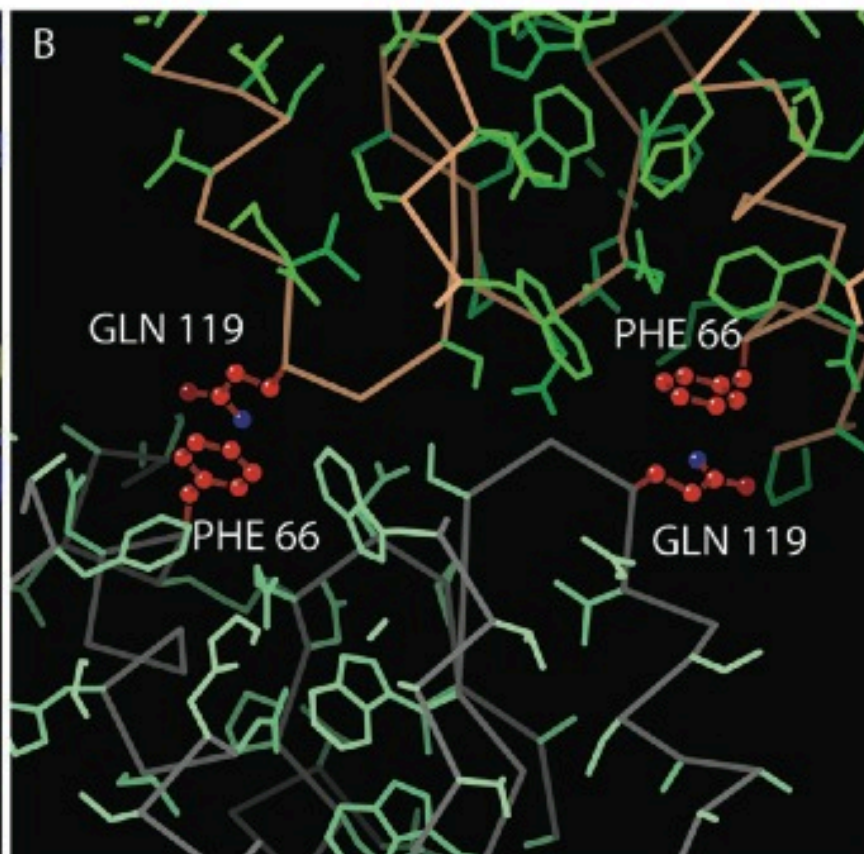
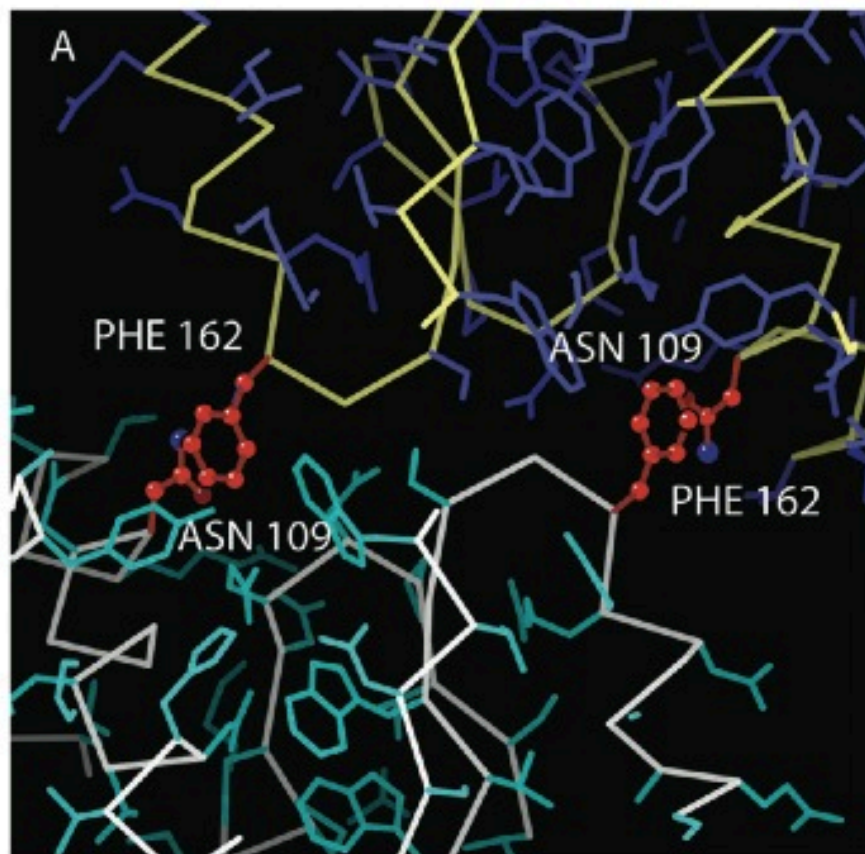


