       names
##    [1] -DAASARSAARAASASSCDAA---- 10
##    [2] -DARSDASAARAASASSADACS--- 11
##    [3] --AR--ASAASCASSSAADAA---- 21
##    [4] --RASAAAAARDASSASADSAS--- 12
##    [5] --R-RSARAARSACAS-ADCD---- 7
##    [6] --RARSARAASSSCASSADSDA--- 8
##    [7] ----RASACASSACAS-SDSDA--- 9
##    [8] RASCR--AAARAARSSAASDRS--- 13
##    [9] --CCRSDAAASAARSSAARDRR--- 16
##    ... ...
## [33] -------AAASRASAASSSCAAA-- 23
## [34] ----ASSDASSSASAASSAAAARA- 20
## [35] ----RRSRAAAAASARRSSAAARS- 30
## [36] ----SASRAAASRSARCSRAAASS- 32
## [37] ----RRCRAASASSRRSSRAADCS- 29
## [38] --------AAASASASSSSAAAA-- 22
## [39] ---ARSAR-ASAASCRRRAADASA- 26
## [40] ---SRSARDARARSSRRRAAR-SA- 27
##    Con ---??A??AAR?AS?????AA??-- Consensus
```

Group 36

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 38 rows and 25 columns
##       aln                       names
##  [1] --SRRSCASAAR-SAAR-AA-ARRR 1
##  [2] ----RSCAAAARRSAAR-AARARRR 2
##  [3] --SRSAAARSAR-AAAD-CARCSR- 3
##  [4] ---SRSAAAARSS-SA---ARDASR 4
##  [5] ---SRSAAAARSARSAR--ARASSR 5
##  [6] --AARAASSAAAARSRR-SARSCS- 18
##  [7] -SAARCAS-AAAARSCR-CARSA-- 19
##  [8] AAASRRARCCARRRAAA-A--SR-- 30
##  [9] -AASRSSADCAARRASA-R--SRS- 33
##  ... ...
## [31] -AAD--RACAAASRSAR-R-SARRA 16
## [32] -AAS--RARSAAARRRS-A-SARAS 27
## [33] -RAACDRSCAAAACD---SSAARS- 14
## [34] -AARCARSDDARARD---AASARR- 37
## [35] --AACARCAARAASC---SARSSRR 36
## [36] --ARCASSAARSASD---SASASSR 38
## [37] --AACR-SAAAACRD-R-SARARSA 15
## [38] ---ACA-SAAAAARSSRASARARCS 22
##  Con -?AA??-A?AA??????-?-?AR?? Consensus
```

Group 37

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 101 rows and 26 columns
##        aln                        names
##   [1] ----ACAASASDCSDSSDSAASSA-- 1
##   [2] ----AAAARAADCSARSDSRCSAA-- 2
##   [3] ----AAARAASASSSSSASAAASA-- 4
##   [4] ----AAAAAASACSSSSSSAAAAA-- 5
##   [5] ----SAAAASASDRSDSDCSARAA-- 38
##   [6] ----SAAAAASSCASDADASARAA-- 39
##   [7] ---SAADAACSDSAASSRDASAS--- 10
##   [8] ----ASAAACSAASASSRDASASA-- 70
##   [9] ---RASDSAASDSAASSSAASRS--- 12
##   ... ...
##  [94] ----SASASSACSSARARSR------ 18
##  [95] ---AAASASAASSSSRARSR-ASD-- 24
##  [96] ---AAASSSASSASSRARSA-ASA-- 23
##  [97] ----ADAASAASSASRASSR-RASA- 22
##  [98] ----SAAAAAASSSDRDSSA-RADA- 40
##  [99] -----AAASAAASSSASSSC-SASRA 33
## [100] ----CAAASAAASSSASSSA-SA--- 37
## [101] -----SCASAAASSSRSDSR-SA--- 45
##   Con ---??AAA?AA?????S??A?A??-- Consensus
```

Group 38

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 155 rows and 27 columns
##          aln                        names
##   [1] --RRAS--ARARAASSAACASSRS--- 26
##   [2] --RSAD--ARARAARSSCAARSSS--- 29
##   [3] --ARAS--ARARAASASAADASSA--- 27
##   [4] --RAAC--AAASASASAAAASCRA--- 64
##   [5] --RAAS--RAASASASARAASSAA--- 66
##   [6] --RAAC--ADDASASAAAAAASCA--- 63
##   [7] ---SAS--AAAASASCASASAARRD-- 118
##   [8] --AAAA--AARASARCAAASCAAS--- 84
##   [9] --ARAR--ARRASASAAAASAAASS-- 100
##   ... ...
## [148] --SAAS--RASSDSARCSAASRAA--- 154
## [149] -----A--CASSASDACSAASRASA-- 155
## [150] --SSSA--ASSASSAAAAAAARSSS--- 52
## [151] --SSSS--ASCASSSASAARARAS--- 125
## [152] --SAAD--ASSARSSAADAAAASS--- 113
## [153] --SASS--SSSSSSSAADAASASS--- 114
## [154] --SCAA--CSSAASAAACAAAASA--- 101
## [155] --ASSA--ASAAASAAACRAASSA--- 102
##   Con --?AA?--AA?????AAAAAA??S--- Consensus
```

Group 39

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 168 rows and 27 columns
##          aln                        names
##   [1] ---SARRAR-ASAACARASAASAS--- 16
##   [2] ---SAASARAASASRADARAAAA---- 155
##   [3] ----ARRAA-ASASAAAASAAAAAS-- 158
##   [4] ------RARASDAADSRAASC------ 70
##   [5] ----AASARASSAAASAAASSARAS-- 143
##   [6] ---ARARARASRAAASAR--RAAAD-- 161
##   [7] ----AAAAARASRDAASAARCRAAA--- 162
##   [8] -----ARAASCDRRSRAASSRRDAS-- 56
##   [9] ------ARARASDRRSRAAAASC----- 71
##   ... ...
## [161] ----RAAASDADSASRADSRDASS--- 89
## [162] ----AAAACAS-SRSSADSRAASS--- 109
## [163] ----RSAAAAARADSRACSRSASS--- 111
## [164] -----RSAAASCRARRSASRASAAD-- 51
## [165] ----SRSASDRDRARCSCSRDSSS--- 108
## [166] -----CARSASSRSASRASRSSSSS-- 103
## [167] ----ARAASASDRSASDASCSASS--- 106
## [168] ------AARSASDRSAADASACDSAS-- 105
##   Con ----??AA??????????S??AS??-- Consensus
```

Group 40

