| **Virus protein** | **Replacement** | **Number of sequences** | **Grantham distance2** | **Miyata distance3** | **Notes** |
| --- | --- | --- | --- | --- | --- |

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| --- | --- | --- | --- | --- | --- | --- |
| **ORF 10** |  | [P10S](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:P:10:S) | 65 | 73 | 0.56 |  |
| **ORF 10** |  | [A28V](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:A:28:V) | 41 | 64 | 1.85 |  |
| **ORF 10** |  | [I4L](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:I:4:L) | 32 | 5 | 0.14 |  |
| **ORF 10** |  | [S23F](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:S:23:F) | 31 | 155 | 3.45 |  |
| **ORF 10** |  | [R24C](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:R:24:C) | 30 | 180 | 3.06 |  |
| **ORF 10** |  | [Q29\*](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:Q:29:*) | 22 | - | - |  |
| **ORF 10** |  | [\*39Q](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:*:39:Q) | 22 | - | - |  |
| **ORF 10** |  | [L17P](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:L:17:P) | 17 | 98 | 2.70 |  |
| **ORF 10** |  | [Y14C](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:Y:14:C) | 16 | 194 | 2.38 |  |
| **ORF 10** |  | [R20I](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:R:20:I) | 12 | 98 | 2.49 |  |
| **ORF 10** |  | [A8V](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:A:8:V) | 11 | 64 | 1.85 |  |
| **ORF 10** |  | [D31Y](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:D:31:Y) | 10 | 160 | 3.95 |  |
| **ORF 10** |  | [L37F](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:L:37:F) | 10 | 22 | 0.63 |  |
| **ORF 10** |  | [R24L](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:R:24:L) | 8 | 102 | 2.62 |  |
| **ORF 10** |  | [P10L](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:P:10:L) | 7 | 98 | 2.70 |  |
| **ORF 10** |  | [I4T](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:I:4:T) | 5 | 89 | 2.14 |  |
| **ORF 10** |  | [V6F](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:V:6:F) | 5 | 50 | 1.43 |  |
| **ORF 10** |  | [Y26H](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:Y:26:H) | 5 | 83 | 2.27 |  |
| **ORF 10** |  | [V30L](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:V:30:L) | 5 | 32 | 0.91 |  |
| **ORF 10** |  | [T38I](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:T:38:I) | 5 | 89 | 2.14 |  |
| **ORF 10** |  | [R24H](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:R:24:H) | 4 | 29 | 0.82 |  |
| **ORF 10** |  | [A28S](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:A:28:S) | 4 | 99 | 0.51 |  |
| **ORF 10** |  | [I4V](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:I:4:V) | 3 | 30 | 0.85 |  |
| **ORF 10** |  | [I13M](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:I:13:M) | 3 | 10 | 0.29 |  |
| **ORF 10** |  | [M21I](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:M:21:I) | 3 | 10 | 0.29 |  |
| **ORF 10** |  | [M21K](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:M:21:K) | 3 | 94 | 2.63 |  |
| **ORF 10** |  | [M21T](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:M:21:T) | 3 | 81 | 1.86 |  |
| **ORF 10** |  | [I27T](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:I:27:T) | 3 | 89 | 2.14 |  |
| **ORF 10** |  | [D31H](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:D:31:H) | 3 | 81 | 1.72 |  |
| **ORF 10** |  | [M1I](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:M:1:I) | 2 | 10 | 0.29 |  |
| **ORF 10** |  | [M1L](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:M:1:L) | 2 | 14 | 0.41 |  |
| **ORF 10** |  | [M1T](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:M:1:T) | 2 | 81 | 1.86 |  |
| **ORF 10** |  | [T12M](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:T:12:M) | 2 | 81 | 1.86 |  |
| **ORF 10** |  | [I13T](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:I:13:T) | 2 | 89 | 2.14 |  |
| **ORF 10** |  | [L17F](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:L:17:F) | 2 | 22 | 0.63 |  |
| **ORF 10** |  | [R20K](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:R:20:K) | 2 | 26 | 0.40 |  |
| **ORF 10** |  | [N22I](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:N:22:I) | 2 | 149 | 3.37 |  |
| **ORF 10** |  | [I27M](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:I:27:M) | 2 | 10 | 0.29 |  |
| **ORF 10** |  | [V33A](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:V:33:A) | 2 | 64 | 1.85 |  |
| **ORF 10** |  | [N34Y](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:N:34:Y) | 2 | 142 | 3.42 |  |
| **ORF 10** |  | [F35S](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:F:35:S) | 2 | 155 | 3.45 |  |
| **ORF 10** |  | [L37P](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:L:37:P) | 2 | 98 | 2.70 |  |
| **ORF 10** |  | [\*39Y](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:*:39:Y) | 2 | - | - |  |
| **ORF 10** |  | [G2V](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:G:2:V) | 1 | 109 | 2.76 |  |
| **ORF 10** |  | [V6I](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:V:6:I) | 1 | 30 | 0.85 |  |
| **ORF 10** |  | [A8S](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:A:8:S) | 1 | 99 | 0.51 |  |
| **ORF 10** |  | [S15G](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:S:15:G) | 1 | 55 | 0.85 |  |
| **ORF 10** |  | [L17V](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:L:17:V) | 1 | 32 | 0.91 |  |
| **ORF 10** |  | [L18S](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:L:18:S) | 1 | 144 | 3.04 |  |
| **ORF 10** |  | [R20\*](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:R:20:*) | 1 | - | - |  |
| **ORF 10** |  | [N22S](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:N:22:S) | 1 | 46 | 1.31 |  |
| **ORF 10** |  | [A28T](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:A:28:T) | 1 | 58 | 0.90 |  |
| **ORF 10** |  | [Q29R](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:Q:29:R) | 1 | 43 | 1.13 |  |
| **ORF 10** |  | [V33F](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:V:33:F) | 1 | 50 | 1.43 |  |
| **ORF 10** |  | [V33I](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:V:33:I) | 1 | 30 | 0.85 |  |
| **ORF 10** |  | [F35I](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:F:35:I) | 1 | 21 | 0.61 |  |
| **ORF 10** |  | [N36S](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:N:36:S) | 1 | 46 | 1.31 |  |
| **ORF 10** |  | [T38R](http://cov-glue.cvr.gla.ac.uk/#project/replacement/ORF_10:T:38:R) | 1 | 71 | 2.03 |  |

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| **ORF 10** |  | [29575-29580](http://cov-glue.cvr.gla.ac.uk/#project/deletion/ORF_10:nca:29575:29580) | No | N/A | 1 |