Hands-on exercises to the lecture „Modern Methods in Drug Discovery“ WS24/25

1. The common degu (*Octodon degus*) develops diabetes quickly upon sugar containing nutrients. Therefore it has been suggest as potential model organism for the study of diabetes and corresponding drugs that i.e. influence insulin.

Retrieve the amino acid sequences (FASTA format) of insulin of the following species from UniProt (www.uniprot.org) and perform a multiple alignment with Clustal Omega (www.ebi.ac.uk/Tools/msa/clustalo). Have a look at the clustering.

human (homo sapiens) INS_HUMAN
pig (sus scrofa) INS_PIG
degu (Octodon degus) INS_OCTDE
chinese hamster (Cricetulus longicaudatus) INS_CRILO
chinchilla (chinchilla chinchilla)
rabbit (oryctolagus cuniculus)
North American opossum (Didelphis virginiana) INS_DIDVI
mouse (mus musculus) INS1_MOUSE
rat (rattus norvegicus) INS1_RAT
chimpanzee (pan troglodytes)
Lowland gorilla (gorilla gorilla gorilla)
guinea pig (cavia porcellus)
dog (canis lupus familiaris)
bovine (bos taurus)
sheep (ovis aries)
domestic cat (Felis catus)
chicken (Gallus gallus)
African claw frog (Xenopus laevis) INS1_XENLA
Zebrafish (Danio rerio)
fat sand rat (Psammomys obesus)

Have a look at the phylogenetic tree (tab above the multiple sequence alignment output).
Which species are closest related to human?
Argue on the basis of the multiple sequence alignment if the degu would be a suitable model organism or not.