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Compilation of sequences of tRNA genes

Dieter H. Gauss* and Mathias Sprinzl+

*Department of Chemistry, Max-Planck-Institut für experimentelle Medizin, Hermann-Rein-Str. 3, D-3400 Göttingen, and +Department of Biochemistry, University of Bayreuth, P.O.Box 3008, D-8580 Bayreuth, FRG

INTRODUCTION

In this compilation of tRNA genes the sequences have been aligned and displayed as has been done in the case of the tRNA sequences (Fig. 1 in preceding paper). The nucleotides preceding nucleotide residue 1 and the nucleotides following nucleotide residue 73 and the intervening sequences (see footnotes) have been excluded from the compilation. The compilers would welcome any information regarding missing material or erroneous presentation.

Acknowledgements: We thank Mrs. H. Geißler and Mr. R. Jung for skillful assistance and the Fonds der Chemischen Industrie for financial support.

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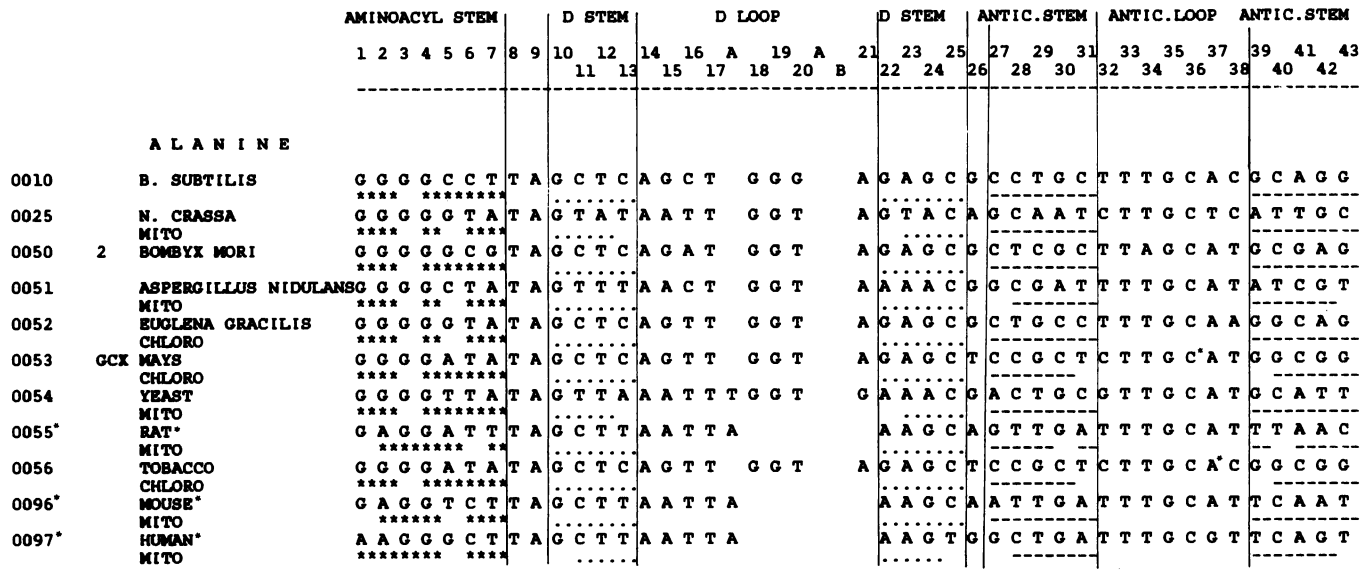

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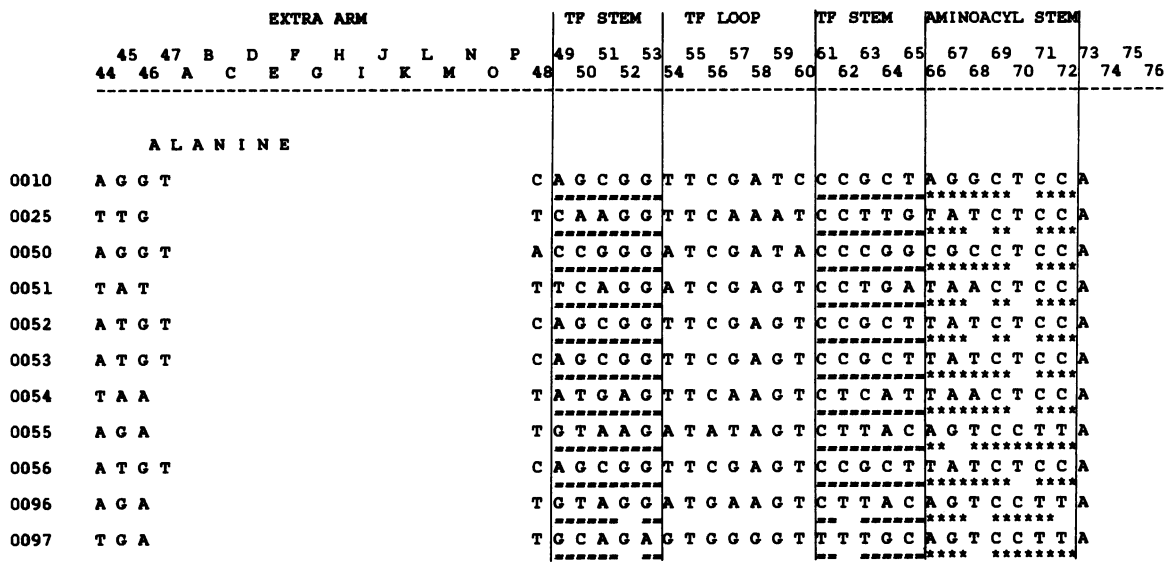

