**Multiple Sequence Alignments and JalView.**

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**1. Introductory Example [*Words.(ods/xlsx)*].**

acqua

aqua

agua

aigua

auga

apa

*More for you to practice:*

*vasser*

*water*

*water*

*vatten*

*vann*

*Al-Kwarizmi*

*algoritmo*

*algorithm*

**2. Insulin Example**

Uniprot Align: <https://www.uniprot.org/align/>

2.1. Uniprot IDs:

P01308

P01315

P01317

P67970

>sp|IA25-54-IB90-110

FVNQHLCGSHLVEALYLVCGERGFFYTPKTGIVEQCCTSICSLYQLENYCN

2.2. CDS for principal transcripts:

>INS-CDS-TRANSCRIPT-202-HUMAN

ATGGCCCTGTGGATGCGCCTCCTGCCCCTGCTGGCGCTGCTGGCCCTCTGGGGACCTGAC

CCAGCCGCAGCCTTTGTGAACCAACACCTGTGCGGCTCACACCTGGTGGAAGCTCTCTAC

CTAGTGTGCGGGGAACGAGGCTTCTTCTACACACCCAAGACCCGCCGGGAGGCAGAGGAC

CTGCAGGTGGGGCAGGTGGAGCTGGGCGGGGGCCCTGGTGCAGGCAGCCTGCAGCCCTTG

GCCCTGGAGGGGTCCCTGCAGAAGCGTGGCATTGTGGAACAATGCTGTACCAGCATCTGC

TCCCTCTACCAGCTGGAGAACTACTGCAACTAG

>INS-CDS-TRANSCRIPT-202-BOVIN

ATGGCCCTGTGGACACGCCTGGCGCCCCTGCTGGCCCTGCTGGCGCTCTGGGCCCCCGCC

CCGGCCCGCGCCTTCGTCAACCAGCATCTGTGTGGCTCCCACCTGGTGGAGGCGCTGTAC

CTGGTGTGCGGAGAGCGCGGCTTCTTCTACACGCCCAAGGCCCGCCGGGAGGTGGAGGGC

CCCCAGGTGGGGGCGCTGGAGCTGGCCGGAGGCCCGGGCGCGGGCGGCCTGGAGGGGCCC

CCGCAGAAGCGTGGCATCGTGGAGCAGTGCTGTGCCAGCGTCTGCTCGCTCTACCAGCTG

GAGAACTACTGTAACTAG

>INS-CDS-TRANSCRIPT-201-PIG

ATGGCCCTGTGGACGCGCCTCCTGCCCCTGCTGGCCCTGCTGGCCCTCTGGGCGCCCGCC

CCGGCCCAGGCCTTCGTGAACCAGCACCTGTGCGGCTCCCACCTGGTGGAGGCGCTGTAC

CTGGTGTGCGGGGAGCGCGGCTTCTTCTACACGCCCAAGGCCCGTCGGGAGGCGGAGAAC

CCTCAGGCAGGTGCCGTGGAGCTGGGCGGAGGCCTGGGCGGCCTGCAGGCCCTGGCGCTG

GAGGGGCCCCCGCAGAAGCGTGGCATCGTGGAGCAGTGCTGCACCAGCATCTGTTCCCTC

TACCAGCTGGAGAACTACTGCAACTAG

>INS-CDS-TRANSCRIPT-201-CHICKEN

ATGGCTCTCTGGATCCGATCACTGCCTCTTCTGGCTCTCCTTGTCTTTTCTGGCCCTGGA

ACCAGCTATGCAGCTGCCAACCAGCACCTCTGTGGCTCCCACTTGGTGGAGGCTCTCTAC

CTGGTGTGTGGAGAGCGTGGCTTCTTCTACTCCCCCAAAGCCCGACGGGATGTCGAGCAG

CCCCTAGTGAGCAGTCCCTTGCGTGGCGAGGCAGGAGTGCTGCCTTTCCAGCAGGAGGAA

TACGAGAAAGTCAAGCGAGGGATTGTTGAGCAATGCTGCCATAACACGTGTTCCCTCTAC

CAACTGGAGAACTACTGCAACTAG

**3. Global and local alignments.**

Ensembl:<https://www.ebi.ac.uk/Tools/psa/>

>P29600|SUBS\_BACLE Subtilisin Savinase - Bacillus lentus

AQSVPWGISRVQAPAAHNRGLTGSGVKVAVLDTGISTHPDLNIRGGASFVPGEPSTQDGN

GHGTHVAGTIAALNNSIGVLGVAPSAELYAVKVLGASGSGSVSSIAQGLEWAGNNGMHVA

NLSLGSPSPSATLEQAVNSATSRGVLVVAASGNSGAGSISYPARYANAMAVGATDQNNNR

ASFSQYGAGLDIVAPGVNVQSTYPGSTYASLNGTSMATPHVAGAAALVKQKNPSWSNVQI

RNHLKNTATSLGSTNLYGSGLVNAEAATR

>P41363|ELYA\_BACHD Thermostable alkaline protease precursor - Bacillus halodurans