```
## use default substitution matrix
```

20

```
##
## MsaAAMultipleAlignment with 162 rows and 30 columns
##        aln                            names
##    [1] ----AASASSAACRAAS--SAASASAS--- 73
##    [2] ----AASASSCARAAAS--SAASAAA---- 90
##    [3] ----AASAASSACCAAS--SCASAAA---- 47
##    [4] ----ARSCSSSARRAAS--SASASAA---- 79
##    [5] ----ARSARSSAARAAA--SRAASDA---- 81
##    [6] -----AAAASSASRAAS--RAAA------- 48
##    [7] -----AASASAASAAAS--RAAAASAA--- 74
##    [8] ----AAAAASSASSAAS--SAAA------- 49
##    [9] ----RAAAASDASSAAS--SASSSSC---- 105
##    ... ...
## [155] ---ARAASRSSAADAAD--RSSSDD----- 57
## [156] ARRARAACRCSAADA----RASSS------ 129
## [157] ---AARSASSCA-CAAD--AASSSDA---- 54
## [158] ----ARSADACADSAAA--AASSSAA---- 62
## [159] ---AASSSSSDAAAAAA--SSSSRA----- 55
## [160] ---AASSSSSDADCAAA--SASSRA----- 56
## [161] --AASASRASRSAAAAA--S--SSAS---- 64
## [162] ---AAACRASASAAAAS--SSASSAS---- 101
##    Con ----?AAA???A??AA?--??SS?A?---- Consensus
```

Group 41

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 66 rows and 30 columns
##        aln                            names
##    [1] ------AASASSSRSARAAADSDSRD---- 1
##    [2] -----AAASASASCSAAAAASSSAR----- 3
##    [3] ------AASASARCAARDAADSSAAS---- 7
##    [4] ------AASASSARRARSAASSSA------ 34
##    [5] ------AAAAASDACARAAAASRARS---- 5
##    [6] -----AASSASSDARRRARAASASR----- 35
##    [7] ----AAAASARASRAAAAASSSRA------ 4
##    [8] -----SAASARASRAAAARAARRSAS---- 20
##    [9] ---SAAAARASRADDAARSACS-A------ 16
##    ... ...
## [59] -------ASARSSARSRAAASAADSCR--- 41
## [60] -------ARARSRARDRSASSA---C---- 49
## [61] -------ASAASSARSRADCSA---CRRRA 40
## [62] ------ACAAR-SSAARSDRSASRACD--- 48
## [63] -----AACAAAASSRSRRDCSASRA----- 53
## [64] -----AAASASSAARSARDCRASAA----- 54
## [65] ------AAAAASSAACDACDRDADAS---- 60
## [66] ------CAASASSSRCRACASRSDAS---- 66
##   Con -----AAAA?A???A???AA????A----- Consensus
```

Group 42

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 105 rows and 25 columns
##        aln                     names
##   [1] -ACASAAAAASASAACASA-SA--- 101
##   [2] --CAASAASDSASAACASARSA--- 102
##   [3] ---AASAAAASSSSSASAARSAS-- 1
##   [4] --AARADAAASASAASARASAA--- 48
##   [5] ---AASAASAAASARAASAAAAA-- 95
##   [6] -SAAASAASCASSAAACDAAA---- 104
##   [7] --AAAAACADSAAACASSCCRS--- 22
##   [8] -RAAAASCAASAACCASDAAA---- 105
##   [9] -AAAAASSAAAAAACASAASA---- 30
##   ... ...
##  [98] --AASSSSAACCASR-SSAARRA-- 76
##  [99] --AASSSSARASASRASSAARSS-- 77
## [100] --AAASAAAAASASASSDAARA--- 73
## [101] --AACSDAARRCR-ACADSARSA-- 69
## [102] --AAASCAARRAAAACSDSARS--- 70
## [103] ---AASASCACRSACAASSDRRA-- 80
## [104] ---AASARAAAASACCASARRRA-- 81
## [105] --AAASAAAAAARCCRSSARR--- 83
##   Con --AAA?AAAAAAAAA??????--- Consensus
```

Group 43

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 22 rows and 23 columns
##        aln                   names
##   [1] -SRSRAASSCSRAASSAASSSS- 9
##   [2] -SACRAASSSSASSSSAACASS- 10
##   [3] -SRAAADRSSSRSSSSAACSS-- 1
##   [4] -SSRAASSSSSRRSASAACSAS- 7
##   [5] SACARARRSSSSASSSAASSS-- 11
##   [6] -SCAASSSSSSSASASAASSS-- 12
##   [7] -SAAAASAASSSRARCADASS-- 14
##   [8] ASSAAASAAARSSARCARSS--- 15
##   [9] -SRAAADAASSSSASAAASDS-- 2
##   ... ...
##  [15] --SSRAASASRRSSSDADSRSS- 22
##  [16] --SRRCDARSSSSAASAASSSA- 3
##  [17] --SRRADADSSSDDASAASS--- 4
##  [18] --SRRRAASSSCSRSSRASDSS- 8
##  [19] --SSRAAASSSRSASACSDAASD 5
##  [20] --SSSAARASSRAADACRDASS- 19
##  [21] -SSARCARRSSRASRCCRDSS-- 16
##  [22] -SSSRRARASSAASAAASASS-- 20
##   Con -SSARAA??SS???S?AA?SS-- Consensus
```

Group 44

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 16 rows and 25 columns
##       aln                      names
##  [1] SSSAAA-RARR--SSAARRCAS--- 5
##  [2] -SSRAA-RARRDSASAARRRAS--- 6
##  [3] SCRRAASRARR--AAARRRRAR--- 4
##  [4] SAASAA-RASR--SACRRRRARA-- 10
##  [5] SSSARA-RASS--AAARCRRARRS- 8
##  [6] SSSARR-RASA--SAARRRRARR-- 9
##  [7] -ARSRR-AASA--AAARRRDARRS- 15
##  [8] -RACRRARSAS---RARARARRSR- 2
##  [9] -SACRRD-SAS---RARDRAASSRA 3
## [10] -RSRSRARSDA---DRRCRRRASS- 13
## [11] -ASCSRAAASS---ACRRDRAARS- 11
## [12] -SACSAAASRS---AARRDCACRS- 12
## [13] -SSSSSAAASS---SARRRRARRAS 7
## [14] SRSRARSCAAD---SSAARRARA-- 14
## [15] -RSRAACRAAR---ASRRRRARRR- 16
## [16] -AADRRCDSDS--RASRARAAAA-- 1
##  Con -?S??R?RA??---AARRRRAR??- Consensus
```

Group 45

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 101 rows and 27 columns
##       aln                       names
##   [1] ----RAASASSDSRCRCSASSACS--- 1
##   [2] ----RASDSSRSAR-RCSARAR----- 34
##   [3] -----SAAAADSRRCRAAAASARAS-- 25
##   [4] -----SSADADSRRASAAAASAAAS-- 28
##   [5] ----RSAARCASSRRRAAACSAAAS-- 12
##   [6] -----SSARAASAAASSACSARDSA-- 20
##   [7] ----AASRRSRSAAADSAASARDS--- 46
##   [8] ----------ASAASACSASARSSC-- 82
##   [9] ----ARSRRSARSADSADASAR-AS-- 47
##   ... ...
##  [94] ----AASAAASACASRACARSSDC--- 81
##  [95] ----SASASSRADADRRASRSS-SR-- 4
##  [96] ------SSAACADRARAAASASASAS- 26
##  [97] ----SSSSASCARDARAACSARSS--- 32
##  [98] ----DAASAASASRARRARSASSD--- 8
##  [99] ----SAASSSRCAARASASSRR-RS-- 29
## [100] ----SSSSSDRASASRSASSRR-RS-- 30
## [101] -----SASSRSCSDRRSACSARSRR-- 31
##   Con ----??S??????AA?A?A?????--- Consensus
```

Group 46

```
## use default substitution matrix
```

```
##
```

```
## MsaAAMultipleAlignment with 14 rows and 23 columns
##        aln                    names
##  [1] -DAAASSSAADDASDRAAARS-- 10
##  [2] --ASASSADRCDADRAAAARAR- 12
##  [3] --SSAASSARASRARAAAARAC- 13
##  [4] -SSSSAAACRASRA-AAAARAS- 14
##  [5] SRASASSCACASRS-SARARA-- 4
##  [6] RRRASDRCAAASRS-SAAAAA-- 5
##  [7] ADASDSSCASASRD-RRAAAA-- 3
##  [8] -ACSSAS-SAACAAAARARAAC- 6
##  [9] --RSDASRSDASAAAARARAAC- 7
## [10] AARSD---ADSSDSAACARRAAA 8
## [11] -ARSDSS-AASSDSAAAARRAC- 9
## [12] ASSSSARRDAASADRRRAARS-- 11
## [13] -RDRSADAACASARSSADARS-- 1
## [14] -RS-SASAACASARRDARRSAC- 2
##  Con -??S?AS?A?ASA??AAAARA?- Consensus
```

