

p53蛋白的生物信息学分析

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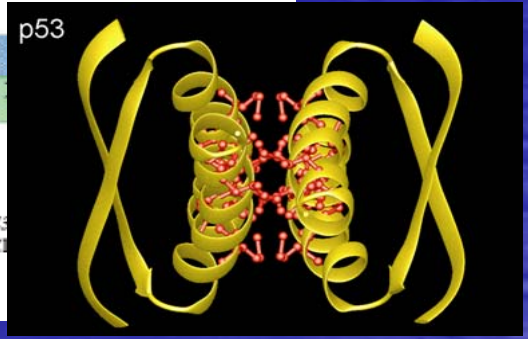
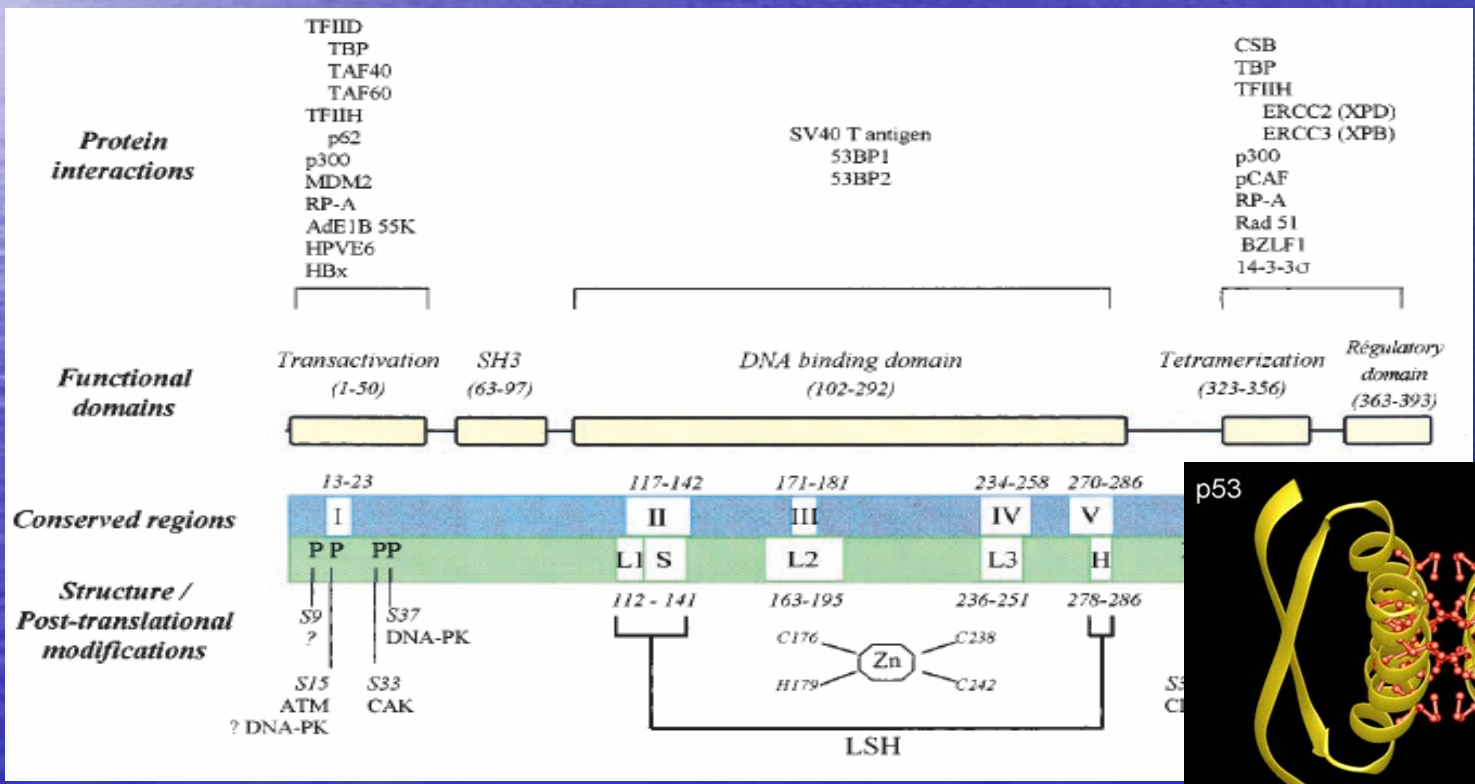
一、p53蛋白的生物学特性

1、p53蛋白的结构

转录激活域 (1-42) SH3域 (63-97)

DNA结合域 (102-292) 四聚体形成域 (323-356)

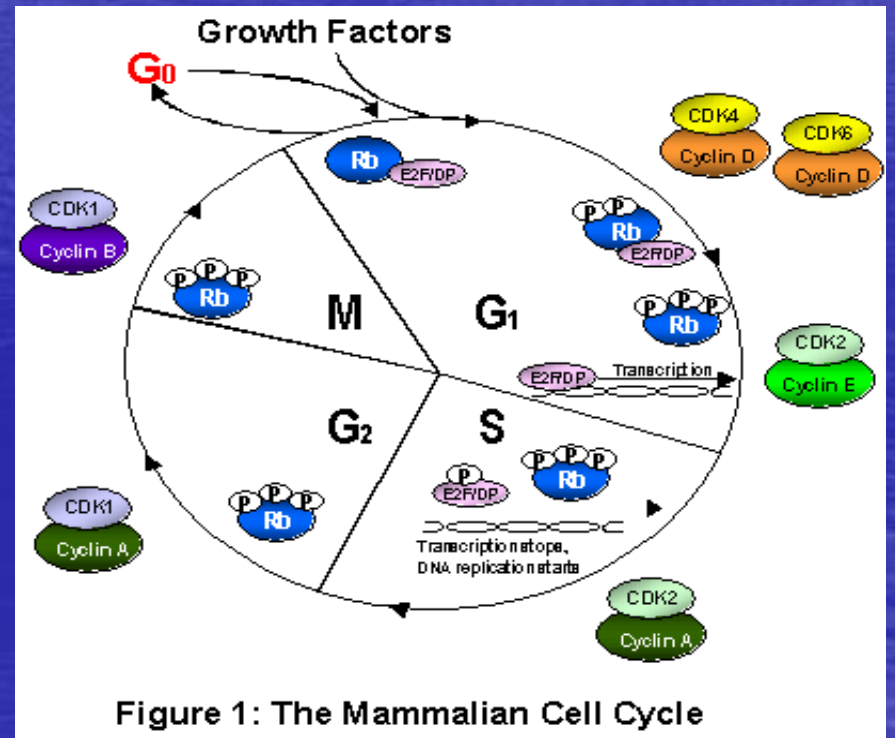
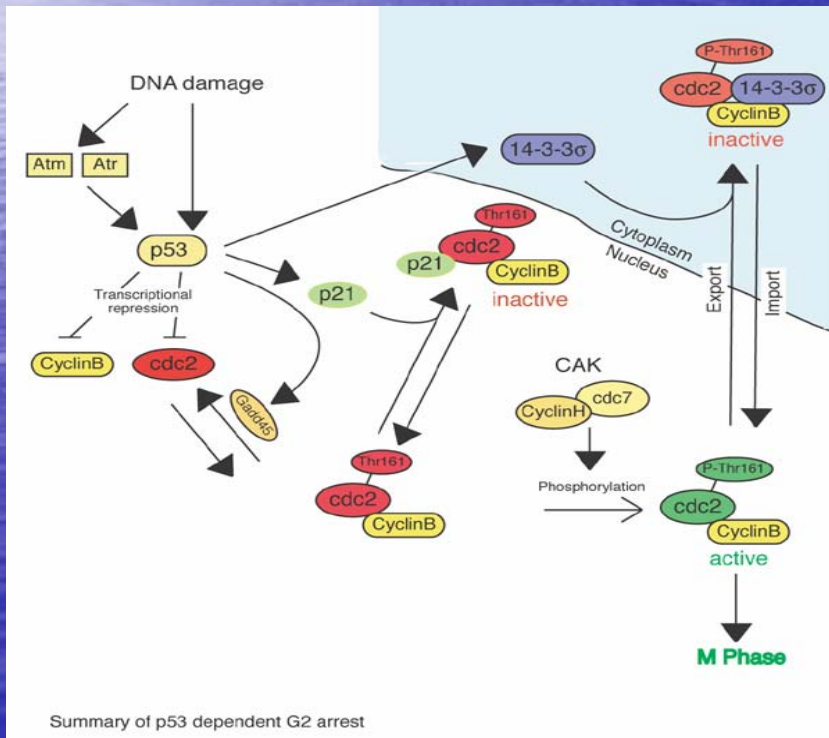
调节域 (363-393)



