

COMPUTATIONAL ANALYSIS OF UNKNOWN DNA SEQUENCES USING INTEGRATED BIOINFORMATICS TOOLS

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Official name: ORF8 molecule
Gene type: protein coding
Organism: Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)

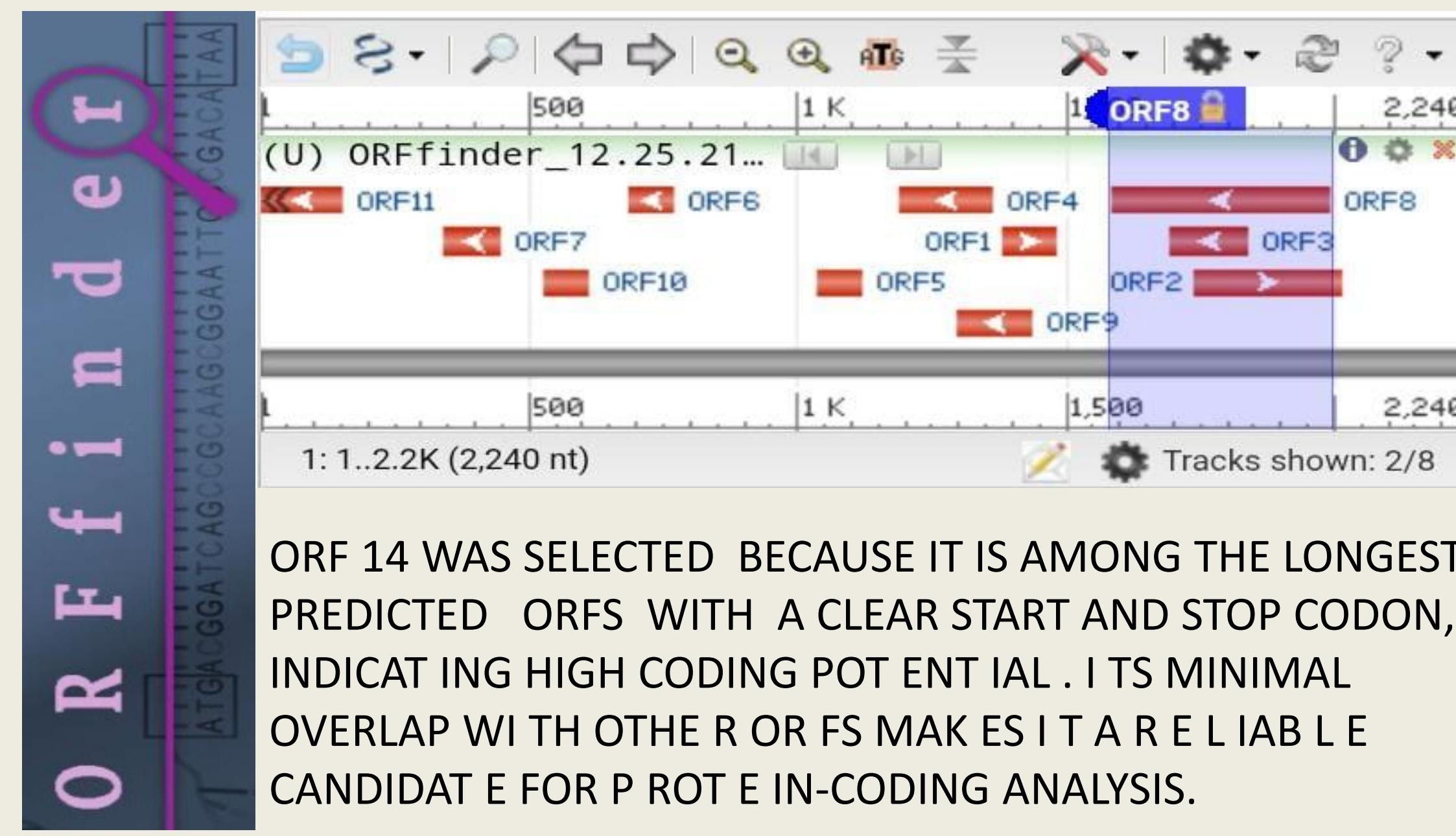
ORF8 is an accessory gene of SARS-CoV-2 that helps the virus evade the host immune system. It reduces MHC-I antigen presentation, weakening immune detection. This enhances viral survival and pathogenicity. Variations in ORF8 can affect disease severity.