Group 47

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 93 rows and 27 columns
##        aln                    names
##  [1] --SRSRA--SAS-ADR-ASDRADSSA- 26
##  [2] --ARSRA--SAA-ASRDSASRADSA-- 28
##  [3] --SSRRA--DAA-ASRASAARSSAD-- 33
##  [4] ---RASD--RAA---AASCASASSD-- 39
##  [5] ----SSR--DAA---AASCASASSA-- 41
##  [6] ---RSRA--RAA---RASCSSASSA-- 40
##  [7] ---SSSS--DAARSRAASCASASSS-- 42
##  [8] --SS-AD--SADSDADASASAARSDA- 35
##  [9] --SSRAR--SAD-DARASAAAADSD-- 36
##  ... ...
## [86] -----AS--ASDAAACAAAAARAA--- 5
## [87] --ADRAS--ASARAACASAASRSA--- 17
## [88] ---AASS--AAAAAASASAASRDRR-- 44
## [89] ---SARS--AAAAAACASAARRARA-- 45
## [90] ---RSAS--SCARAAAAASRARSAA-- 8
## [91] -SARSAS--ACARCASSAAASRSA--- 16
## [92] --SCSSS--SSDRAAAADAASRRA--- 11
## [93] --SASAS--SSARSAAADSASSSA--- 69
##  Con --?????--??A?AA?A??A????--- Consensus
```

Group 48

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 121 rows and 28 columns
##        aln                      names
```

```
##    [1] --SSASSARAAAAACAAAA-ARCS---- 2
##    [2] --SSSSAARAASAAAAAAA-ARCS---- 3
##    [3] ---SSSSCRDAASACAAAA-ARAA---- 1
##    [4] ----SDSASRSAAACAAAC-ASAS---- 98
##    [5] ---AAASASAAARARARAS-ARSS---- 111
##    [6] ----SCASSAAAAAAASAA-RSAAA--- 8
##    [7] ----RAASRAAAAAAARAA-ASARAS-- 112
##    [8] ----ASAARAAAAAASRAA-A------- 59
##    [9] ---AASASRAAAARARRAA-AADS---- 113
##    ... ...
## [114] ---ASAAADSRRAAAASSAAASS----- 57
## [115] ---DSARARDCRAASRSASSASA----- 41
## [116] -----ARAAACRRAARSASADSSAS--- 117
## [117] --SAASSARAARAASSSDSAAS------ 49
## [118] --SAAASARAARAAASSRSADS------ 50
## [119] ---ASSSRRARRAAASRDSAASAS---- 119
## [120] ---ASSRRAAARAACSSASARSA----- 120
## [121] ----ASARAACRAAASSDSARASA---- 121
##    Con ---???AA?AAAAAA?AAA-?S??---- Consensus
```

Group 49

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 229 rows and 27 columns
##         aln                      names
##    [1] --SAA-SASSAASS-SAASDSAAS--- 1
##    [2] --SAARSACAASSS-SAARDAAAS--- 197
##    [3] -----SAAARAASS-SARSDAAAS--- 199
##    [4] --DARSAAAAAASC-SARRSSAAS--- 219
##    [5] ---ARSASDSAASC-AARSSAADA--- 221
##    [6] ---SRCSDARASSASAARSCAAA---- 68
##    [7] ---SRSAARAASSASSARSARAAS--- 69
##    [8] ---SRSARRAARSR-AARACSARS--- 203
##    [9] ---SRSARRAASSA-AARSSSARS--- 204
##    ... ...
## [222] ----ARSDSCARSRSASSSRAAAA--- 70
## [223] -----RRDCSADSRAARSSRS------ 74
## [224] ----AARSRDRSARAAASASRSRR--- 83
## [225] -----ARSCARSARAAASSRAARRD-- 84
## [226] -----SSSSRSRAAAAADARRAAASR-- 86
## [227] ---AAASASRRRSAAAASSRAAAS--- 190
## [228] ----SRARSSRACSAARRASASCR--- 92
## [229] ----SRASSSAASSAAASASAAAA--- 94
##    Con ----??????A?A?AA??AA?A??--- Consensus
```

Group 50

```
## use default substitution matrix


##
```

```
## MsaAAMultipleAlignment with 179 rows and 28 columns
##        aln                        names
##   [1] ----SRS---ARSAASRASSSSCAAAAS 31
##   [2] ----SRS---AASSAARAAASRAAAAD- 47
##   [3] ----SRS---ARSAAASAASCAASASR- 32
##   [4] ---ASDA---ARAAASRAASCAASAA-- 113
##   [5] -----RSD--ARSAARRASSAAASASA- 94
##   [6] ---AARSA--ARSAARRAAAAAARRS-- 141
##   [7] ---SRRSS--ARAAASRASAAAAARS--- 140
##   [8] ---SCRAA--ARDAASRAAAAAARSS--- 142
##   [9] -----ASA--ASSAASASSSAARCSA-- 100
##   ... ...
## [172] ---RRSAR--RAASRDRCARASRSR--- 148
## [173] ---AR-RS--AAASAARSRRASASAD-- 145
## [174] -SRA-SSC--ARAAAARA-SDASAS--- 131
## [175] -SRA-SSA--ARAAAARARSRRAAS--- 132
## [176] --RARSAC--ARARSRRS-ASASAS--- 146
## [177] --SA-SSA--DAAARARA-SDAASS--- 136
## [178] --SARSSA--AAAARARR-SAARSS--- 137
## [179] ---DRSRR--ASAARARA-SAAARSC-- 138
##   Con ---???S?--A?AAAA?AAAAAAA?--- Consensus
```

Group 51

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 30 rows and 25 columns
##        aln                       names
##   [1] -SASACASAASADAARCRACR---- 8
##   [2] -SRSACASAASARAS-SRSCAR--- 9
##   [3] RSCSASAAAAASSAAAARASA---- 20
##   [4] --SSSCADARAAAAARARACRA--- 1
##   [5] -RRSSCSCAASSASDAAR-ASA--- 21
##   [6] --RSSCASAASSSASAARSASA--- 22
##   [7] -ARASCSAADSSSSAARRSAR---- 23
##   [8] --ASSCSAADSSS--ARRDARARA- 24
##   [9] -ARSC-AARDSSAACSRRCDSD--- 29
##   ... ...
## [23] --CASAASAA-DASARRAAASAA-- 11
## [24] -SASAAASAA-DACARRAAAAA--- 12
## [25] ---AACASSA-SASARRAAAAASA- 15
## [26] ----SSSSSR-SAAARRAASAASAA 17
## [27] --RCASDDSD-AASSSAAAA-ASA- 19
## [28] ----ARDDCD-SASASAAAARARAA 28
## [29] -SRSAASSSASAARASCRSASD--- 7
## [30] -RSSSCRSSADSASADCRRRS---- 25
##   Con --?S????A???A?A?R?AA???-- Consensus
```