Coevolution between Proteins

- Protein–protein interactions effectively mediate molecular function and are maintained by the action of evolutionary pressure on the regions of the interacting proteins that contribute to binding.
- For the most part, selection restricts amino acid replacements, accounting for the conservation of binding interfaces. However, in some cases, change in one protein will be mitigated by compensatory change in its binding partner, maintaining function in the face of evolutionary change.



C

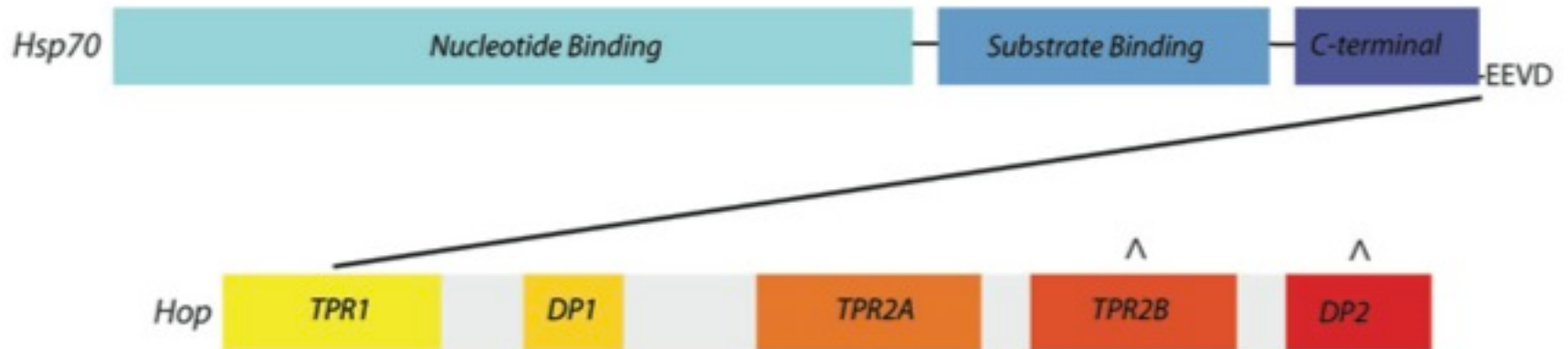
SODM_THET8	PQDIQTAVRNNGGGHLNHSLEFWRLLT
SODF_NICPL	KGAPLPAF--NNAQAAWNHOFFWESMK
SODF_SYNE7	GDASKAGLEFNNAQAAWNHSFYWNSIK
SODM_BACCA	PESIRTAVRNNGGGHHANHSLEFWTILS
SODF_METJ	PENLRGPVRNNGGGHHANHSLEFWKVLT
SODM_LISIV	PEEIRGAVRNHGGGHHANHTLFWSSLS
SODM_MYCLE	--LNEKNLAFHLGGHVNHSLIWWKNLS
SODM_PROFR	--KLEKDLAFNLAGHVNHSLVFWKNMA
SODF_METTH	--AALKELSFHVGGYVHLFFWGNMG
SODM1_CAEL	--ALQPALKFNNGGGHINHSIFWTNLA
SODM_HUMAN	--ALQPALKFNNGGGHINHSIFWTNLS