2、p53蛋白的功能

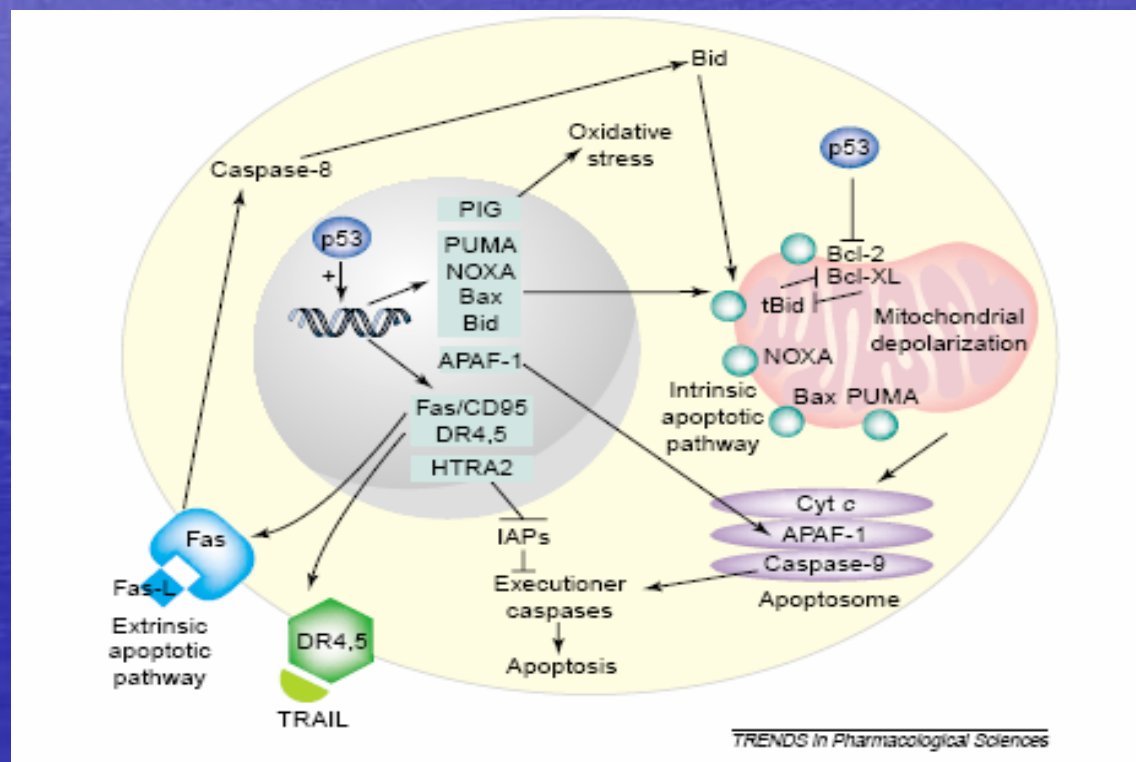
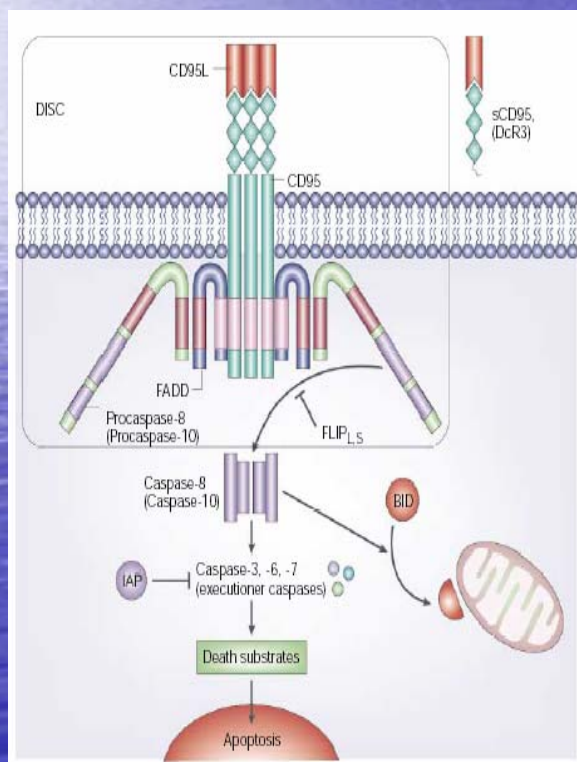
p53蛋白是细胞忠实的守护者（gatekeeper），它对于维护细胞的正常功能，监控DNA损伤、调节细胞周期、细胞分化以及细胞凋亡等功能发挥重要作用。