Group 52

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 66 rows and 24 columns
##      aln                    names
##  [1] -SSASRSARARCAACAAAAAAS-- 1
##  [2] -SSASRSASRSCAR-DAAAAAS-- 2
##  [3] --AACARRSRASAARAAACAAS-- 27
##  [4] -RARCRRSRRASAAASAAAAAS-- 29
##  [5] -SDSARRRRSASAARSAAAASS-- 30
##  [6] -SASARRRRSSSAASAAAAAA--- 31
##  [7] --SSARDARRSASSRCARARAAA- 5
##  [8] ---SSRACRRRASSRAAAAAAAA- 37
##  [9] ---SCSACRRADRARAAAACSDA- 8
##  ... ...
## [59] ---CRS-SASRRARSAAAAASA-- 26
## [60] ----AR-CSARRAASAARRAS--- 25
## [61] RDAASA-CSARSAAAAAAAAA--- 41
## [62] ---AAS-ASASAAAAARAAAAAAR 49
## [63] ----AR-ASASADAAARSAAA--- 51
## [64] RSSAARSASAAADAAARAAAS--- 58
## [65] DSSDAS-ASAARAAAARAASAS-- 59
## [66] RRSSAS-ASARDAAAARAAAS--- 60
##  Con --???????A???A?AAAAAA?-- Consensus
```

Group 53

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 83 rows and 26 columns
##      aln                      names
##  [1] ---SAA-SARCSASARAAASRASS-- 68
##  [2] ---SAA-SRRSSASAAAAASAASS-- 69
##  [3] AARSAC-SARSSDSARCAAAR----- 2
##  [4] --AAAA-SRRRSSSASADAASAS--- 71
##  [5] --SAAC-SRR-SSSASADASSASS-- 72
##  [6] ---AAC-ARR-SSSAAAAASAASAAS 70
##  [7] --SASR-AAR-SSSARAAARCASC-- 29
##  [8] ----SA-SSAARSSSAASAAAACAR- 31
##  [9] ---DAA-SRACASASAASADAASA-- 75
##  ... ...
## [76] --SAA-RDSSRAASASAAAAAAS--- 50
## [77] --CAA-SCSSRCAAAARAASADS--- 78
## [78] --ARRSRSSRSSRSSAAADRSS---- 35
## [79] --ARRSRSSRSRRAAAASCASS---- 36
## [80] --DDRRSSRSSACASADAADS---- 46
## [81] -SDCARDSSRSSR-ASADAAAA---- 47
## [82] -----ACSSRASRA--ASASAS---- 81
## [83] ---DARCASRASRASDAAASASS--- 82
##  Con --????????????AA?AAAA?--- Consensus
```

Group 54

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 68 rows and 25 columns
##       aln                        names
##  [1] --SSRC-SSR-RASCASSASAASS- 1
##  [2] -SSSSS-SARARASCASSASAA--- 2
##  [3] --ASRS-RARASSSCADSAAARR-- 35
##  [4] --ASRS-SARADASAASSAAADA-- 36
##  [5] -SSSSS-SAASAASACAAAAAA--- 8
##  [6] -SSASS-SSADASSACSSAAAA--- 9
##  [7] -SSSAA-SRASSCRSAAAADAA--- 46
##  [8] -SDSAS-SARAAAAACASAAAA--- 10
##  [9] -SASAS-SACAAADRCSSAARAS-- 26
##  ... ...
## [61] -SRASRSAAARAACSDASAAA---- 29
## [62] -ASSSRSARAAAACSDAAAAD---- 34
## [63] -RSSSARAADSAASDSAAAAAS--- 32
## [64] -ASSSCAAADSAASSDSAAAA---- 33
## [65] --SSSARSCSSAASRSARSAAD--- 48
## [66] --SSSDASCSSAASSAARAASA--- 49
## [67] --SSRADSCSSAASSACAAAAR--- 50
## [68] CSSSSADSRSSRASSDAAAA----- 51
##  Con -SSSSS-S???S????AAAAA?--- Consensus
```

Group 55

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 112 rows and 24 columns
##       aln                        names
##   [1] -SSSRRAAASCSSSDSDSASAA-- 3
##   [2] --SD--AASSCASSDSAAASAACA 99
##   [3] -ASD-AASSDCRRSDSSAASAA-- 30
##   [4] --SSRASRASARASDSSASSAA-- 23
##   [5] -ASSCASRASAARS-SSAASAA-- 57
##   [6] --ASSCACRSDSRSSSRACSAA-- 56
##   [7] --ASRSDCASRDASASRASSAA-- 71
##   [8] SAASSCAASSDSASSS-SRAA--- 69
##   [9] -AASSAAASSDSCSRSRSSAA--- 70
##   ... ...
## [105] -ASSRRARRRRSSSCSDDSAA--- 4
## [106] -ASSR-ARASRSSSCSADAASSS- 5
## [107] -ASAARADA-ASASSSSRAASA-- 11
## [108] -CASARSRARASRSSAARAAS--- 87
## [109] -DS-ASASCRSSSASASSSDAD-- 65
## [110] -AS-AARSARSSSASASRDDAD-- 66
## [111] -ASRAAASCRASSRAASRRDA--- 64
## [112] -ADSADSSDRASARSASS------ 59
##   Con --SS?SS??????S????AAA?-- Consensus
```

Group 56

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 116 rows and 27 columns
##         aln                       names
##    [1] ---SARSSASASRARACAASRRS---- 60
##    [2] ------SSASASSCRASAASSASSASS 102
##    [3] ---CASDDSAASSARASAASRSD---- 2
##    [4] ---SSSAASSSRAARAAADSDAS---- 44
##    [5] ---SSRSRASARAACAAARSSAS---- 111
##    [6] ---SSSSSASSCAAAAASCARASS--- 22
##    [7] ---SSRSSASRDARAAASSSRAS---- 62
##    [8] ----DSSASRCDAASSCARCSSSA--- 86
##    [9] ----SSSRSSADRASSSARASDSA--- 96
##    ... ...
## [109] --SRRSSAADSCRRCSRASS-CS---- 58
## [110] -RSRRSSARDSCRASSAASS-CS---- 59
## [111] --SSRSSAASSCRSRRAASDDAS---- 27
## [112] DSSASRSAASSCASSDAASA------- 91
## [113] DDSSRDSARAACARSASASA------- 92
## [114] --SSRRSRARSCAASAASARSA----- 109
## [115] ---SRRSRRASCAASAAARSSSS---- 110
## [116] --DSSRSASSSCASSAARASAA----- 90
##   Con ---??SS??SS?A???AA?S???---- Consensus
```

Group 57

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 68 rows and 27 columns
##         aln                       names
##   [1] --SSSS--SAAAADCRSAASASAS--- 41
##   [2] ---SAS--SSRAASCRSARSASAS--- 42
##   [3] ----AS--S--AARCRSAARASAS--- 9
##   [4] --RASS--AARAAAAACARAACRS--- 22
##   [5] --AAAS--SRAAARSASRDAARSA--- 10
##   [6] ---ASS--SR-AARSRSARCARS---- 12
##   [7] --RSSA--ASAADAAR-AAADRSSS-- 30
##   [8] --SSSA--ASAARASRSAAAARSS--- 31
##   [9] DSASAS--ASAACASR-SAASAA---- 35
##   ... ...
##  [61] ---AAA--SCASRARASAASDRADR-- 55
##  [62] ---ARS--AAAAASRAAAAAASARR-- 16
##  [63] --SSCA--ARASASARSRAADSAA--- 67
##  [64] --SSAA--ARASASACASAAARAA--- 68
##  [65] ---ADA--AAAAASASASARSRADR-- 21
##  [66] ---ARA--ARARASASRSRAARSDS-- 1
##  [67] ----SC--AAARASASRADSARACAC- 62
##  [68] ---AAA--AAARA-ASDASAACSDSD- 14
##   Con ---A?S--A???A?A??A??A?A??-- Consensus
```

Group 58

```
## use default substitution matrix
```

29

```
##
## MsaAAMultipleAlignment with 43 rows and 24 columns
##       aln                     names
##  [1] -RSDA-AAARRSSDRASAARAA-- 1
##  [2] -SSDS-ASASSSSCAASAARAA-- 2
##  [3] ---AA-ASASSSSACARAARACSS 18
##  [4] RSCRA-SSSSRSSAAASAARA--- 7
##  [5] ASARARSSSARSSAAAS-ARA--- 8
##  [6] --SRDAARSSSAARAASAARAA-- 3
##  [7] ---RSRARDSSSSRRASADSAAS- 10
##  [8] -RSRCCADSSSSRRAARSARD--- 9
##  [9] ---ACARDSSSSARRARAARARR- 17
##  ... ...
## [36] ---RARCSSSSADARSRDAACRAA- 30
## [37] ---RSRASSAAARR-CSAACSARA 4
## [38] --R-SSRRASACSRRCSRAAARA- 5
## [39] --RASSARSAAASRRCRRASAA-- 25
## [40] CDASASSSSDSSAR-CSRAACS-- 15
## [41] SDAADASSASSSARRRSRAA---- 16
## [42] ----AAASSASAARAASARCASAA 26
## [43] ---SAAARSASAASDCRARSADA- 41
##  Con --??A??S?S?S?RAA?AA???-- Consensus
```