MRQSLKVMVLSTVALLFMANPAAASEEKKEYLIVVEPEEVSAQSVEESYDVDVIHEFEEI

PVIHAELTKKELKKLKKDPNVKAIEKNAEVTISQTVPWGISFINTQQAHNRGIFGNGARV

AVLDTGIASHPDLRIAGGASFISSEPSYHDNNGHGTHVAGTIAALNNSIGVLGVAPSADL

YAVKVLDRNGSGSLASVAQGIEWAINNNMHIINMSLGSTSGSSTLELAVNRANNAGILLV

GAAGNTGRQGVNYPARYSGVMAVAAVDQNGQRASFSTYGPEIEISAPGVNVNSTYTGNRY

VSLSGTSMATPHVAGVAALVKSRYPSYTNNQIRQRINQTATYLGSPSLYGNGLVHAGRAT

Q

>sp|P29144|TPP2\_HUMAN Tripeptidyl-peptidase 2 MATAATEEPFPFHGLLPKKETGAASFLCRYPEYDGRGVLIAVLDTGVDPGAPGMQVTTDG

KPKIVDIIDTTGSGDVNTATEVEPKDGEIVGLSGRVLKIPASWTNPSGKYHIGIKNGYDF

YPKALKERIQKERKEKIWDPVHRVALAEACRKQEEFDVANNGSSQANKLIKEELQSQVEL

LNSFEKKYSDPGPVYDCLVWHDGEVWRACIDSNEDGDLSKSTVLRNYKEAQEYGSFGTAE

MLNYSVNIYDDGNLLSIVTSGGAHGTHVASIAAGHFPEEPERNGVAPGAQILSIKIGDTR

LSTMETGTGLIRAMIEVINHKCDLVNYSYGEATHWPNSGRICEVINEAVWKHNIIYVSSA

GNNGPCLSTVGCPGGTTSSVIGVGAYVSPDMMVAEYSLREKLPANQYTWSSRGPSADGAL

GVSISAPGGAIASVPNWTLRGTQLMNGTSMSSPNACGGIALILSGLKANNIDYTVHSVRR

ALENTAVKADNIEVFAQGHGIIQVDKAYDYLVQNTSFANKLGFTVTVGNNRGIYLRDPVQ

VAAPSDHGVGIEPVFPENTENSEKISLQLHLALTSNSSWVQCPSHLELMNQCRHINIRVD

PRGLREGLHYTEVCGYDIASPNAGPLFRVPITAVIAAKVNESSHYDLAFTDVHFKPGQIR

RHFIEVPEGATWAEVTVCSCSSEVSAKFVLHAVQLVKQRAYRSHEFYKFCSLPEKGTLTE

AFPVLGGKAIEFCIARWWASLSDVNIDYTISFHGIVCTAPQLNIHASEGINRFDVQSSLK

YEDLAPCITLKNWVQTLRPVSAKTKPLGSRDVLPNNRQLYEMVLTYNFHQPKSGEVTPSC

PLLCELLYESEFDSQLWIIFDQNKRQMGSGDAYPHQYSLKLEKGDYTIRLQIRHEQISDL

ERLKDLPFIVSHRLSNTLSLDIHENHSFALLGKKKSSNLTLPPKYNQPFFVTSLPDDKIP

KGAGPGCYLAGSLTLSKTELGKKADVIPVHYYLIPPPTKTKNGSKDKEKDSEKEKDLKEE

FTEALRDLKIQWMTKLDSSDIYNELKETYPNYLPLYVARLHQLDAEKERMKRLNEIVDAA

NAVISHIDQTALAVYIAMKTDPRPDAATIKNDMDKQKSTLVDALCRKGCALADHLLHTQA

QDGAISTDAEGKEEEGESPLDSLAETFWETTKWTDLFDNKVLTFAYKHALVNKMYGRGLK

FATKLVEEKPTKENWKNCIQLMKLLGWTHCASFTENWLPIMYPPDYCVF

**4. DNA sequences for JalView.**

Reference:<https://www.nature.com/articles/s41564-020-0688-y/figures/6>

OCR tools:Search on Google “*ocr on line*”, there’s a lot!

Ensembl Tools for MSA:

<https://www.ebi.ac.uk/seqdb/confluence/display/JDSAT/Multiple+Sequence+Alignment>

<https://www.ebi.ac.uk/Tools/msa/>

GeneBank IDs:

AY278741

KF367457

KF569996

KY417151

KY417146

KY417144

KC881005

MN908947

KY417142

JX993988

JX993987

DQ648857

KY417147

KY417143

DQ071615

KY417148

GQ153543

GQ153548

KJ473815

KF294457

KJ473816

KY417145

MG772934

MG772933

KJ473811

KJ473814

DQ412042

KJ473812

DQ648856

NC014470

**5. Protein sequences for JalView. (File “CoutardFastaProtein.fa”)**

**Reference:** <https://www.sciencedirect.com/science/article/pii/S0166354220300528>

**Genomes\_IDs**

AY391777

EF065513

KF514433.1

KF530114.1

MG772934

NC\_004718.3

NC\_006577.2

NC\_014470.1

NC\_019843.3

NC\_045512.2

**S Protein IDs**

AAR01015.1

ABN10911.1

AGT21367.1

AGT51394.1

AVP78042.1

NP\_828851.1

YP\_173238.1

YP\_003858584.1

YP\_009047204.1

YP\_009724390.1