1. DNA ANALYSIS

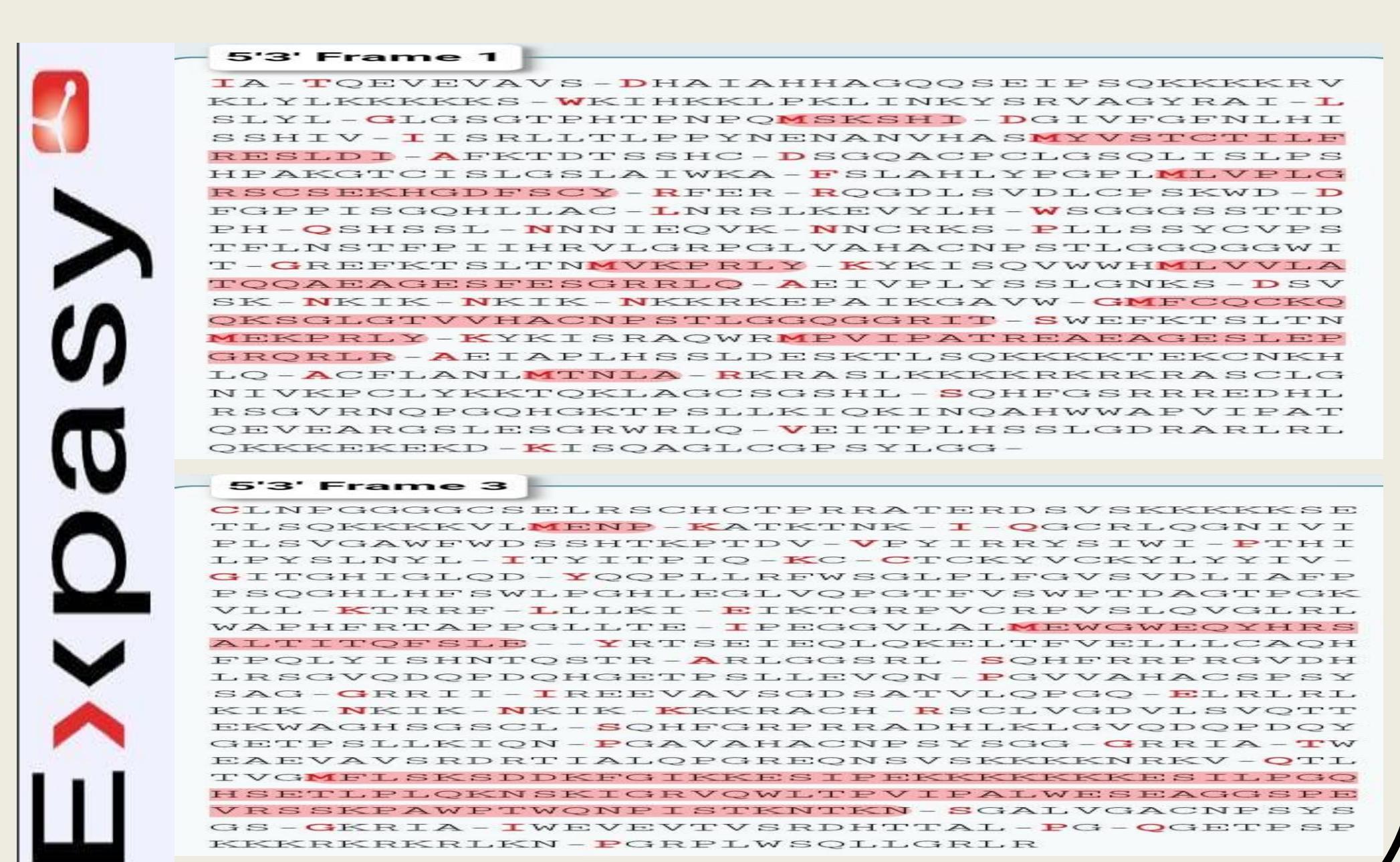
1.1 BLAST



1.2 ORF FINDER

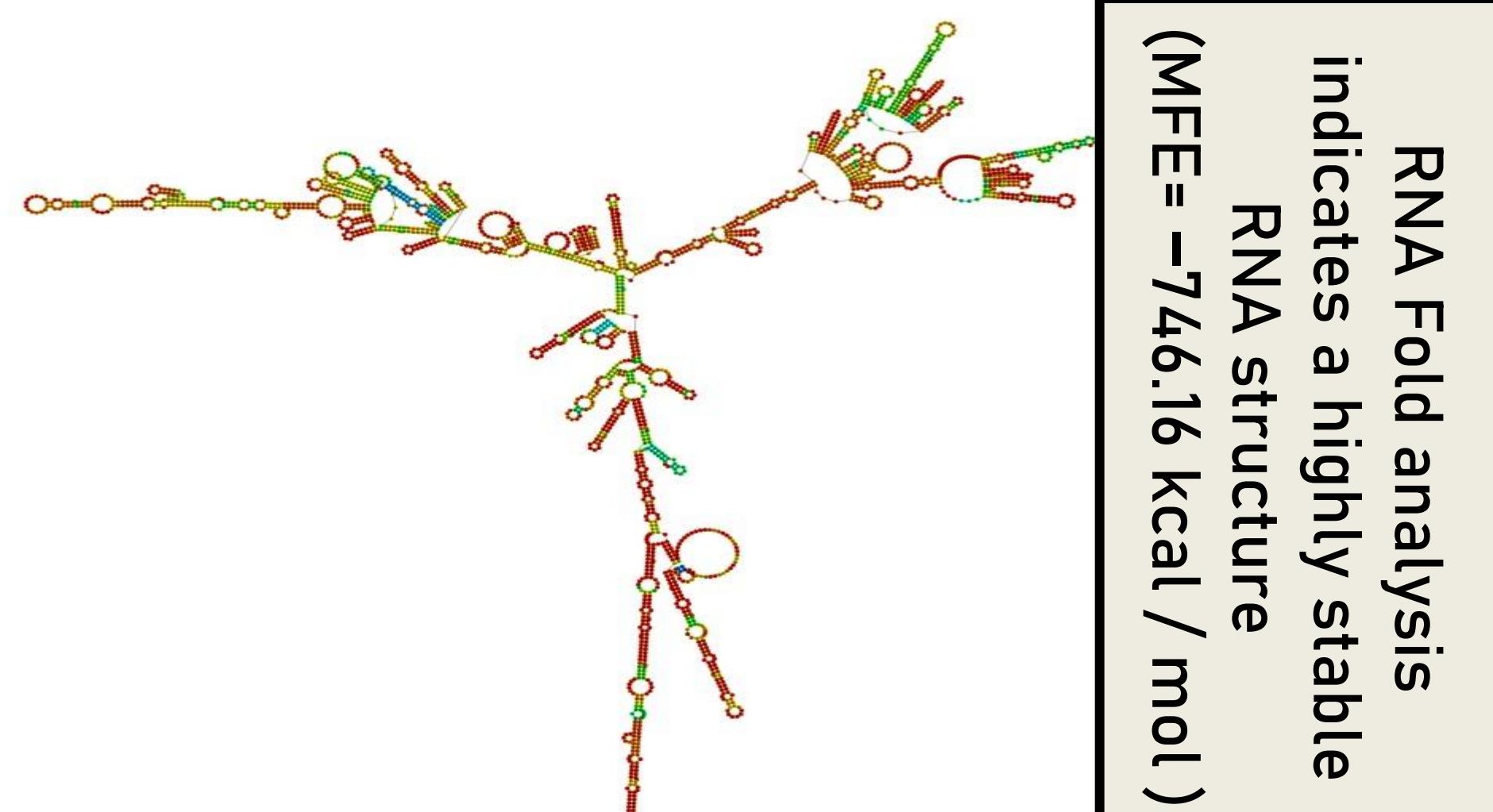


1.3 DNA TO PROTEIN TRANSLATION

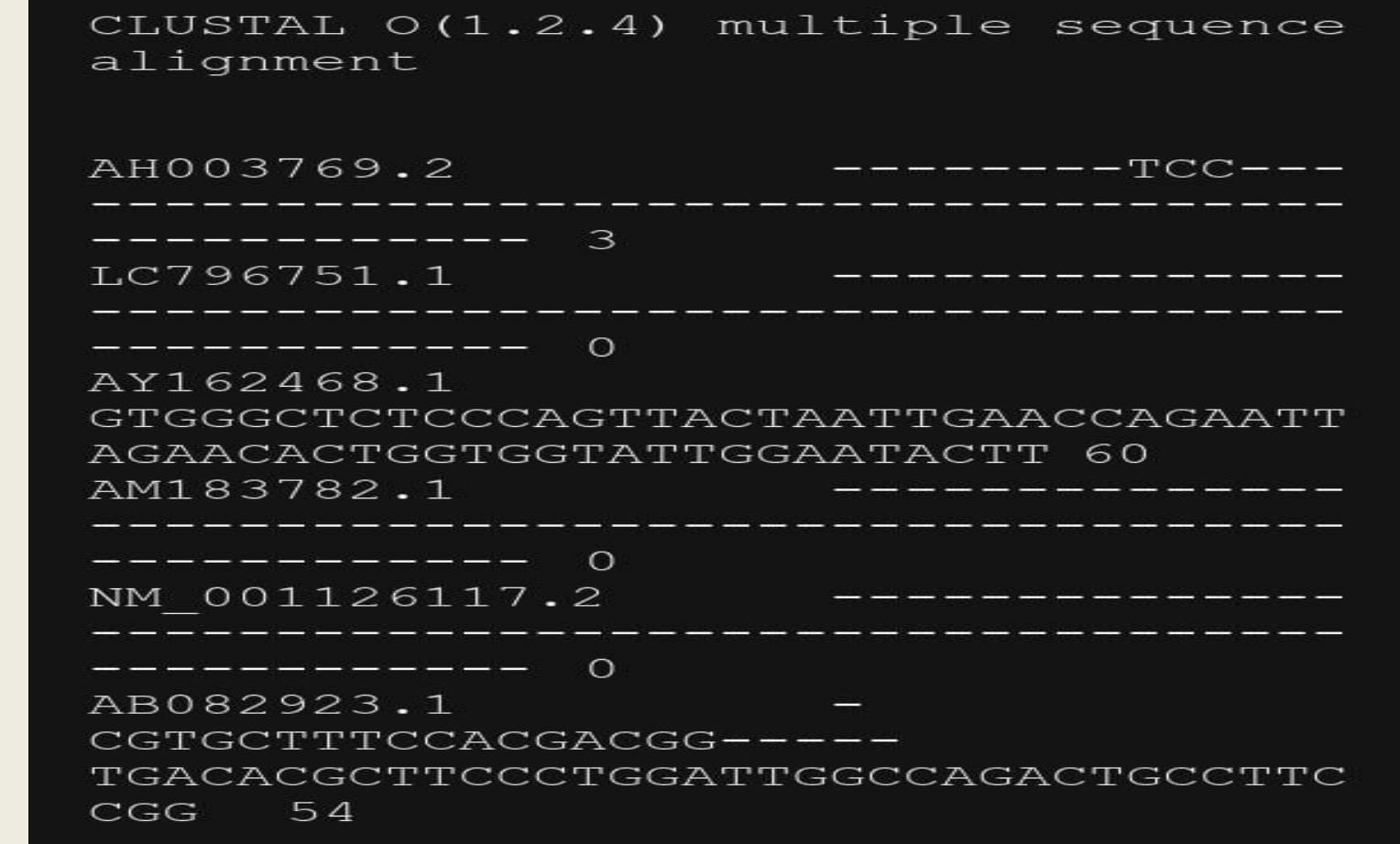