Group 59

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 65 rows and 24 columns
##       aln                     names
##  [1] --AAADAAS--RAASSADSAS--- 17
##  [2] ---AAAADS--RAASSAASAC--- 18
##  [3] --SDADADSSARASDSAASASC-- 16
##  [4] --RSADAASDARAASSAAASAD-- 15
##  [5] -DSSAASDSDSSAAASADASR--- 39
##  [6] -SSSAASRSDSSAAASAAAAS--- 40
##  [7] -CSSSASDSDSSACASARRDS--- 38
##  [8] -SDSAASDSSAASSARARSAA--- 31
##  [9] --SSRARDSCSAASAARRARRS-- 23
##  ... ...
## [58] --AAAASADASDAASRASSDAS-- 20
## [59] --SRAACADSRDCAARDSSSAD-- 21
## [60] --CASAASSSSAADDSARAASA-- 33
## [61] --SASAASAASDRSSSARAASC-- 41
## [62] RRRASAASSSSASARRSRAA---- 56
## [63] SSRASAASASSSSARSSRAA---- 57
## [64] ---SAASSSSAASAASSAAAASC- 42
## [65] --CSASASDSSASARSSRSAAS-- 44
##  Con --??RAASSS??A??S??AA??-- Consensus
```

Group 60

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 32 rows and 26 columns
##        aln                     names
##   [1] -----RDSRCASSRAASSSRDSCSA- 1
##   [2] ----RRSADSASSDAASDSADS-SA- 4
##   [3] ---RARAADRSRSSAARSSSSS-D-- 6
##   [4] ---SSRRADRSASSAASASSAS-D-- 7
##   [5] ---RARSAD-SASSAAAASACS-AA- 5
##   [6] ---CCSARSSARSCASASSSSASA-- 9
##   [7] ---CSRDRSSSRSSRSSSSSSAA--- 12
##   [8] --SSSACRSSSRSSASASSASSA--- 11
##   [9] --SSARSDRSSRSSRSSSSASS---- 13
##   ... ...
## [25] ---SRASASSS--RASRRSRCSSSA- 18
## [26] --RCRAARSSR--AARSRSRSSSA-- 3
## [27] ----RCSACSRAARASSSASSASA-- 2
## [28] ----ARSAAACRASADSSSSRCRS-- 19
## [29] ----RASAASCAARADSSSSCSRS-- 21
## [30] ---DRASAARCAA-ASSSSSDSRS-- 20
## [31] -----CSASADRSAASSSSRASCS-- 25
## [32] ----RCARSARASDASASSSDADSA- 27
##   Con ---???S??S?R?SA?SSSSSS??-- Consensus
```

Group 61

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 111 rows and 26 columns
##        aln                     names
##    [1] ----AASASCSSAAASRASSSASA-- 8
##    [2] ----AASASCSSAAAAAASSDSAS-- 68
##    [3] ---SAASASCS-AAASDASSSSAA-- 9
##    [4] -----AASAASSAADACSSSSSASA- 92
##    [5] ----SAASASSSAAAACSRSSSAS-- 93
##    [6] ----AAASACSADARRCRSSSSAS-- 91
##    [7] ---AASASSCAAAAAASRSDSSAS-- 51
##    [8] --RSDAASARSSSSAA-SSADAS--- 23
##    [9] ----AAASARSRSSAA-DSAAASSA- 59
##    ... ...
## [104] ---DCRRSSSSASARAARSAAAA--- 40
## [105] ----RARSASRASARARRSAAASS-- 41
## [106] ---SAAASSSSASARARRSAS----- 39
## [107] ----RAASASRSSARARASARSCD-- 108
## [108] --CARCASAACAAASARRSAAS---- 42
## [109] ---ARSDSSASRAASARRCSASAS-- 43
## [110] -----CARASSCSCDAAASSDAAAS- 50
## [111] ---AACRRAASRSCDSSASSDRD--- 71
##    Con ---?A??SA??????A??SS?S?--- Consensus
```

Group 62

```
## use default substitution matrix
```

31

```
##
## MsaAAMultipleAlignment with 102 rows and 28 columns
##          aln                     names
##    [1] -SSARCADSSARS-RSA--AAASA---- 29
##    [2] -SSARSASRSAAS-AAA--AAARA---- 73
##    [3] -ASRDSASSAARS-AAS--AAASAA--- 7
##    [4] -RSS-CSARDAAS-AAR--SAARA---- 14
##    [5] -RSS-CSCRASSS-ASS--SAASAS--- 56
##    [6] -R-RDSRSRASSS-SAA--AARAAA--- 45
##    [7] -S-RDSRSARSSS-CAS--ASAAAA--- 102
##    [8] -R-ACCRASSASS-SAS--ASRASA--- 57
##    [9] -R-ASARAASASS-RAS--AAAAAA--- 99
##    ... ...
##   [95] ----RA-SRRSRAAASDRDASASSR--- 64
##   [96] ---SRSRSRRADSCASS--ASCSAD--- 66
##   [97] --RSRSRCRRASSDSRS--SAC-AD--- 68
##   [98] --ASSSDARDASAARSA--SRSSA---- 13
##   [99] ---RASRCRSAAARRSA--SRASAR--- 65
##  [100] ---RSC-AARCASASSA--ARASRAA-- 54
##  [101] ---ASR-AARAARSSAA--ARASCAA-- 85
##  [102] ---RSCRASRCAAAASA--ARASAS--- 55
##    Con ---?????????S??A?--??A?A?--- Consensus
```

Group 63

```
## use default substitution matrix


##
## MsaAAMultipleAlignment with 21 rows and 24 columns
##          aln                     names
##    [1] --DASARRRSRSAARASRAADD-- 5
##    [2] --DRSRAARSSSAARACCADDD-- 7
##    [3] --SRRRRASSSAARAAARADD-- 8
##    [4] -SDAARDASSARACSASCAAD--- 1
##    [5] --AR-AAAASSRASSRSARAASR- 11
##    [6] RAAR-ASSDAARADSRRARAA--- 18
##    [7] AAARCASSRASRA-SRRASAD--- 17
##    [8] --AACACDCASSDRSASSASDD-- 4
##    [9] -DAARARDSASAS-AAASRRDD-- 6
##    ... ...
##   [14] ---SAAAARCSSAASSRAAARAA- 19
##   [15] --DAAARARASSASSSRCCACA-- 13
##   [16] -SCDAAAARASSR-SSRRAADA-- 12
##   [17] -SSAAASRAASSDRASRAAAR--- 15
##   [18] SSCAAASARAASDRSSRRAA---- 16
##   [19] --CADACARSSSSCSASRAASA-- 10
##   [20] --SDAADASSASARSAAAASCS-- 2
##   [21] -CADARRCDCASDRSACSAAC--- 3
##    Con --???A???SSSA?S???AA??-- Consensus
```

Group 64

```
## use default substitution matrix
```
```

```
##
## MsaAAMultipleAlignment with 119 rows and 26 columns
##        aln                       names
##    [1] ----CCSAASSSSADRSCAAAARA-- 21
##    [2] -----SSAASSRSSDSSAAAAAAA-- 38
##    [3] ----SSSSAASASCSDRAAAAAAS-- 30
##    [4] ----SSDSRASRSSSASAAARARS-- 34
##    [5] ----SSSDSASRSSASSARAAAAS-- 35
##    [6] ----ASASASRRSSSSSACAAARS-- 36
##    [7] -----CSSASARSSSSSACRAAACA- 47
##    [8] ----SSASASCSDSSSSSAAAAAA-- 37
##    [9] ---RSSAAASRSSSSASAACCAR--- 42
##    ... ...
##  [112] ----SSACSSSAACAASAACSSAA-- 73
##  [113] ---SASAASASSASSAA-ASSSAA-- 88
##  [114] ---SASRASSAA-ARCARASDAS-A- 1
##  [115] ---SSSRACSSA-ARAARSSAAA-A- 2
##  [116] ----AAAADSSARASCARASRSR-A- 49
##  [117] ---SAAAADSAA-SRCSRSARSA-A- 50
##  [118] ----SSASSSAS-DRSSRDCRSSDA- 71
##  [119] --------ASAA-DRSSRRSASARA- 82
##    Con ----???S???S????????AAA?-- Consensus
```