(1) 调节细胞周期，监控DNA，修复DNA损伤细胞，维护细胞的正常功能。



(2) p53诱导细胞凋亡

通过细胞外和细胞内两种途径诱导细胞凋亡



(3) p53蛋白是肿瘤抑制因子

在人的肿瘤细胞中，超过50%的肿瘤细胞中p53突变或失去功能。主要通过以下途径影响p53的功能：

1、p53发生突变：

主要发生DNA结合域，如：175aa,249aa,273aa和282aa

2、p53与其它蛋白相互作用：

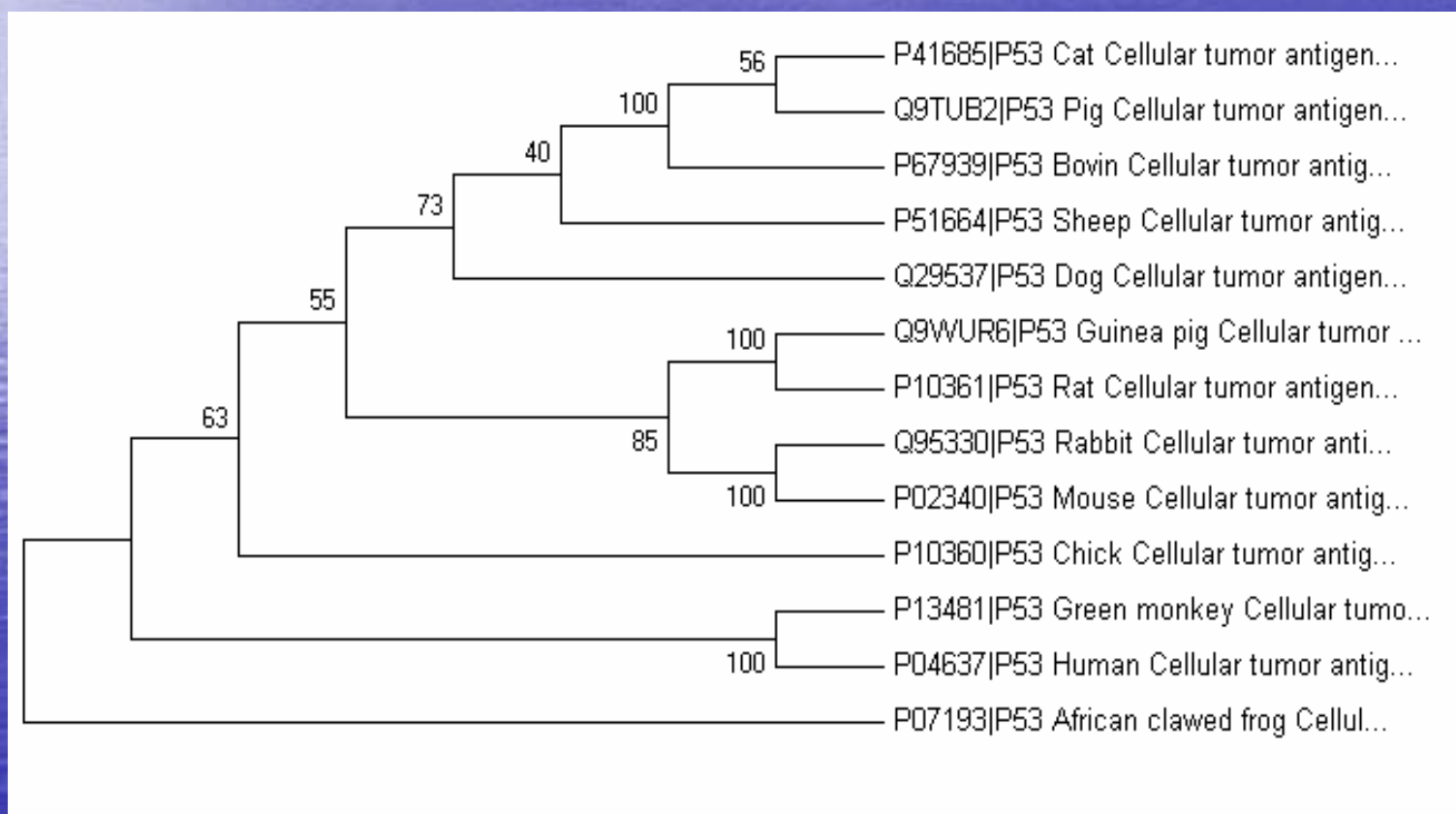
Ad E1B蛋白、HPV E6蛋白、HBV X蛋白、MDM2等

3、p53的细胞定位发生变化，不能进入细胞核。

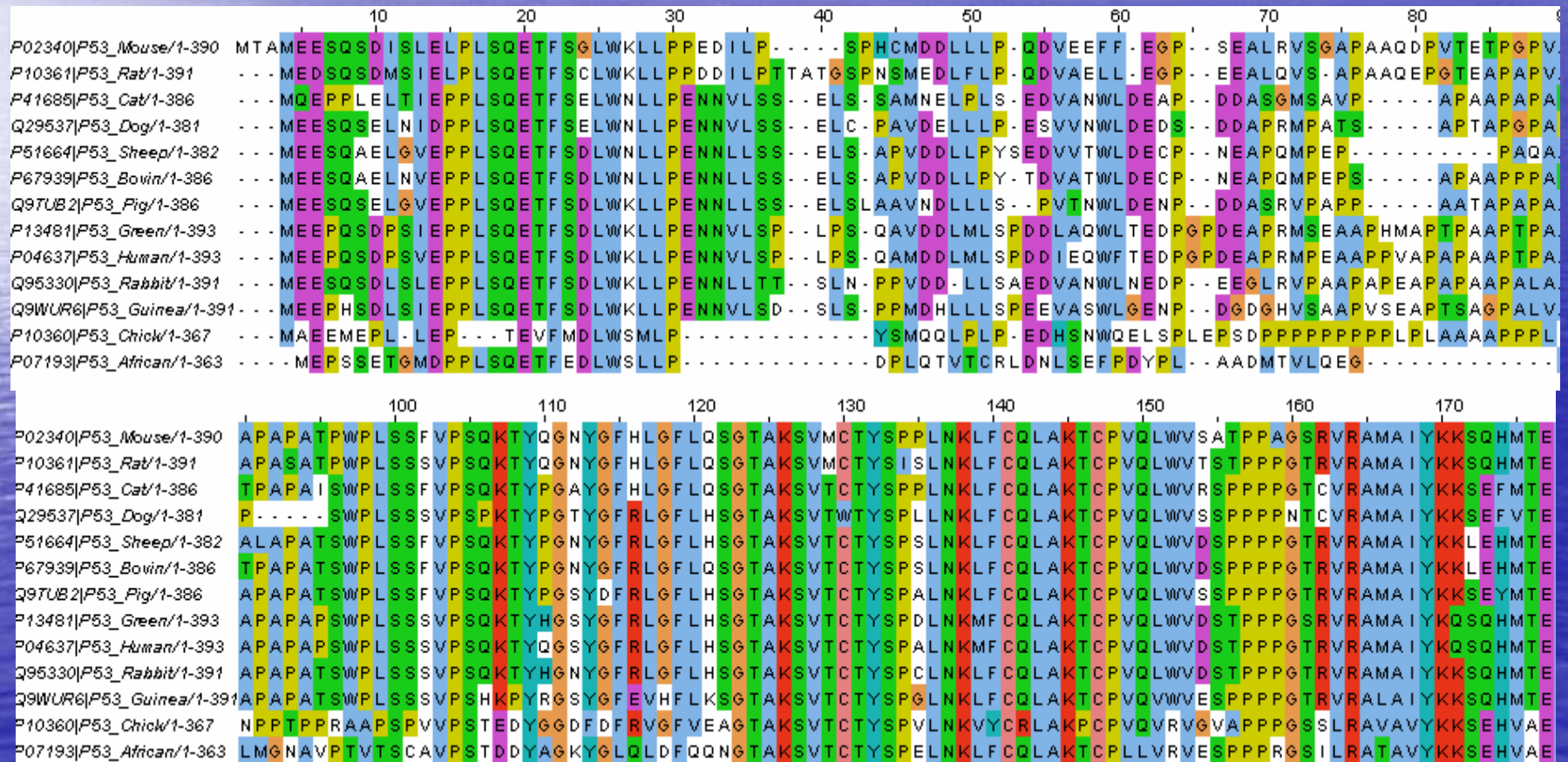
三、13种动物的p53蛋白分析

动物种类	蛋白名称	蛋白序列号	蛋白长度
猫	P53_Cat	P41685	386
非洲绿猴	P53_Green monkey	P13481	393
豚鼠	P53_Guinea pig	Q9WUR6	391
狗	P53_Dog	Q29537	381
兔	P53_Rabbit	Q95330	391
绵羊	P53_Sheep	P51664	382
人	P53_Human	P04637	393
鼠	P53_Mouse	P02340	390
大鼠	P53_Rat	P10361	391
猪	P53_Pig	Q9TUB2	386
鸡	P53_Chick	P10360	367
牛	P53_Bovin	P67939	386
非洲爪蛙	P53_African clawed frog	P07193	363