2 RNA ANALYSIS

RNAfold WebServer

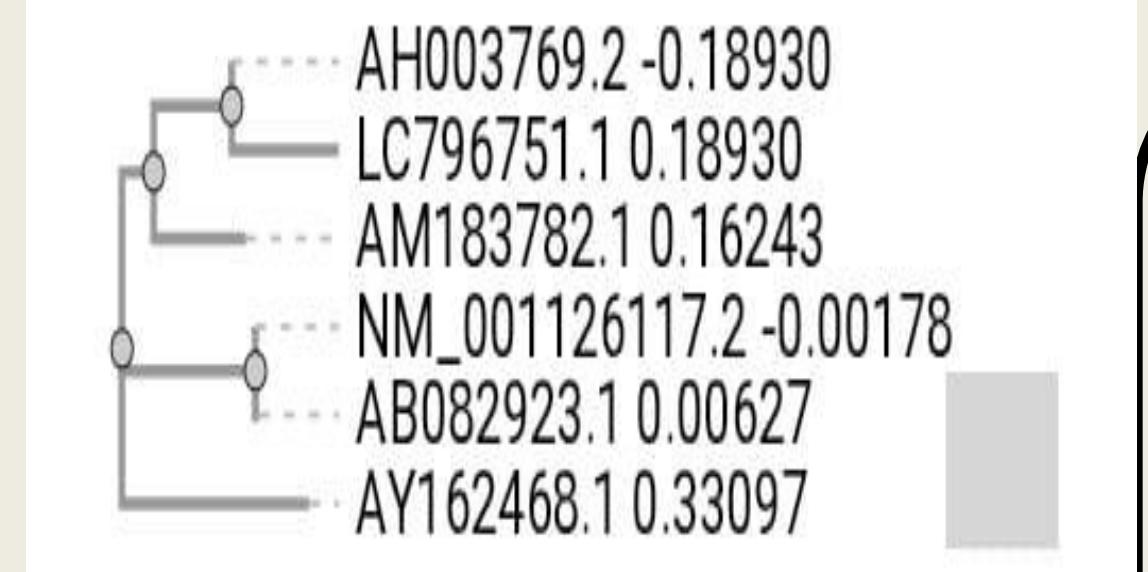


3.1 MSA



3. PHYLOGENETIC ANALYSIS

3.2 Phylogenetic Tree



This phylogenetic tree illustrates the evolutionary relationships between six genetic sequences, showing how closely related they are based on common ancestry. The sequences are grouped into clades, with shorter horizontal branches indicating a higher degree of genetic similarity (such as the top two TP53 variants). The numeric values on the branches represent the genetic distance or the rate of molecular change between these specific genes.