Group 65

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 55 rows and 24 columns
##        aln                     names
##    [1] RSSASSCA-RRASASAAADAA--- 25
##    [2] -SSASSAA-CRASSSAADRAA--- 26
##    [3] -SSASSAR-RRRSCSAAASAAA-- 24
##    [4] -SDSRAAA-RRASADASASAAA-- 1
##    [5] -SDSRAARDCSAAASSSAAAA--- 2
##    [6] -SSSAAARSRRAASSASADAA--- 27
##    [7] --SASSAACASSRAARSAASAS-- 5
##    [8] --SSRSAAAASSRSAASSAAAS-- 7
##    [9] --SAASSRSRRSAAAASSASCA-- 49
##    ... ...
##   [48] --RCDSSAARSARASSSRSARR-- 4
##   [49] ---ASSSAARASRSRSRRSASRSS 18
##   [50] ---ASAAAARAAASCASRSSSAA- 10
##   [51] --RASRSAARARSSRSSSDSSA-- 21
##   [52] --SCSRASSRDAASRSRSASRA-- 12
##   [53] --SCSSAARAASRSAASSRSSA-- 17
##   [54] --ASSAARRRASRSASSSRSSA-- 20
##   [55] --ASSSRRARSSRASSASRSSA-- 19
##    Con --???????R????????AS?A-- Consensus
```

Group 66

```
## use default substitution matrix
```

33

```
##
## MsaAAMultipleAlignment with 22 rows and 27 columns
##        aln                         names
##  [1]  --CASRDAASSSSSA-SRSSRAS---- 13
##  [2]  --CASSDAARSSSSA-SASSAAA---- 14
##  [3]  ---ASRDAAAASRSARSRSSAAA---- 6
##  [4]  --CAARDARRASCRA-RRSSAAA---- 5
##  [5]  --CAACAADSASASA-SSSCAAA---- 9
##  [6]  --SASSDARSASSAR-SRSAAAA---- 7
##  [7]  ------RAAAAAAAD-DSARARSCAAA 8
##  [8]  ------RCAASDASD-ASARAA----- 18
##  [9]  --SCDARAAAASSSS-ADASAAAA--- 11
##  ...  ...
## [15] ------DASDASASS-SSARAASARAA 15
## [16] -----CARADACCSCSSRSRAAAAA-- 1
## [17] ------ARADASCSASSAAASAAARA- 2
## [18] ----RSRAARDSCSASRRSCDARA--- 3
## [19] -----SAAADDSCSASSRRSSASAR-- 4
## [20] ----SSAAAAASCASASSSSAASA--- 10
## [21] -----RRAARADCAS-SSSSAAAA--- 20
## [22] ------RADDAASAS-SSSASRAA--- 16
##  Con ----???AA?AS?SA-S?S?AAAA--- Consensus
```

Group 67

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 71 rows and 27 columns
##        aln                         names
##  [1]  --ARADSAASAADARRAASASA----- 32
##  [2]  ---R--SSRDAADARRAASSSA----- 66
##  [3]  ----ADARAAARDRRRAASAAACS--- 31
##  [4]  --------CRSADARSSASAAAA---- 50
##  [5]  ---SRASRCDSADARSAASSASA---- 67
##  [6]  ----RRSAASACDRRACSCAAAAS--- 24
##  [7]  ------SARSDAARDACSCRAAA---- 43
##  [8]  ---------AASDASSAAASCAAA--- 49
##  [9]  ----CRSSAAASDSSAADADSAAA--- 65
##  ...  ...
## [64] ----ADDSAARDSASSSAARAAAA--- 41
## [65] -------SDARAAASCSAAAAA----- 54
## [66] ----RSAAADDSACSRRSADAAAA--- 63
## [67] ---CRSAAAADSR-DRSRADDAAA--- 64
## [68] ----ASAAAASAADACRASDAAAS--- 6
## [69] ---CRADAARSCSADASAAARAA---- 39
## [70] ---CRASAASDDSCRRAADARAA---- 62
## [71] ----RRAAARCSAAASDAADRAAD--- 40
##  Con ----????AA???A????AAAAA---- Consensus
```

Group 68

```
## use default substitution matrix
```

34

```
##
## MsaAAMultipleAlignment with 101 rows and 32 columns
##         aln                             names
##    [1] --ARCSRAASCSDSS---RASSAAA------- 9
##    [2] --DRSS-AASCAASS---AASSAAAA------ 18
##    [3] -----SAADSCARRS---RACASAADAA---- 34
##    [4] -----SRRDSCARSS---RAAAAASDAR---- 36
##    [5] ----SASARSARAAS---CSSAAAAAA----- 29
##    [6] ----SSSARSSDCAD---SSSASAAAA----- 52
##    [7] ------SRDSSDAAS---SRSAASSAA----- 4
##    [8] ---------SSRSSR---RSAASASASASAAA 13
##    [9] ------D--CARSAS---RSAASSSA------ 70
##    ... ...
##   [94] ----------CSASR---SCSSAASSAC---- 69
##   [95] -----AARASASCRS---AASSAAAAAAS--- 78
##   [96] ------ARDACSASS---ASASAAAAAAS--- 86
##   [97] ------RSDARADRS---SCSARSSAAAA--- 41
##   [98] ------ASAARASRS---CCSARAAAASA--- 66
##   [99] ----CAASSDRSARS---SC---RASCAAC-- 56
##  [100] ------ASSRRSARS---SCCAARADCAA--- 57
##  [101] ------ARSACRARA---SCCSACASCSA--- 61
##    Con -----??????????---?A?AAAAA?---- Consensus
```

Group 69

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 86 rows and 32 columns
##         aln                             names
##    [1] ------SSASSA----RARRCSDAARAARS-- 71
##    [2] ----RRSAARSS----RARRCSAASRSA---- 85
##    [3] ---ARCASASSS----RSRRASAAASA----- 21
##    [4] ----AASDDRSA----RAAACARCRDSC---- 44
##    [5] ----AASSASSA----RASACAAACASA---- 82
##    [6] -----ASARDSA----SSASARRARSASA--- 24
##    [7] -----ASAASSA----ASARARRRRSASR--- 25
##    [8] -----ARSAASS----AAARAARRASAAA--- 1
##    [9] ----CARACSRC----SDSSCRAASR-SR--- 52
##    ... ...
##   [79] ----RAARASSR----AACDSRA-ASRSA--- 86
##   [80] -----SASSACR----AACDASR-ASSRDA-- 68
##   [81] ------AAASAR----AARDDSS-AASSDAD- 72
##   [82] -----SARDSARSRDSAARASSA-AAS----- 76
##   [83] -----SA-ASAR---SAARDSSA-AACASA-- 81
##   [84] -------AADS-----SRRRCSSAAASSDADS 77
##   [85] -------AADS-----AARDSSDRAASADAAS 78
##   [86] ------RARSSR----AARSSSARASSADR-- 73
##    Con -----A??????----????????A??A?--- Consensus
```

Group 70

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 62 rows and 23 columns
##        aln                     names
##   [1] --AAAADRASSAASCRASAARA- 53
##   [2] -SSAAARRARSAASSAASASR-- 61
##   [3] --RASAAAARSASSAAASASRA- 56
##   [4] --SAAAAAARSASSAAASAARA- 57
##   [5] -SAAAASSACADAASAASAAA-- 13
##   [6] --RAAASSSCSAACASASAAAA- 1
##   [7] -----SSASCSSASAAASAASA- 35
##   [8] --RAAASADSCSAAA-ADAASSS 48
##   [9] -ARAAASASSASAAADADSASS- 49
##   ... ...
## [55] --SRARSAASSAAARSASASRA- 23
## [56] -SSDADA-SSSASACSSARAAA- 25
## [57] -AAAAAD-RSSASSCSSASAAR- 54
## [58] -ARSAAR-SRSADDCSAARAAS- 43
## [59] DARSADRRSRCADDSAAASS--- 42
## [60] -ADSARARRSSCSDASDCCSA-- 44
## [61] -ADSAARRASARSDSADCAAA-- 46
## [62] -AD-AAARRSSSSDRDRCAAAA- 45
##   Con --??AA??SSS??AA?A?????- Consensus
```