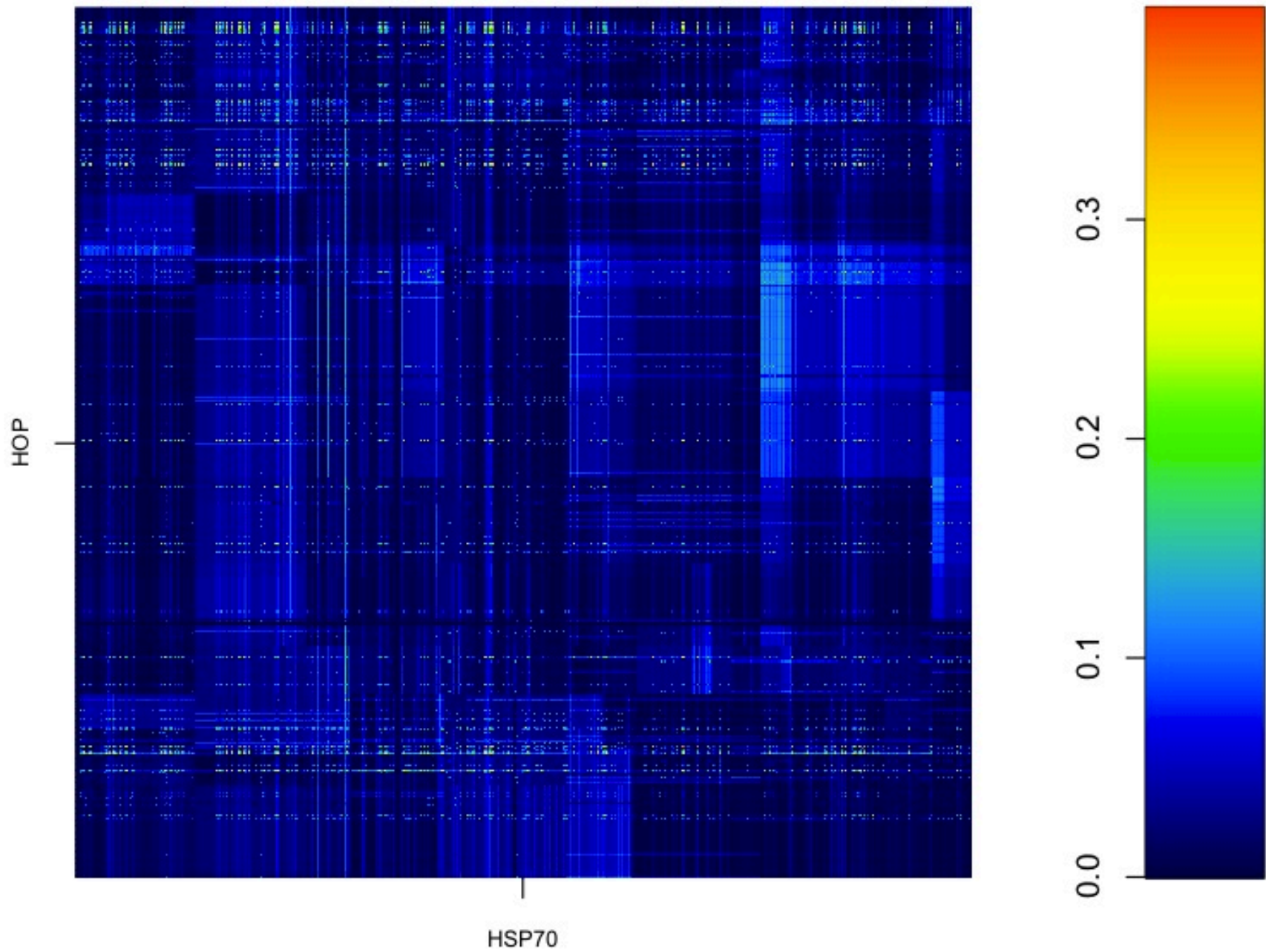
D

IDEQFGGFQALKEKLTQAAMGRFGSGWAWLVKD
INRDFGSYDAFVKEFKAAAATQFGSGWAWLAYK
IAADFGSFENFVTEFKQAAAATQFGSGWAWLVLD
INKKFGSFTAFKDEFKAAAGRFSGSGWAWLVVN
IKSDIGGLDTFKEAFTKAALTRFGSGWAWLSVT
IESEFGTFDEFKEKFNAAAAARFGSGWAWLVVN
IDETFGSFDKFRAQFSAAANGLOGSGWAVLGYD
IDEFFGSFDNMKAQFTAAATGIQSGWASLVWD
IEKDFGSFERFRKEFSQAASAEFGSGWAVLTYC
IKSDFGSLDNLQKQLSASTVAVQSGSGWGLGYC
IKRDFGSFDKFKEKLTAASVGVQSGSGWGLGFN

44 species ortholog alignments.