1、用最大简约法13种动物p53蛋白的系统树



2、P53蛋白多序列比较结果

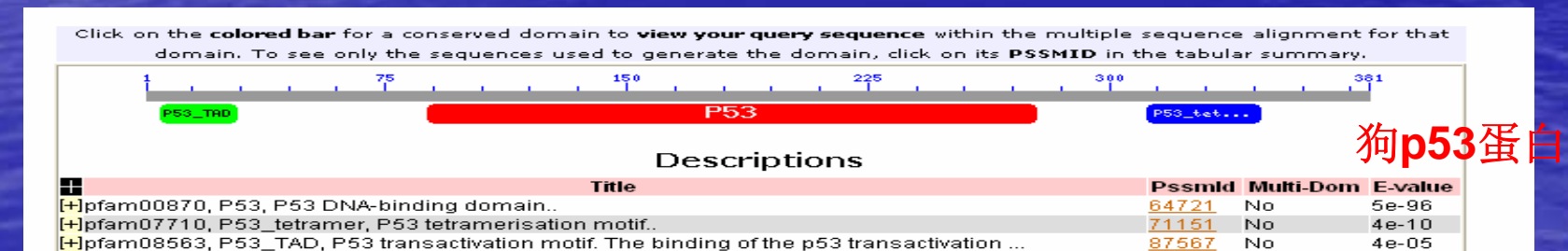
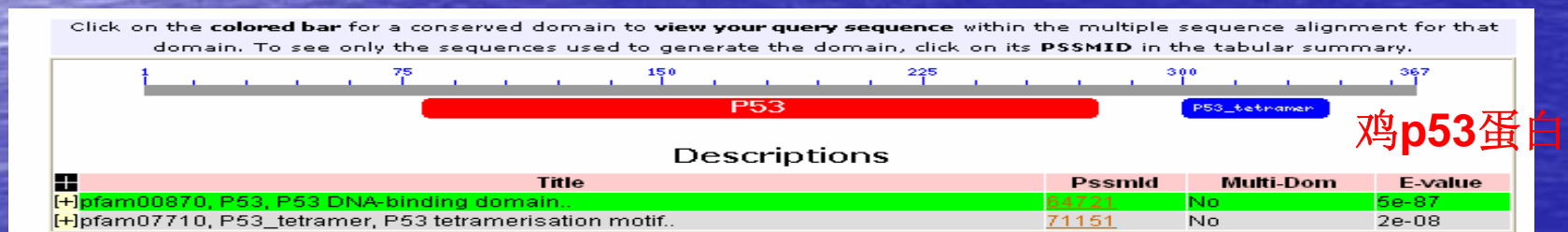
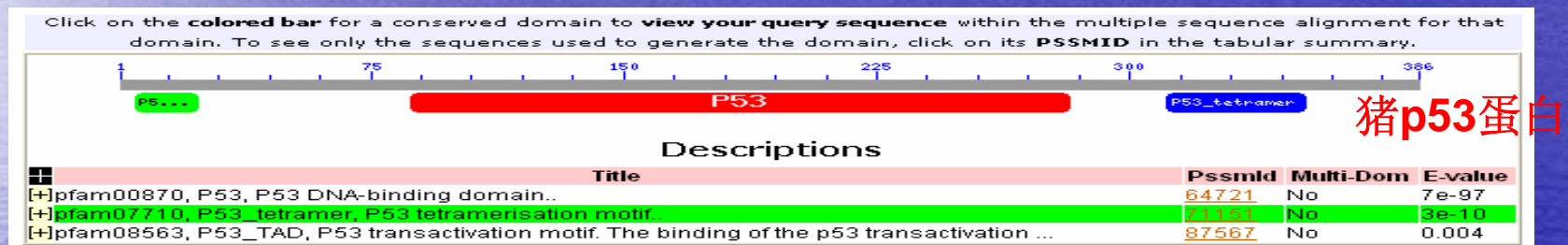
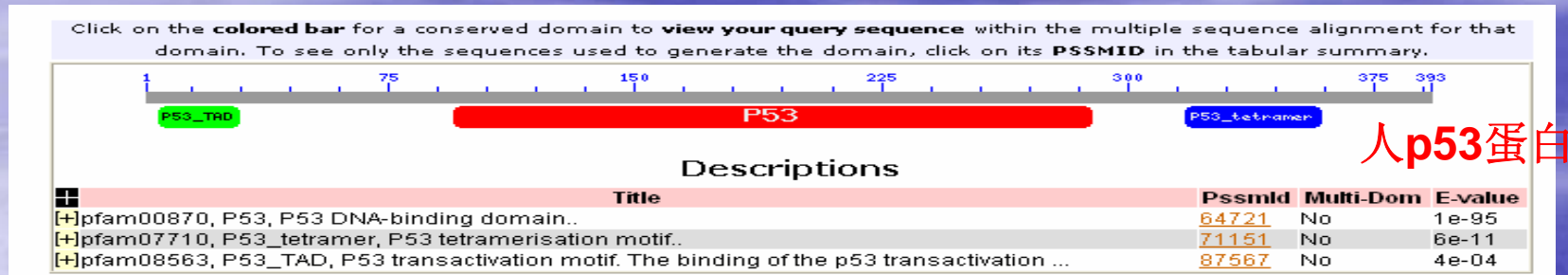


	180	190	200	210	220	230	240	250	260
P02340 P53_Mouse/1-390	VVRRCPHHERCSD	GDGLAPPQHLI	RVEGNLYPEYLED	RQTFRHSVVV	PYEPPEAGSEY	TTIHYKMYMCN	SSCMGGMNR	RRPILTIIT	LED
P10361 P53_Rat/1-391	VVRRCPHHERCSD	GDGLAPPQHLI	RVEGNLYAEYLD	DRQTFRHSVVV	PYEPPEVGS	SDYTTIHYKMY	CNSSCMGGM	NRRPILTI	ITLED
P41685 P53_Cat/1-386	VVRRCPHHERCP	SSDGLAPPQHLI	RVEGNLHAKYL	DDRNTFRHS	VVVPEPEVGS	SDCTTIHYNF	MCNSSCMGG	MNRRIIT	ITLED
Q29537 P53_Dog/1-381	VVRRCPHHERCSD	SSDGLAPPQHLI	RVEGNLRAKYL	DDRNTFRHS	VVVPEPEVGS	SDYTTIHYNY	MCNSSCMGG	MNRRIIT	ITLED
P51664 P53_Sheep/1-382	VVRRSPHHERSS	DYSDGLAPPQHLI	RVEGNLRAEYF	DDRNTFRHS	VVVPESEIE	SECTTIHYNF	MCNSSCMGG	MNRRIIT	ITLED
P67939 P53_Bovine/1-386	VVRRCPHHERSS	DYSDGLAPPQHLI	RVEGNLRAEYLD	DDRNTFRHS	VVVPESEID	SECTTIHYNF	MCNSSCMGG	MNRRIIT	ITLED
Q9TUB2 P53_Pig/1-386	VVRRCPHHERSS	DYSDGLAPPQHLI	RVEGNLRAEYLD	DDRNTFRHS	VVVPEPEVGS	SDCTTIHYNF	MCNSSCMGG	MNRRIIT	ITLED
P13481 P53_Green/1-393	VVRRCPHHERCSD	SDGLAPPQHLI	RVEGNLRAEYLD	DDRNTFRHS	VVVPEPEVGS	SDCTTIHYN	MCNSSCMGG	MNRRIIT	ITLED
P04637 P53_Human/1-393	VVRRCPHHERCSD	SDGLAPPQHLI	RVEGNLRAEYLD	DDRNTFRHS	VVVPEPEVGS	SDCTTIHYN	MCNSSCMGG	MNRRIIT	ITLED
Q95330 P53_Rabbit/1-391	VVRRCPHHERCSD	SDGLAPPQHLI	RVEGNLRAEYLD	DDRNTFRHS	VVVPEPEVGS	SDCTTIHYN	MCNSSCMGG	MNRRIIT	ITLED