Group 71

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 178 rows and 26 columns
##        aln                     names
##    [1] ARASASAASACSDAASSASS------ 15
##    [2] ---SASCASAASSAASSASDCRA--- 144
##    [3] -RSSAAASSSCSDSSSDRRAD----- 73
##    [4] ---SASASSSSASSDSDSRDDSA--- 95
##    [5] ---SARADSSAASARSSSASDSS--- 135
##    [6] ---SARSRSSAASSRSSSASSSA--- 152
##    [7] ---SDARDSSAAAARASAASDSA--- 172
##    [8] --SSSSARSSARSARCARSSRS---- 49
##    [9] ---SASAASSASAASCADSSRSA--- 92
##    ... ...
## [171] ---SACSASSASRASSSRAASSS--- 105
## [172] --SSSASSASASSASSSDSSRS---- 54
## [173] --SDSASRASSSSARSSDSRAS---- 61
## [174] --SSSAADASASRASSRDAARS---- 37
## [175] -SCRRSRSRSSSRSSDSRASS----- 60
## [176] SCCARSCASSASASSASRSS------ 81
## [177] --CASAAAASASAAASSSRASSS---- 140
## [178] -ACASAAASSASSADSSRASS----- 141
##   Con --?SS?A?SAAA??SS??SS???--- Consensus
```

Group 72

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 192 rows and 29 columns
##        aln                           names
##    [1] AAADRSSACASSADAARAAS---------  13
##    [2] --DDSSSACASSRSAAASASAA-------  92
##    [3] ----SSSSCSSSSRAARAASAASA-----  117
##    [4] -----SSASAAASSAAAAASAAAAA----  84
##    [5] ----RSSASAASSCRAAAASAAAA-----  90
##    [6] ----SSSASAASSAAADSASAAAA-----  91
##    [7] ---AAASAAASSSAASACASAASS-----  48
##    [8] -----RSAACSSSAAAASASAADAD----  52
##    [9] ----SSSAAAASSSASASDSDAAS-----  186
##    ... ...
## [185] -----SARRARSAASADASRAAARD----  11
## [186] ----SCRARCASRSASSASACAAR-----  5
## [187] ----SARCASARRAARSASAAASR-----  6
## [188] ---SAASRRRADSASRSASSAAS------  37
## [189] ----SRRAASARADSSRASSAARR-----  7
## [190] ----SSADASADAASSCASAAARA-----  51
## [191] ---SSRSSASADSSRRSASAAAR------  8
## [192] --SSSRSSASSRAAARSASSRA-------  61
##    Con ----?SS?????SS?SAAAAA????----  Consensus
```

Group 73

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 74 rows and 26 columns
##        aln                           names
##    [1] ----SRAACAAASRSCSARAAAAS--  1
##    [2] ---SARAASCASSRSCDAACAAA---  24
##    [3] ---SSRASAASAARSRACRARAAS--  49
##    [4] ---SSSDASSAASRSSSRSRS-RA--  19
##    [5] ---SSSSAASAAS-SRSRSRAARA--  20
##    [6] ---SAAAAAASARRSSARSAAAAS--  48
##    [7] --ASRAARADSASRSSARSAAAS---  56
##    [8] ---SRAA--ASASRSSSRRA------  13
##    [9] --RSAASAARSASSRCSRSAAA----  54
##    ... ...
## [67] --RAAASSAARSAS-ASAASARR---  34
## [68] ----ARAAASAAAS-ASAARAAS-AR  33
## [69] -----RAAASAARS-ASAAAARSAAR  35
## [70] --ACCRAAASASAS-ASCAS------  61
## [71] ---ASASAARAAAD-DSAACASAA--  21
## [72] ---CRASCAAASSR-SSAARASAA--  44
## [73] ---DSRSAASSDAS-DSCARARAA--  22
## [74] ---ASSSAASADASDDSCA-ARAS--  23
##    Con ---???A?AAAA?SS?SA?AAA?---  Consensus
```

Group 74

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 106 rows and 27 columns
##        aln                      names
##   [1] ---AARAAS-ARASSCSASSAAAS--- 1
##   [2] ---AARASS-SSASAASASSAASS--- 62
##   [3] ----SRACS-SSSSACSASSASSSA-- 56
##   [4] ----SRAAS-SSARASSAASASCSS-- 57
##   [5] ----ARDSSRASRSSASASAASRAS-- 44
##   [6] ----SSARS--DSSARSRAARSRS--- 8
##   [7] ----SSSRSRASSSADSRASRRSS--- 38
##   [8] ---RASARSCSCARSSCSAAARS---- 33
##   [9] ---RASARDRRSARSSACSARRSS--- 59
##   ... ...
##  [99] ----RSRAADACSSASSSSSSAAS--- 26
## [100] ---SACSSASSCSSSAASAAAAA---- 86
## [101] ---SSSAAARSACSASSSRSAAS---- 16
## [102] ----RSAAADSACSRSSSSSSASS--- 25
## [103] ---SRSASASSACSCSDASCADS---- 43
## [104] ---ARDSAASSSCSSSDASCS------ 46
## [105] ----RSASAD-ACSDSCSSSAAASR-- 27
## [106] ----SSSSSD-AASRSSSSSAASD--- 28
##   Con ----????SSSS?SA?S??AA???--- Consensus
```

Group 75

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 27 rows and 23 columns
##        aln                    names
##   [1] ARASAAA-AAA-SDSACSRSDR- 1
##   [2] AAASAAACAAA-SASACASAA-- 2
##   [3] -RSDAAAAASR-SRSSRDSASR- 11
##   [4] RSSDAASRDSS-CARSCDRSA-- 20
##   [5] RSSRRADCDSR-CSRSCSSSA-- 21
##   [6] -CSSAADARSRDSSSSASADS-- 9
##   [7] RSSSAASASSC--SAADSSARS- 26
##   [8] RSSSAASASSS--ARSASRACS- 27
##   [9] RSSRAACAASA--SSAASRASS- 17
##   ... ...
##  [20] AACSSAAACAR-ASRSDASSA-- 3
##  [21] AASSASRDCAR-DSSSDACSR-- 4
##  [22] RCSSAAADSRRRSSAADDDA--- 7
##  [23] -CSSASAADRRSDSASRASAA-- 8
##  [24] ACSSASARAACARSSAACRA--- 5
##  [25] AASSASAAARCAASRARSCA--- 6
##  [26] -SSSARAAADSSSCRARSAAS-- 22
##  [27] DSSSASASRDSSSARSSSAA--- 23
##   Con ??SSAAA?A??-?SS??S?A?-- Consensus
```

Group 76

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 207 rows and 28 columns
##          aln                         names
##    [1] ------RSSSARASRCASRS-AARASA- 1
##    [2] ------RSSSASSSRCASAS-AAAASA- 2
##    [3] -------SSSSSASRSAAAS-AASA--- 19
##    [4] -------CASASASRSAAASDAASAAA- 113
##    [5] -------CSASSASRSASASCAASCAA- 114
##    [6] -----AADAASRASSAAARSCAASA--- 42
##    [7] -------SASSAASSAAARSAAA----- 184
##    [8] ----AASSSASSASSAAAASCS------ 162
##    [9] ----ASSSSSSSASSAAARSCAAA---- 182
##    ... ...
## [200] ----AAS-RSSSSSSS-SASCAAAAA-- 167
## [201] ---SSRSDSASSSSDS-DRSCAAA---- 136
## [202] ----SRSDSASSSSDSADASAAAA---- 137
## [203] ----ARACSASSASSSSSSSAAAA---- 156
## [204] ----ARACSRSAASSARASSAAAA---- 188
## [205] ----AASASDASASSSARSSRAAAS--- 194
## [206] ----ASSASRRSASSSARSS-AAA---- 196
## [207] ----ARSASSSSASSSARSRSAAA---- 195
##    Con ----??????S??SSSA????AAA---- Consensus
```