Example: Hsp70 & Hop





VVVVVV--VVV-VVV-VVVVV-VVVVVV-V-VVVVVVIIIIII
DDDDDDDDDDDDDDDDDDDDDDDDDDDD-D-D-D---D-EEEEEE

AAAAAA--AAA-AAA--AAAA-AAAAAA-AAAAAGAASNNNN
QQQQQQQKQQQQQQQQQQQQQQQQQ-Q-Q-Q-Q-K-QTEDEEE

AAAAAA--AAA-AAA--AAAA-AAAAAA-AAAAAGAASNNNN
EE-EEEEEEEEEEEEEEEEEEEEEEEEEE-E-E-T-AEQQQQ

AAAAAA--AAA-AAA--AAAA-AAAAAA-AAAAAGAASNNNN
KK-KKKKKKKKTKKKKKKKKKKKKKKKKK-K-K-Q-KRRRRRR

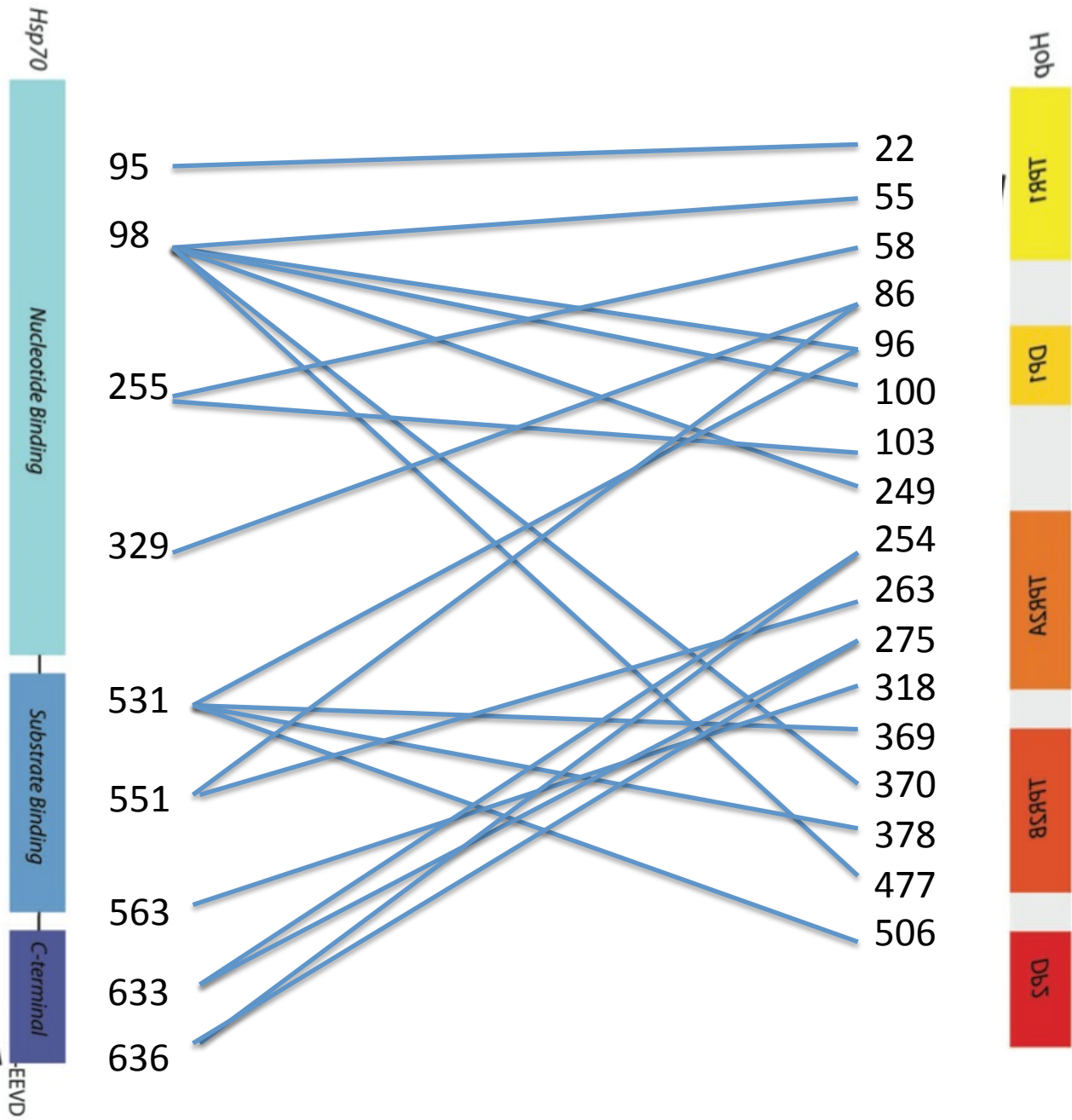
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DDDDDDDDDDDDDDDDDDDDDDDDDDDD-D-DDDD-D-D-DGEEEE