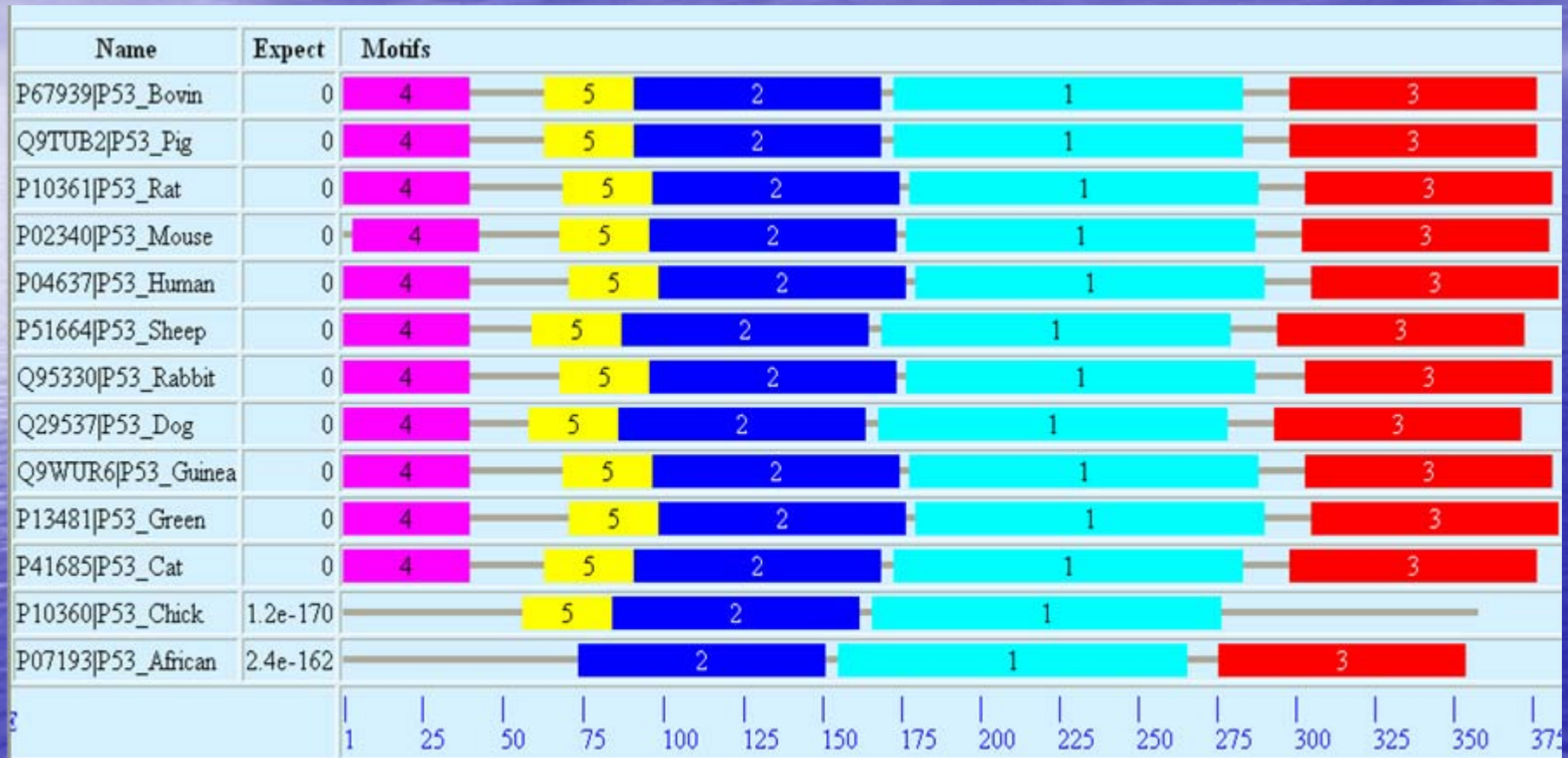
	270	280	290	300	310	320	330	340	350
P02340 P53_Mouse/1-390	SSGNLLGRD	SFEVRVCAC	PGDRDRRTE	EEENFRKKE	VLCEPELPP	GS AKRALPT	CTS -ASPPQ	KKKP -LDGE	YFTLKI
P10361 P53_Rat/1-391	SSGNLLGRD	SFEVRVCAC	PGDRDRRTE	EEENFRKKE	EEHCPELPP	GS AKRALPT	STS -SSPQQ	KKKP -LDGE	YFTLKI
P41685 P53_Cat/1-386	SNGKLLGRNS	SFEVRVCAC	PGDRDRRTE	EEENFRKKG	EPCEPPPG	STKRALPP	STS -STPPQ	KKKP -LDGE	YFTLQI
Q29537 P53_Dog/1-381	SSGNVLGRNS	SFEVRVCAC	PGDRDRRTE	EEENFHKKG	EPCEPPPG	STKRALPP	STS -SSPPQ	KKKP -LDGE	YFTLQI
P51664 P53_Sheep/1-382	SRGNLLGRS	SFEVRVCAC	PGDRDRRTE	EEENFRKKG	QDSCPEPP	PGSTKRALP	SSTS -SSPQQ	KKKP -LDGE	YFTLQI
P67939 P53_Bovine/1-386	SCGNLLGRNS	SFEVRVCAC	PGDRDRRTE	EEENLRKKG	QDSCPEPP	PRSTKRALP	NTS -SSPQP	KKKP -LDGE	YFTLQI
Q9TUB2 P53_Pig/1-386	ASGNLLGRNS	SFEVRVCAC	PGDRDRRTE	EEENFLKKG	QDSCPEPP	PGSTKRALP	STS -SSPVQ	KKKP -LDGE	YFTLQI
P13481 P53_Green/1-393	SSGNLLGRNS	SFEVRVCAC	PGDRDRRTE	EEENFRKKG	EPCHPELPP	GS AKRALP	NNTS -SSPQP	KKKP -LDGE	YFTLQI
P04637 P53_Human/1-393	SSGNLLGRNS	SFEVRVCAC	PGDRDRRTE	EEENLRKKG	EPHHELPP	GS AKRALP	NNTS -SSPQP	KKKP -LDGE	YFTLQI
Q95330 P53_Rabbit/1-391	SSGNLLGRNS	SFEVRVCAC	PGDRDRRTE	EEENFRKKG	EPCEPELPP	GS AKRALP	TTT -SSPQT	KKKP -LDGE	YFILKI
Q9WUR6 P53_Guinea/1-391	SSGKLLGRD	SFEVRVCAC	PGDRDRRTE	EEENFRKKG	GLCEPEPT	PGNIKRALP	STS -SSPQP	KKKP -LDAE	YFTLKI
P10360 P53_Chick/1-367	PGGQLLGRRC	FVEVRVCAC	PGDRDKIEE	ENFRKRG	GGAG - - -	GVAKRAM	SPPT	EAP	PEPPKRV
P07193 P53_African/1-363	PQGLLLGRRC	FVEVRVCAC	PGDRDRRTE	EDNYTKK	RGLK - -	PSGKRE	LAHP	SS	EPPLPKR

	360	370	380	390	400
P02340 P53_Mouse/1-390	ALELKDAAH	ATEESGDS	SRAHSSYL	KT KKGQ	STSRHKK
P10361 P53_Rat/1-391	ALELKDARAA	EESGDS	SRAHSSYP	KT KKGQ	STSRHKK
P41685 P53_Cat/1-386	ALELKDAAQ	SGKEPGGS	SRAHSSHL	KAKKGQ	STSRHKK
Q29537 P53_Dog/1-381	ALELKDAAQ	SGKEPGGS	SRAHSSHL	KAKKGQ	STSRHKK
P51664 P53_Sheep/1-382	ALELMDA	DAGREP	GESRAHSSHL	KS KKG	PSPSCHKK
P67939 P53_Bovine/1-386	ALELKDALD	GREP	GESRAHSSHL	KS KKR	PSPSCHKK
Q9TUB2 P53_Pig/1-386	ALELKDAD	TARE	SGENRAHSSHL	KS KKG	QSPSRHKK
P13481 P53_Green/1-393	ALELKDAD	AGKEP	AGSRAHSSHL	KS KKG	QSTSRHKK
P04637 P53_Human/1-393	ALELKDAD	AGKEP	AGSRAHSSHL	KS KKG	QSTSRHKK
Q95330 P53_Rabbit/1-391	ALELKDAD	AEKEP	AGSRAHSSYL	KAKKGQ	STSRHKK
Q9WUR6 P53_Guinea/1-391	ALEFKDA	QTEKEP	GESRPHSSYP	KS KKG	QSTSCHKK
P10360 P53_Chick/1-367	ALQLA	E	GG	SAPR	PSKGR - - -
P07193 P53_African/1-363	ALELQ	E	SLD	Q - - -	KVTIKCR