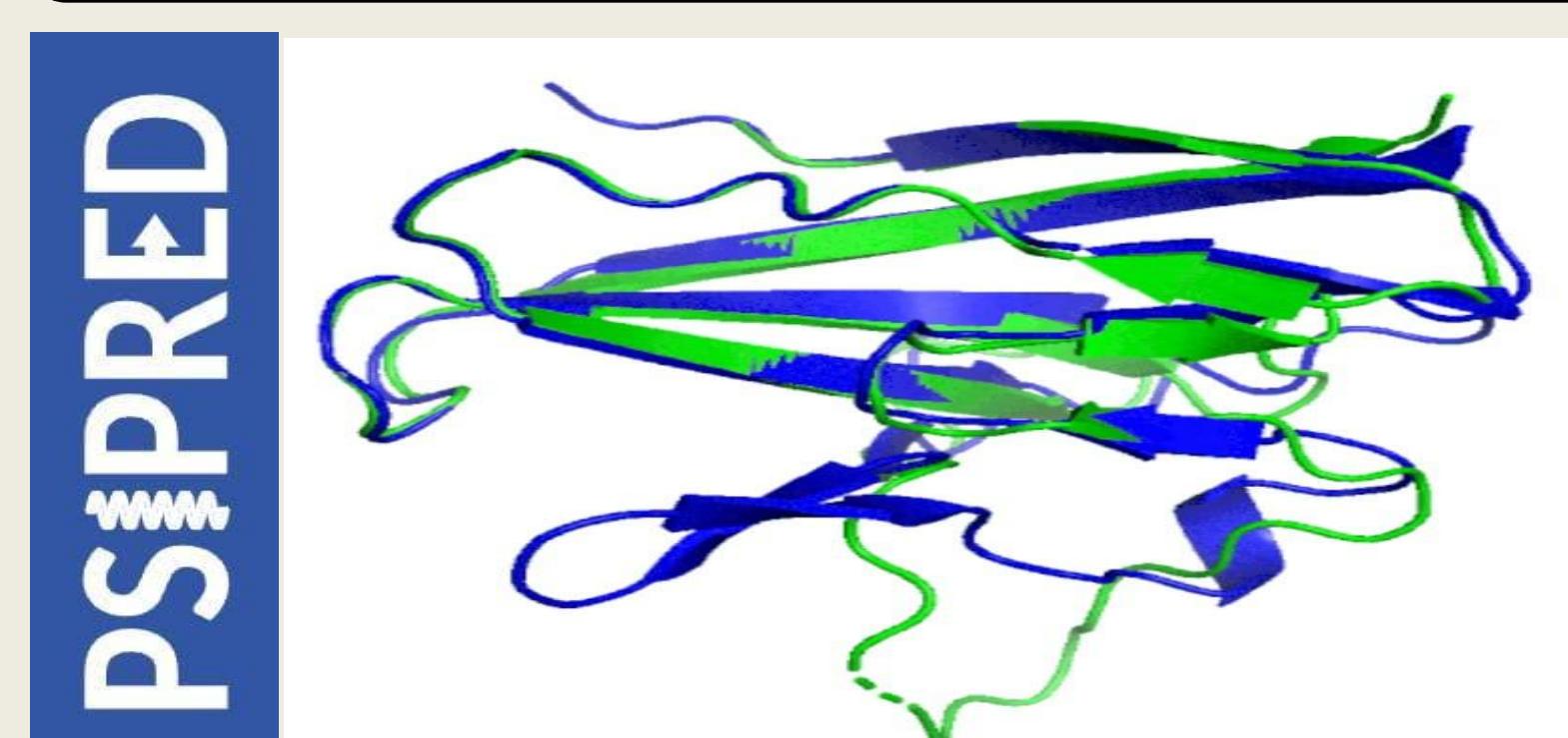
4.1 Domain and Motifs



4.2 Table Of Protein Properties

Parameter	Values
Number of amino acids	135
Molecular weight (Da)	15070.45
Theoretical pl	6.69
Instability Index (II)	53.78