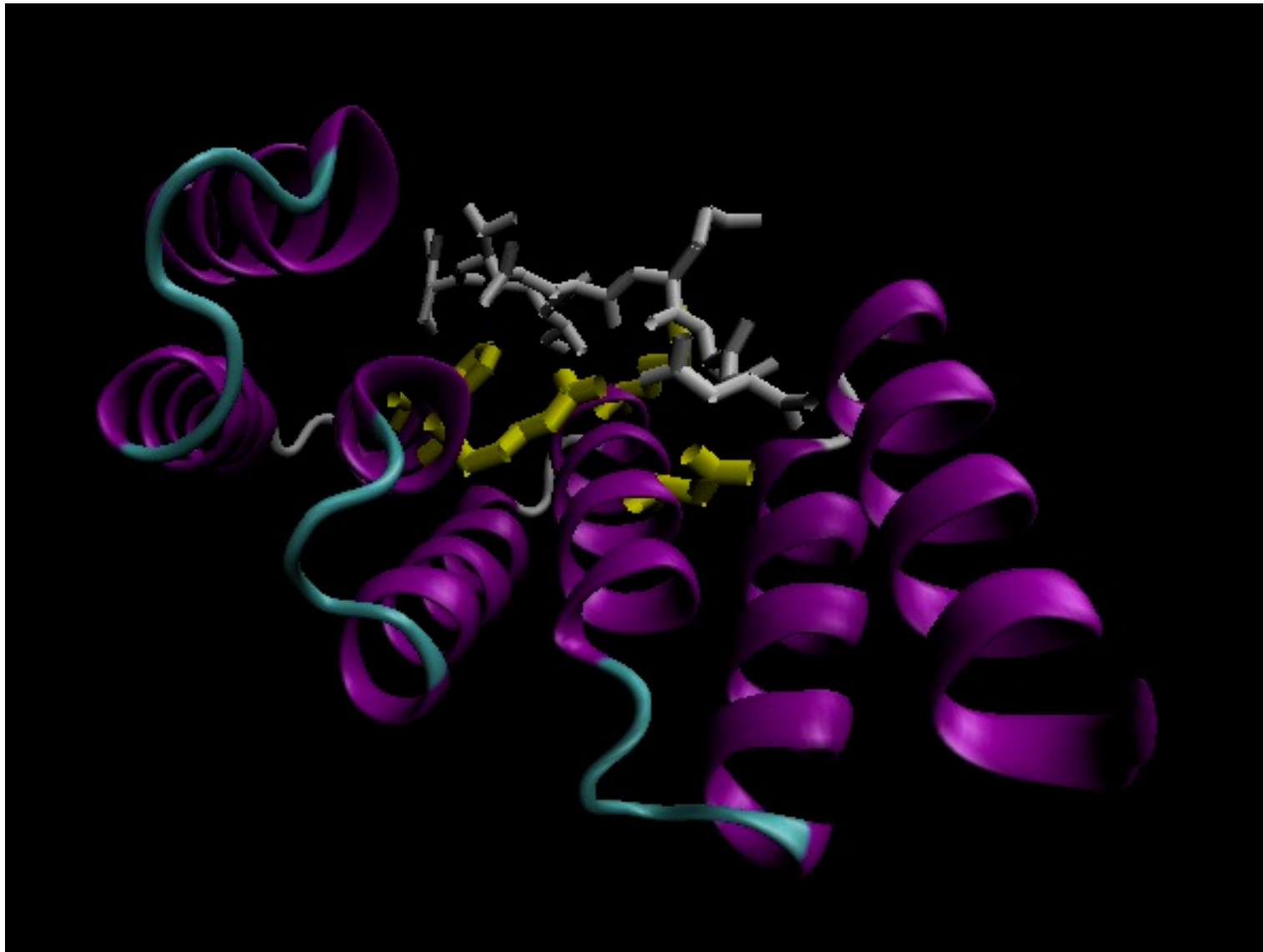
AAAAAA--AAA-AAA--AAAA-AAAAAA-AAAAAGAASNNNN
CCCCC-CCC-CCCCCCCCCCCCCCC-CCCC-C-S-FSAAAAA