3、用 NCBI CDD 数据库预测 p53 保守结构域

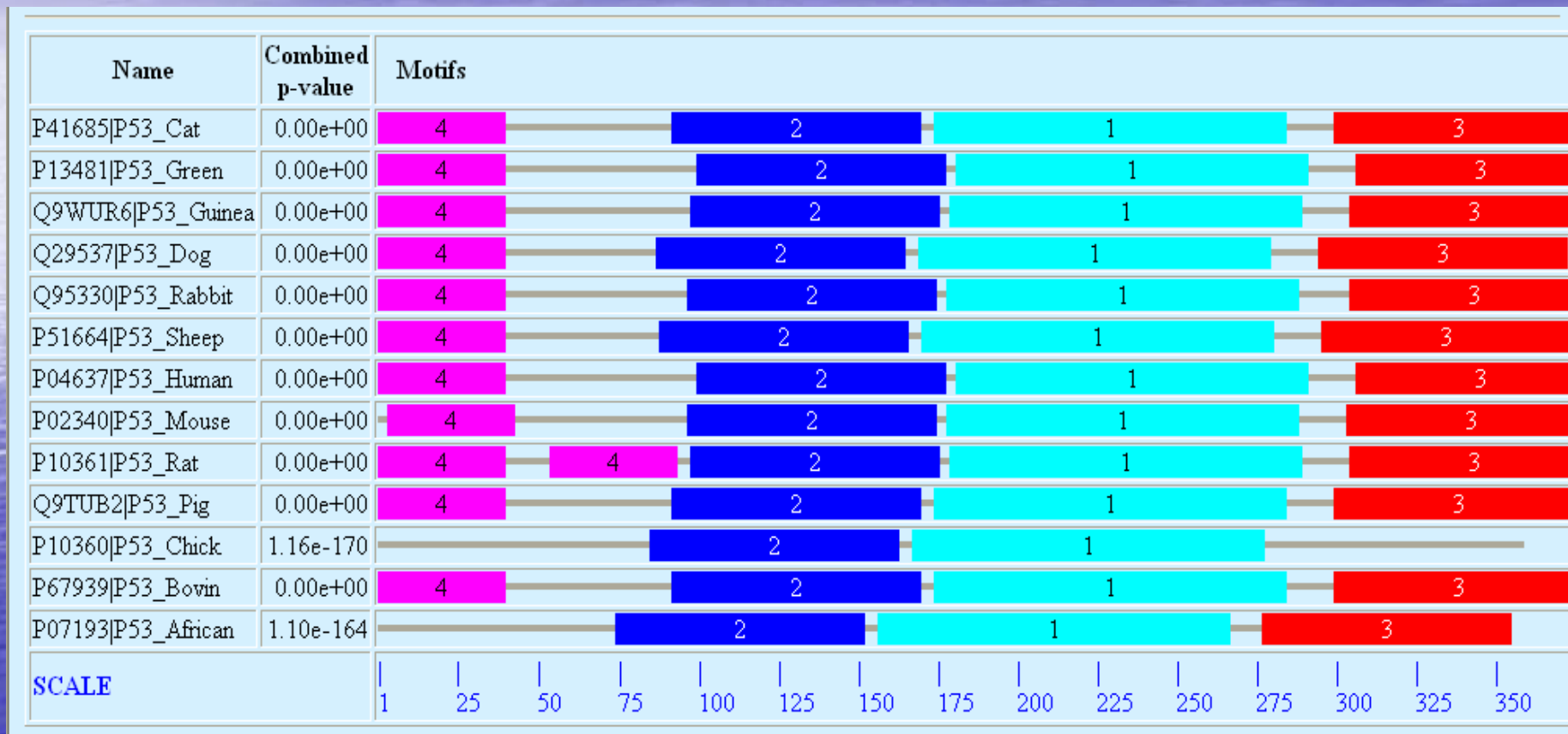


4、MEME进行保守域预测

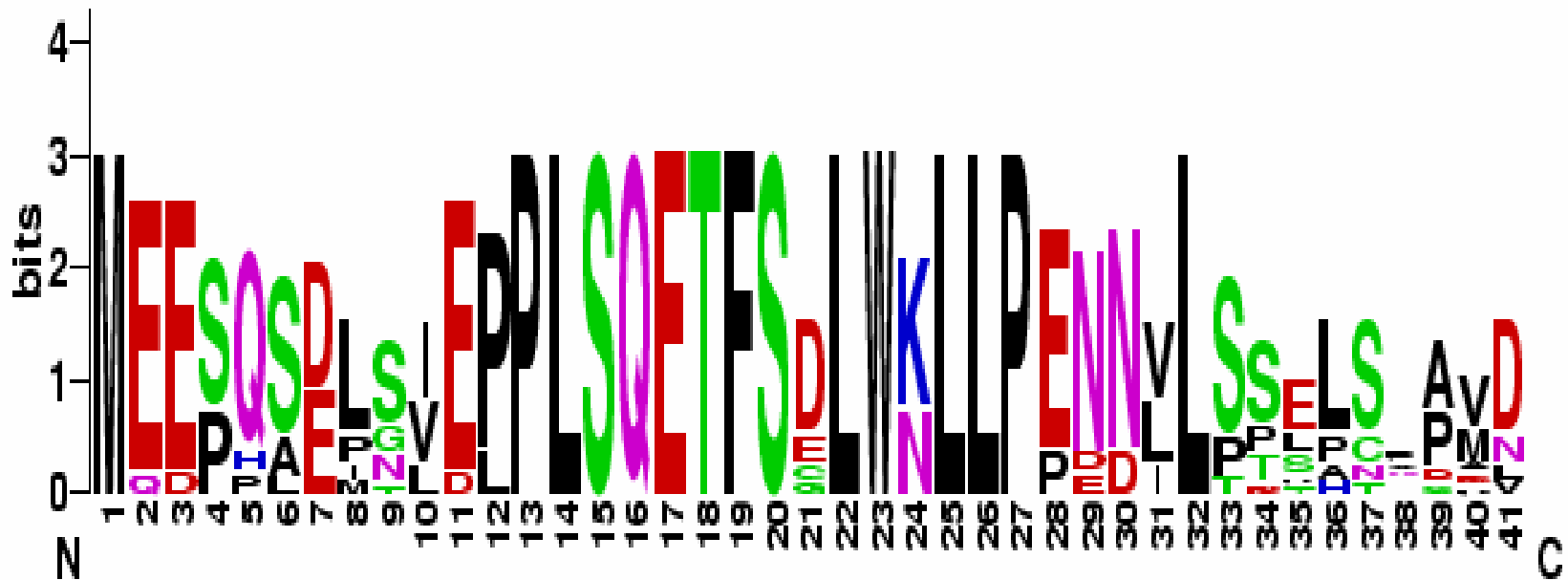


SECTION III: ANNOTATED SEQUENCES

用MEME预测p53 motif (改用4个motif)

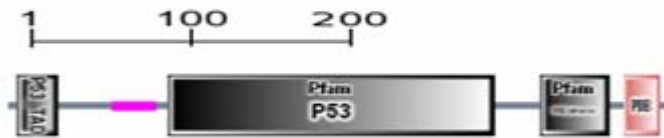


5、Weblogo预测motif 4的保守氨基酸



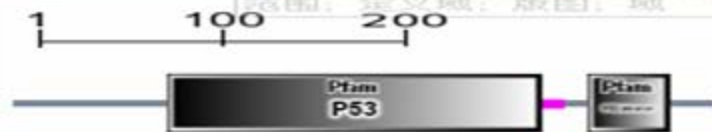
Domains within *Homo sapiens* protein P53_HUMAN (P04637)