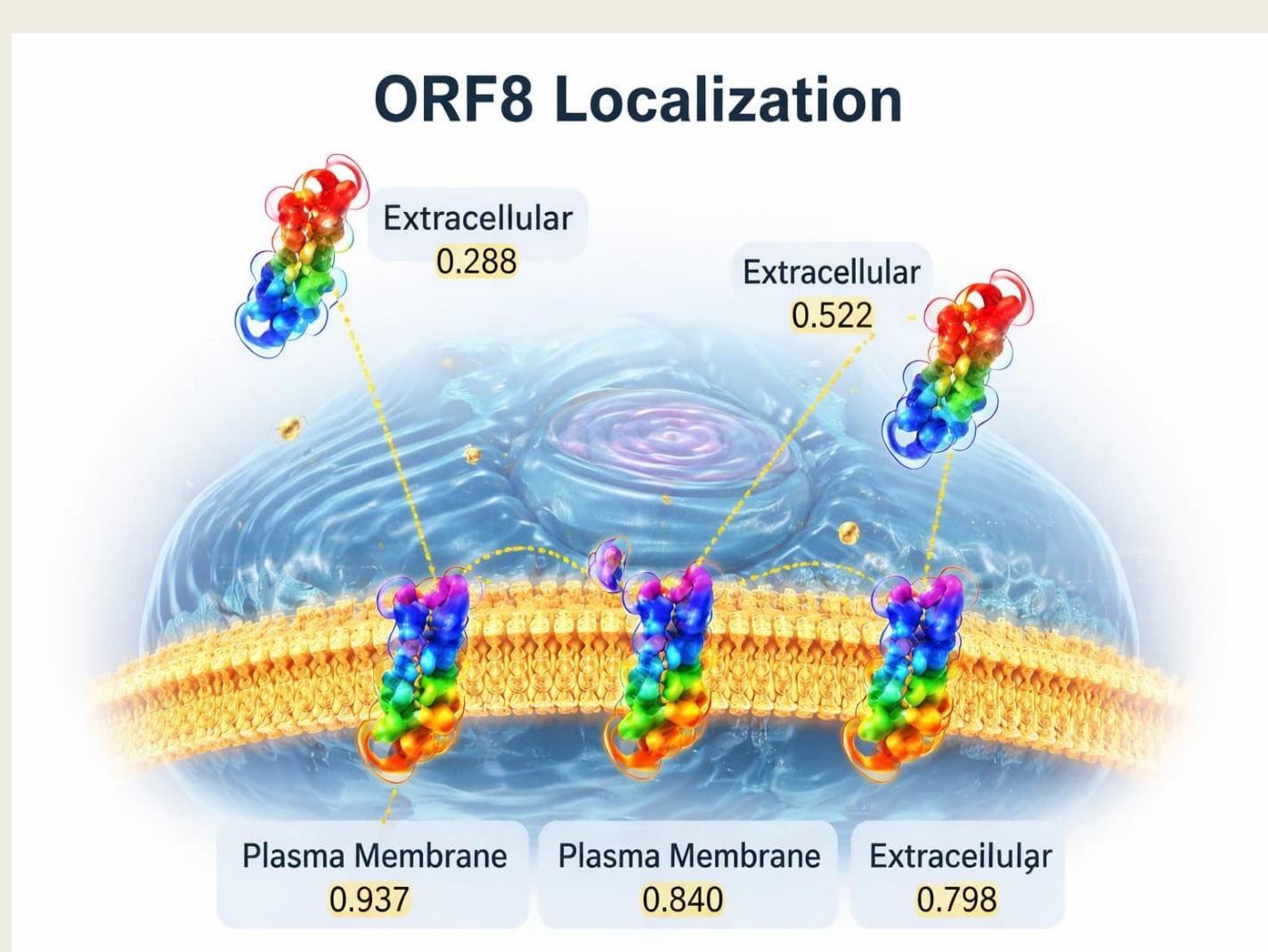
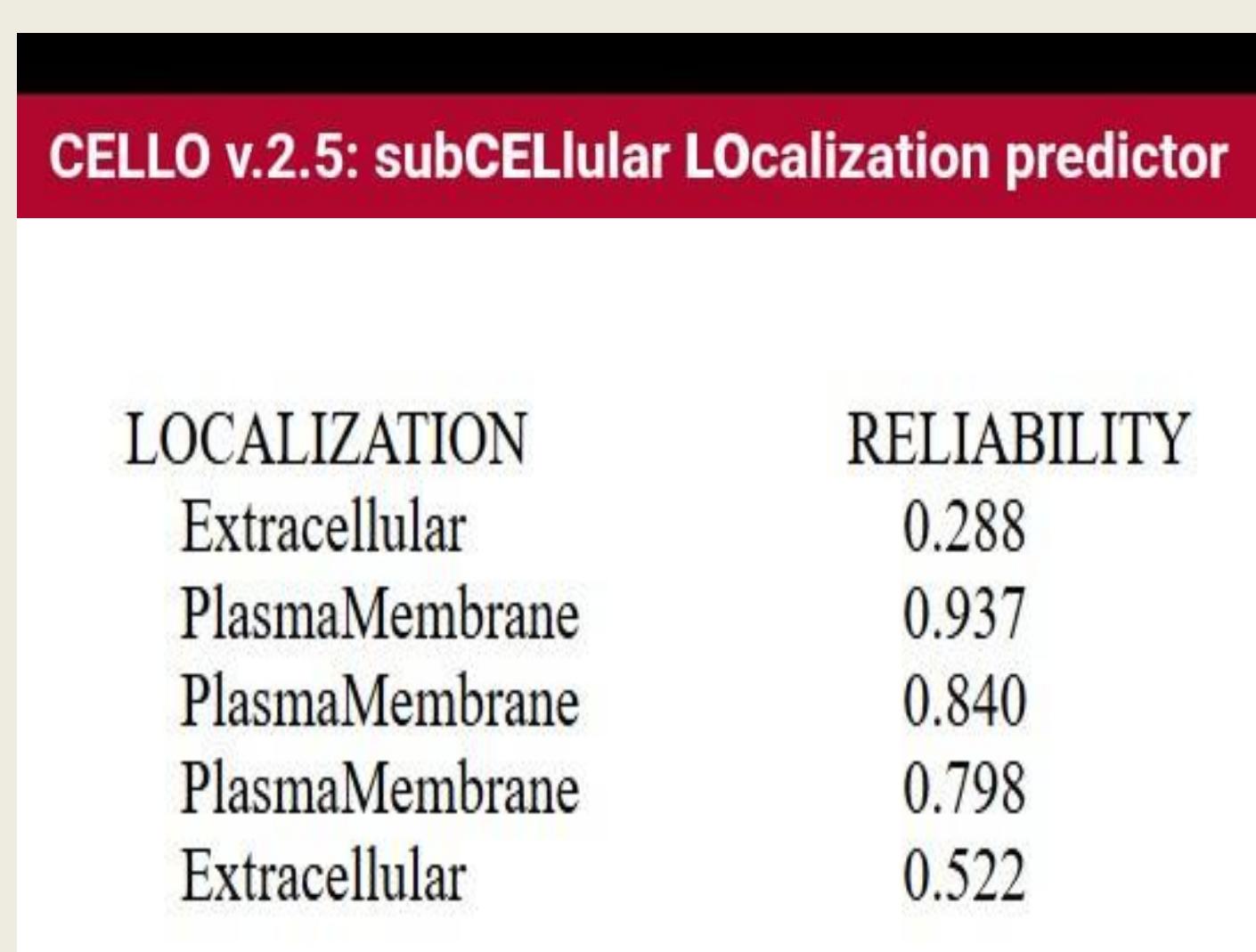
4.3 Protein Sec Structure



4.4 SUMMARY OF PREDICTED FUNCTION:

Domain analysis indicates the protein is ORF8, an accessory protein of SARS-CoV-2 that helps the virus evade the host immune system by down regulating MHC-I, disrupting antigen presentation, and enhancing viral survival and pathogenicity.

5. SUBCELLULAR LOCALIZATION



The primary and strongest localization of the ORF8 protein is at the plasma membrane, supported by high confidence scores. A secondary, strong extracellular localization is also evident, suggesting the protein can be secreted or released. This dual localization indicates ORF8 likely functions both as a membrane-bound protein and in the extracellular space.

6.1 Biological Significance

The ORF8 protein serves as a master regulator of immune evasion by physically interacting with and down regulating MHC-I molecules, which prevents the host's T cells from recognizing and destroying infected cells. Structurally, ORF8 forms unique covalent dimers and higher-order assemblies that allow it to act as a molecular decoy, antagonizing Type I Interferon signaling and binding to the IL-17 receptor to trigger hyper-inflammation. By disrupting these critical proteostatic and signaling pathways, ORF8 interactions directly facilitate viral persistence and the systemic "cytokine storm" characteristic of severe COVID-19.

STRING