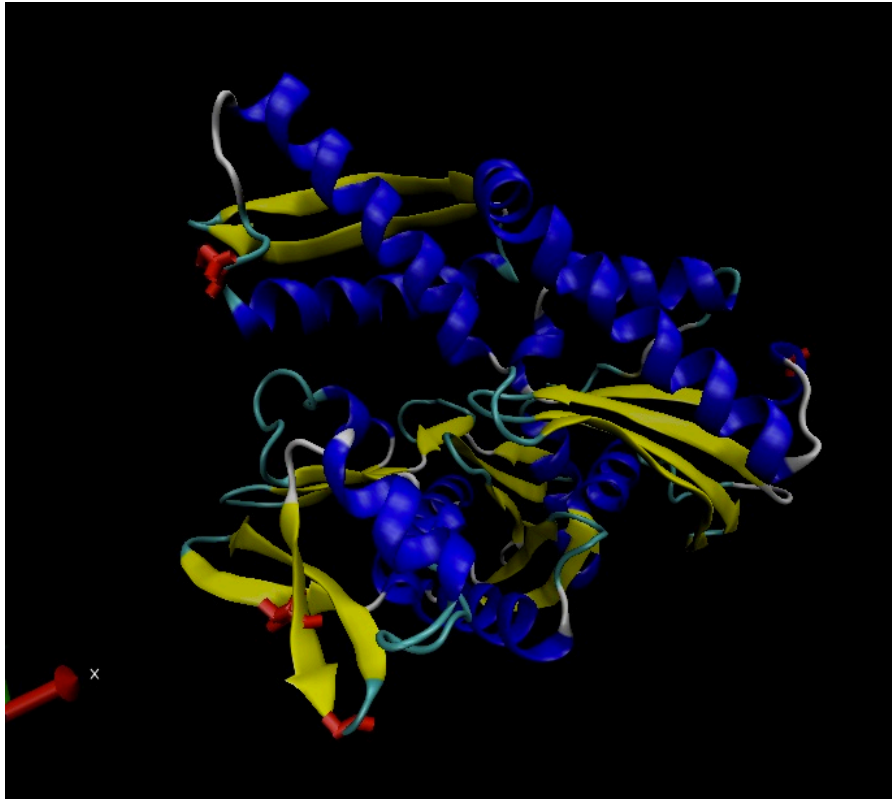
AAAAAA--AAA-AAA--AAAA-AAAAAA-AAAAAGAASNNNN
NNNNNN-NNNNNNNNNNNNNNNNNNNN-NN-NN-N-T-NHTMTT

EEEEEE-EEEEEE-E---EEE-E-EE-EEEEEEEEDEDDDDDD
YYYYYYYYFYYYYYYYYYYYYYYYYYY-Y-Y-Y-Y-L-LLLLLLL

EEEEEE-EEEEEE-E---EEE-E-EE-EEEEEEEEDEDDDDDD
AA-AAAAAAAAAAAAAAAAAAAAAAAAA-A-A-S-PPPPPP







HSP70

HOP



- The coevolutionary signal is subtle and somewhat weak in those proteins that only make transient interactions.
- Map 1000 genome SNP data & disease SNP data onto these pairs.