Cellular tumor antigen p53



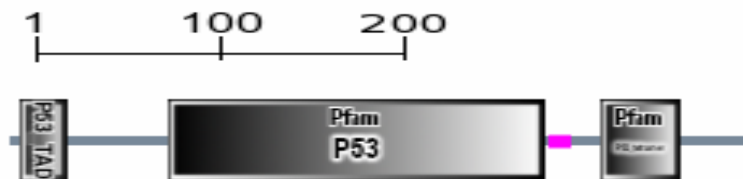
人p53蛋白

Domains within the query sequence of 367 residues



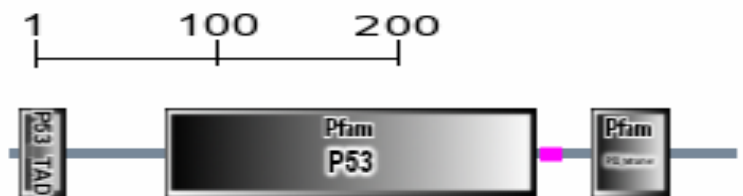
鸡p53蛋白

Domains within the query sequence of 381 residues



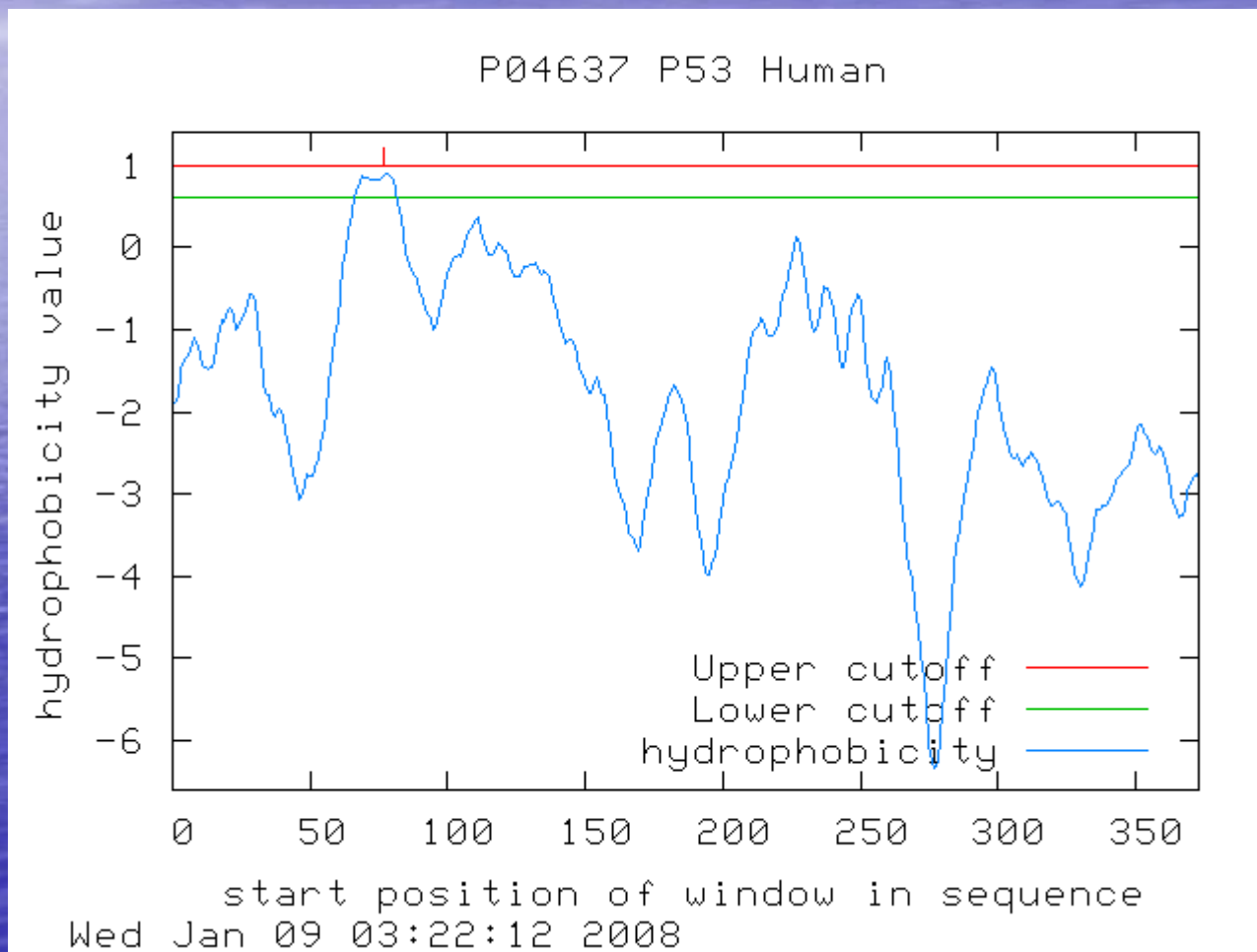
猪p53蛋白

Domains within the query sequence of 381 residues

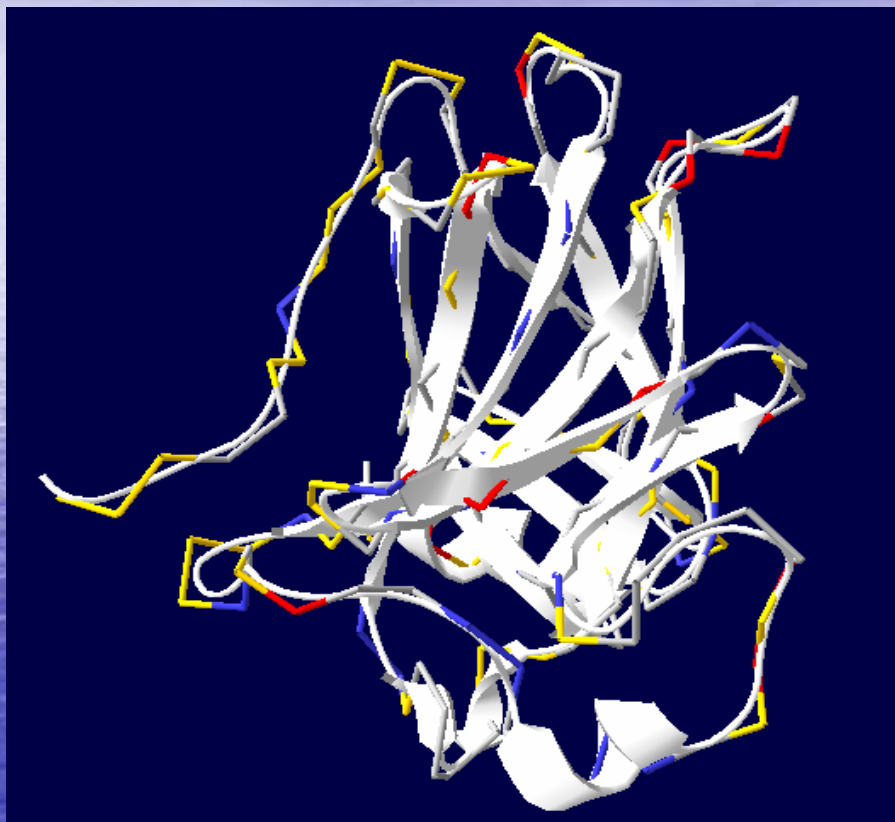


狗p53蛋白