Group 77

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 149 rows and 28 columns
##          aln                         names
##    [1] ------SASRDRRACASDASAAARSA-- 1
##    [2] -----ASASASRRAAASDASARA-SA-- 124
##    [3] ------SCARSSAASAASASDRRRAA-- 16
##    [4] ------SAARASAACDASASASDAAS-- 132
##    [5] ------SSARRDAASDASCAASASAA-- 120
##    [6] ------SACRASASAASSARRSARAAA- 21
##    [7] ------SAARASDRAASSASSSAACA-- 22
##    [8] -------SRACDRSAASAASAASAAAA- 24
##    [9] ------DSSACDRSASSAAAASSSAA-- 123
##    ... ...
## [142] ----SAASRSDACSRRRRRCAARA---- 6
## [143] -----SSAASSAAAASDRRAASAAA--- 100
## [144] ----RSSARRAAAAADSRRARSAA---- 144
## [145] ----ARSSRAAAAASSDRR-ASCSA--- 140
## [146] -----RSSARAADASSSRRDRSRAA--- 145
## [147] ------ASSARSSACSAS-ADSAA---- 83
## [148] ------SSRAASRACSSS-ADSAAASA- 90
## [149] -----DASRARSAACSSRDASSAAA--- 109
##    Con -----?SS?????????S????AAA?-- Consensus
```

Group 78

```
## use default substitution matrix
```

39

```
##
## MsaAAMultipleAlignment with 34 rows and 27 columns
##        aln                       names
##  [1] ---ARR--ASSASRRSASAARASDSS- 6
##  [2] --SAAR--RSSASRRSASASRA-DS-- 8
##  [3] ---SAR--RSSASRRSASAAASSRA-- 5
##  [4] ---AAS--CSAASSRSASAARRSDA-- 28
##  [5] --SASR--SSRCRAASASASRSRSD--- 13
##  [6] ---ASR--SS-ARSAS-SARRRSS--- 15
##  [7] --SAAR--RSASRSASAAACRDAA--- 7
##  [8] ---ARC--SCSARSASAAARDSASR-- 10
##  [9] SADSRD--SCSARSASAAAR-SA---- 11
##  ... ...
## [27] --ASAA--ASSAAARS--SSCR----- 20
## [28] ----AA--ASSAARADRSRSDARASA- 26
## [29] --RADS--AASASCADSSRSCDAD--- 16
## [30] ---SAD--SACRS-ASASSSRSACDA- 17
## [31] ----AD--SSDSR-ASASSARAACRAA 23
## [32] ---CAD--RDSRA-ASASAARAARAD- 24
## [33] ----AD--RASRASASSSRACSAAAD- 21
## [34] ----AD--RSSAASASSSCACARCSD- 22
##   Con ---?A?--?S?A???SASA?R????-- Consensus
```

Group 79

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 146 rows and 28 columns
##        aln                       names
##   [1] --SASRS--S-AAAAASRSSCSSAS--- 18
##   [2] -RACARS--SSAAAAAARSSCAR----- 123
##   [3] ----ARS--SSARAASSRSRSASARR-- 122
##   [4] AASSRSR--SAASAARSSA--ASS---- 91
##   [5] RASSASS--AAASAARSSA--ACSS--- 103
##   [6] ---SSSA--SAASCARRSA--ASSAAD- 72
##   [7] ---SRAR--SAASAARSSARDAASA--- 13
##   [8] -------AAARASARARSSSSAAR----- 125
##   [9] -----ASCAACASAAAASSSASRAAS-- 136
##   ... ...
## [139] --AAASA--RSAARAR-SSSDCAAS--- 38
## [140] --RSASC--AAAARRRSSSRRARAS--- 42
## [141] --RSASS--AAASRRRSSCASA-AS--- 43
## [142] --ASASA--ARASDARSSSRRA-SS--- 40
## [143] --SASSA--SDSADARSSCRA-ARR--- 118
## [144] ---ASAS--SACAAARSSCRASAAR--- 119
## [145] --SARSS--ASAARAAASCSS-SRR--- 120
## [146] --AARSS--RDADRAASSRAS-ARR--- 121
##    Con ---???S--A???AA??SSS?AAA?--- Consensus
```

Group 80

```
## use default substitution matrix
```

```
##
## MsaAAMultipleAlignment with 140 rows and 26 columns
##         aln                        names
##    [1] ----ASSCASCS-SASCAASRSAR-- 7
##    [2] ----RSSRASSSASASCASSRAAC-- 8
##    [3] ---ASSSSAASSASRASASRDRA--- 11
##    [4] --RASSSSAASSASSRSAS-DAA--- 12
##    [5] ---AARSRASSSSDASSASSASA--- 90
##    [6] ----SASASSSSSAASSASSASAR-- 119
##    [7] ---AASSSCSSASSRSAASARSSS-- 15
##    [8] ----ASSACSAASSRSAASRASAS-- 20
##    [9] ---ASSASSSAASSSSAASAASSA-- 17
##    ... ...
## [133] -ASSAARSAARSSSSSRARCAA---- 46
## [134] ---AARASASRASASRRARCAAS--- 58
## [135] --ASARACASRASASSRAR-DAS--- 59
## [136] --AASAACSSARSRSSRARCCA---- 44
## [137] ----AASSASRSCSSSRSRSAASA-- 42
## [138] ----RRSSARSRRSSARSSSAASA-- 113
## [139] ---RARASAADRASSSSARSDAS--- 51
## [140] --ARADASSDSRSSRSSRRSDA---- 55
##    Con --??A??S?????SSS?AS???---- Consensus


Group 81


## use default substitution matrix


##
## MsaAAMultipleAlignment with 259 rows and 31 columns
##         aln                        names
##    [1] ------ARSAARARARCSSSSAS--ASA--- 1
##    [2] ------ASSAARASARASSASAS--ASSA-- 72
##    [3] ----RAASSASRARARDSSARSS--A----- 101
##    [4] -----ASSAAARASARASCSASA--AS---- 73
##    [5] -----AASSAARADARASSSASS--SS---- 200
##    [6] ------CSAARRASARDSASSDA--SSS--- 5
##    [7] ------ASSAARASAAASASSAA--SSSS-- 71
##    [8] --------AARRASARARSSSAR--ASADS- 10
##    [9] --------AASRASARRRSSSAR---SASS- 11
##    ... ...
## [252] ------ASRAARASCASARDSDS--SSR--- 218
## [253] ------SSSAAAASCASASDAAS--SRR--- 181
## [254] -ARRAACASARSAARSAASSS---------- 85
## [255] ----AASAAARRAARSAASSASS--R----- 220
## [256] -----AASSASSAARAAAASCAS--AA---- 130
## [257] -----ACSSSRSAAAAAAASSAS--AAS--- 233
## [258] ----AASSSAASAARSAAASSAS--D----- 249
## [259] -----AASSASSAAAASAASSAS--SS---- 131
##    Con -----????????A??A??S??S--S?---- Consensus
```