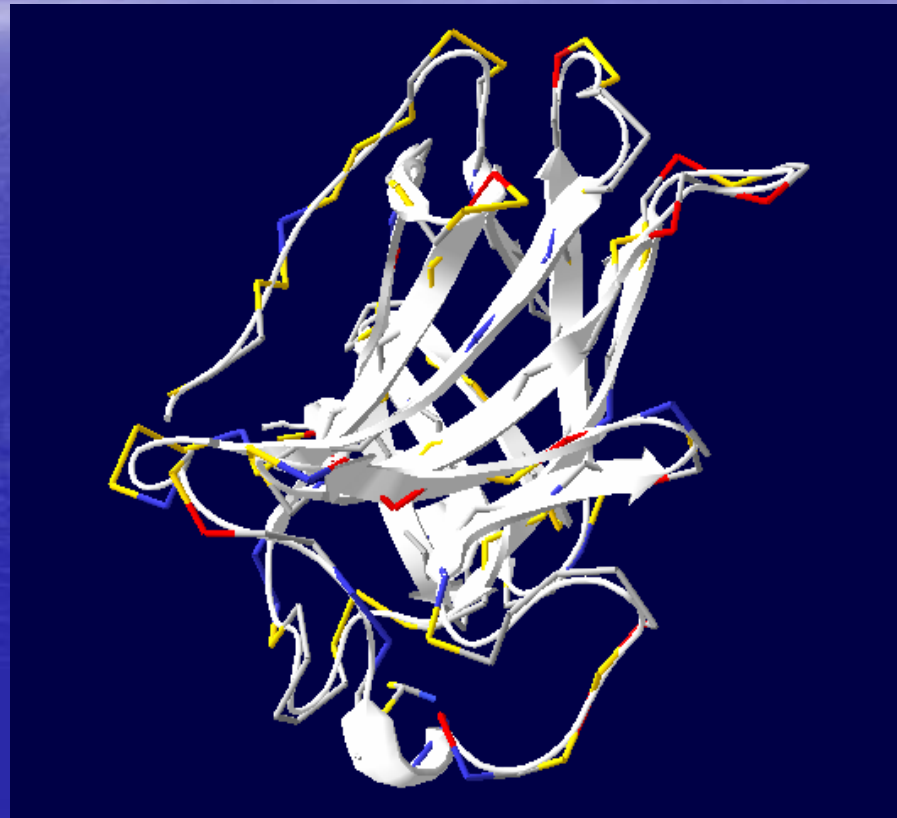
6、人p53蛋白跨膜预测



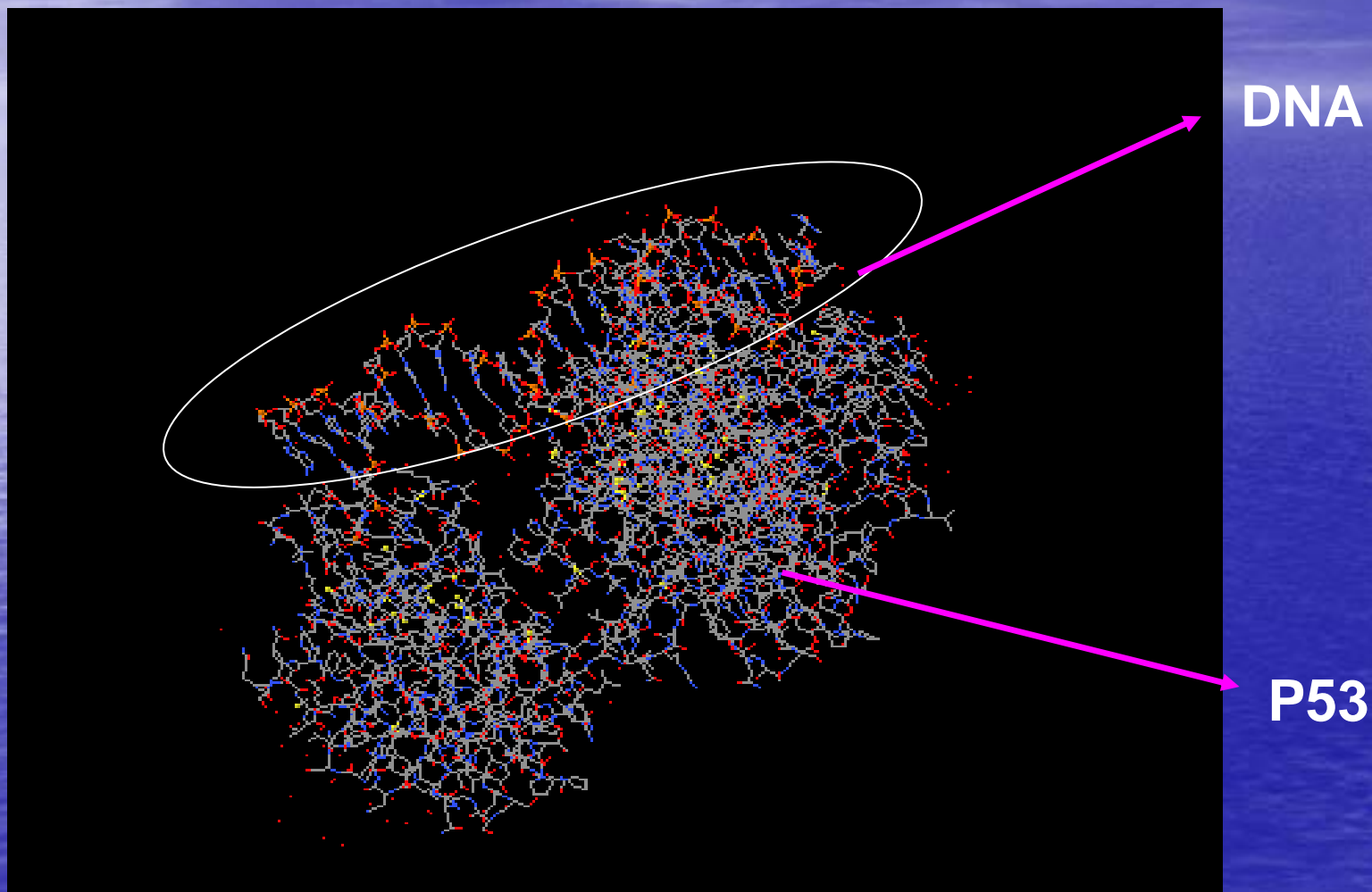
P53DNA结合域 (96-288)
三维结构 (1TUP)



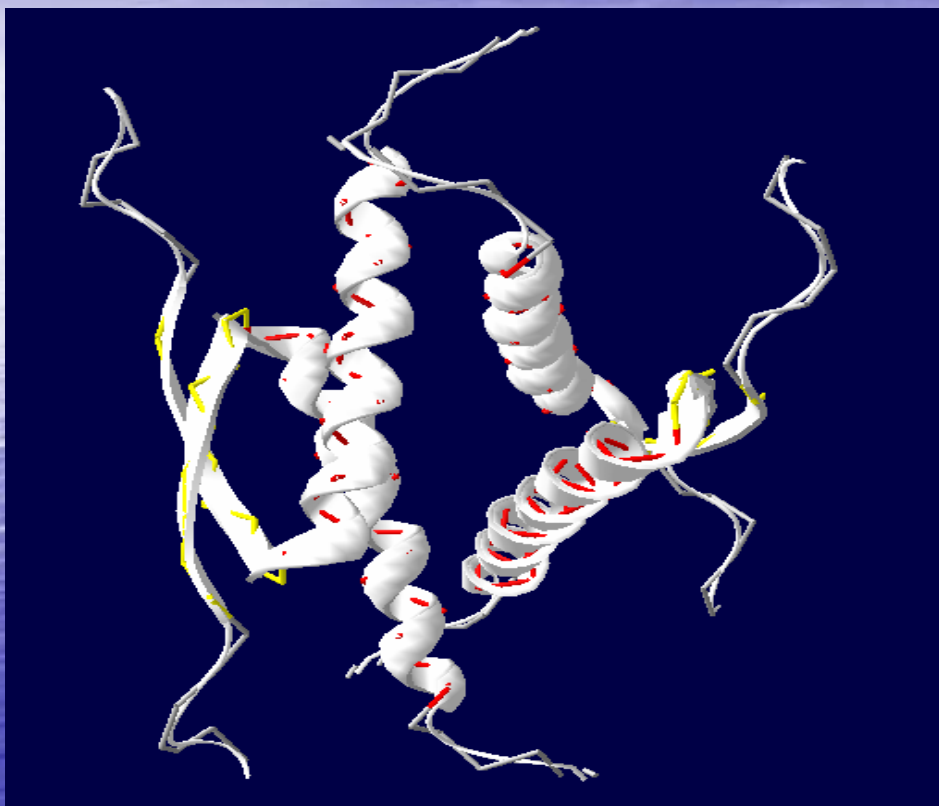
**P53突变M133L,V203A,
N239Y(2J21)**



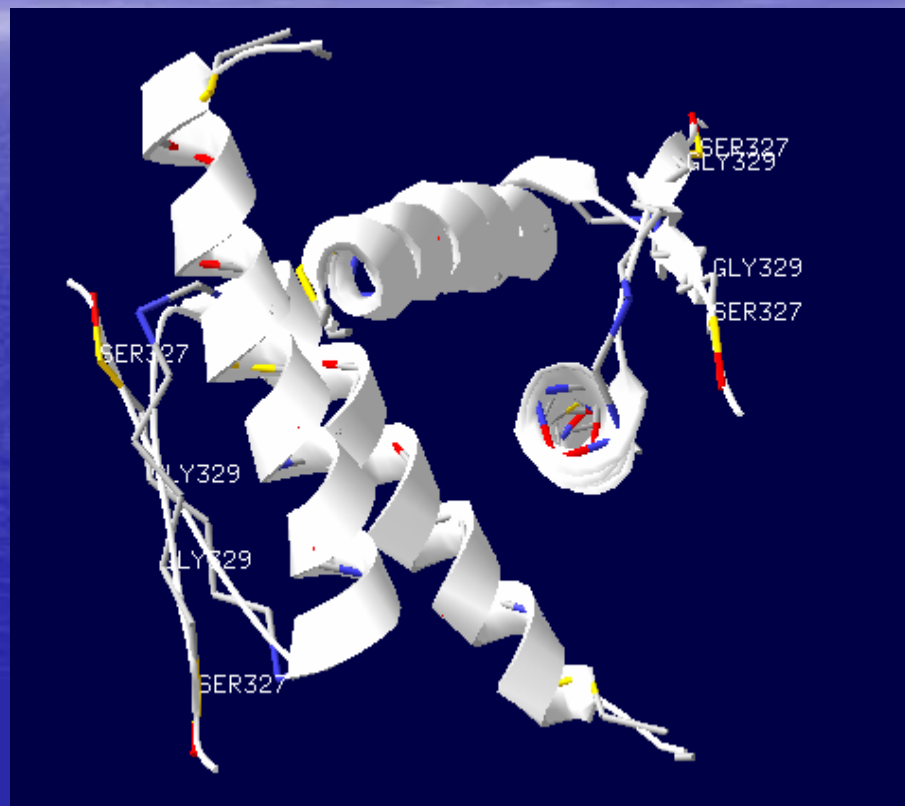
P53与DNA作用模式图



P53四聚体形成域 (319-360)
三维图(1OLG)



P53突变Y327S
T329G(2J21)



衷心感谢罗老师的关心和指导！

祝愿罗老师身体健康，工作顺利！

祝同学们学业有成，前程似锦！

谢谢！