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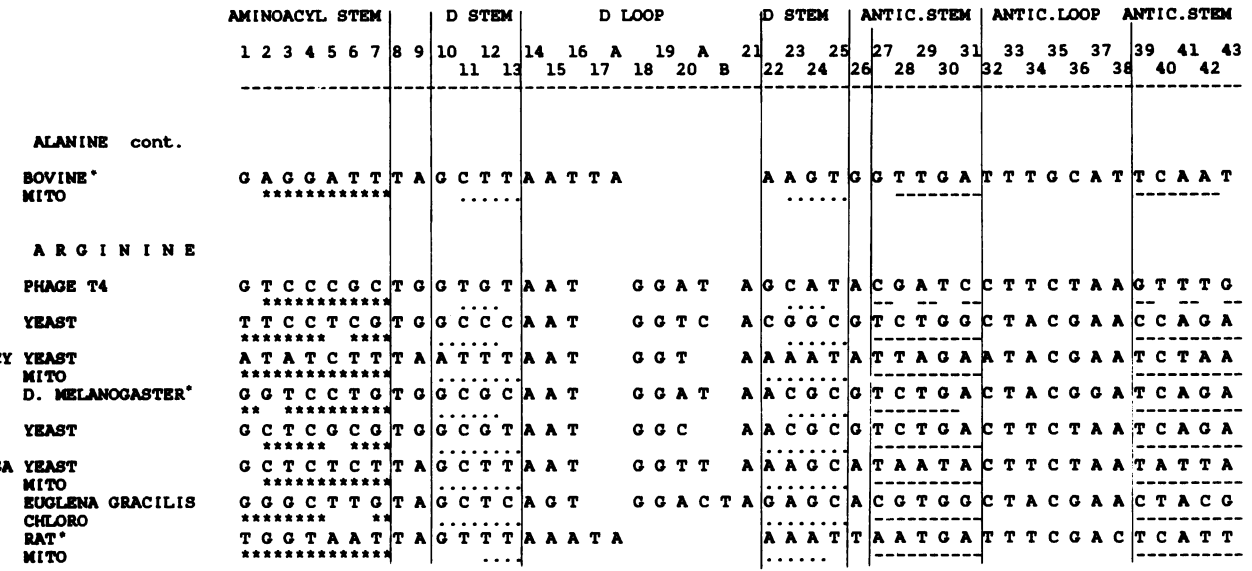

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0120 G.P.MAKEARA, G.PLUNKETT, W.H.MCCLAIN (1981) PROC. NATL. ACAD. SCI. 78, 889–892

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0150 N.C.MARTIN, D.MILLER, J.HARTLEY, P.MOYNIHAN, J.E.DONELSON (1980) CELL 19, 339–343
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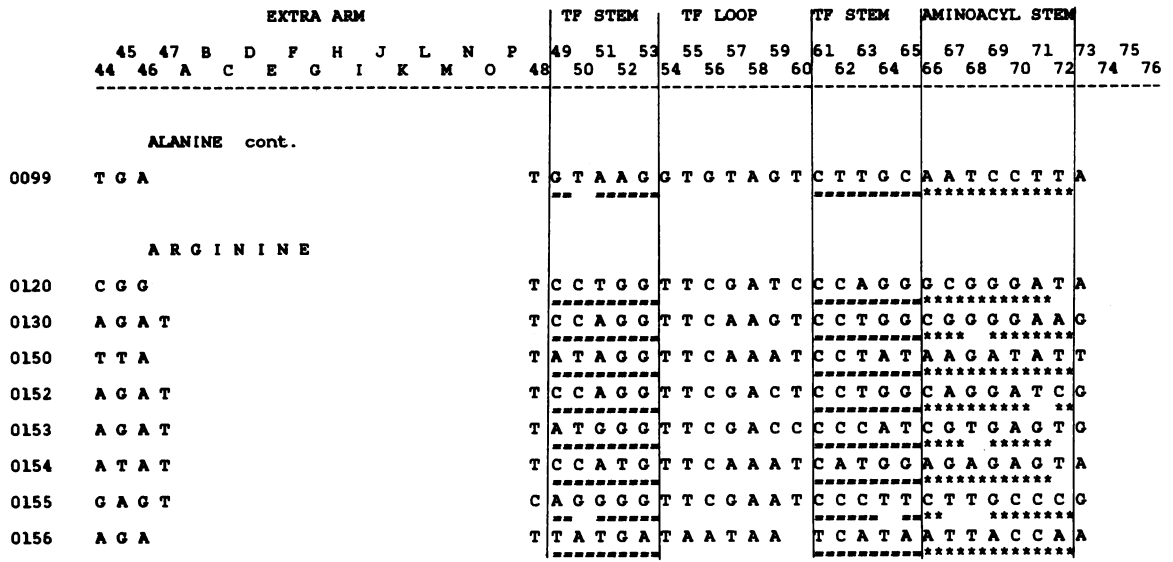

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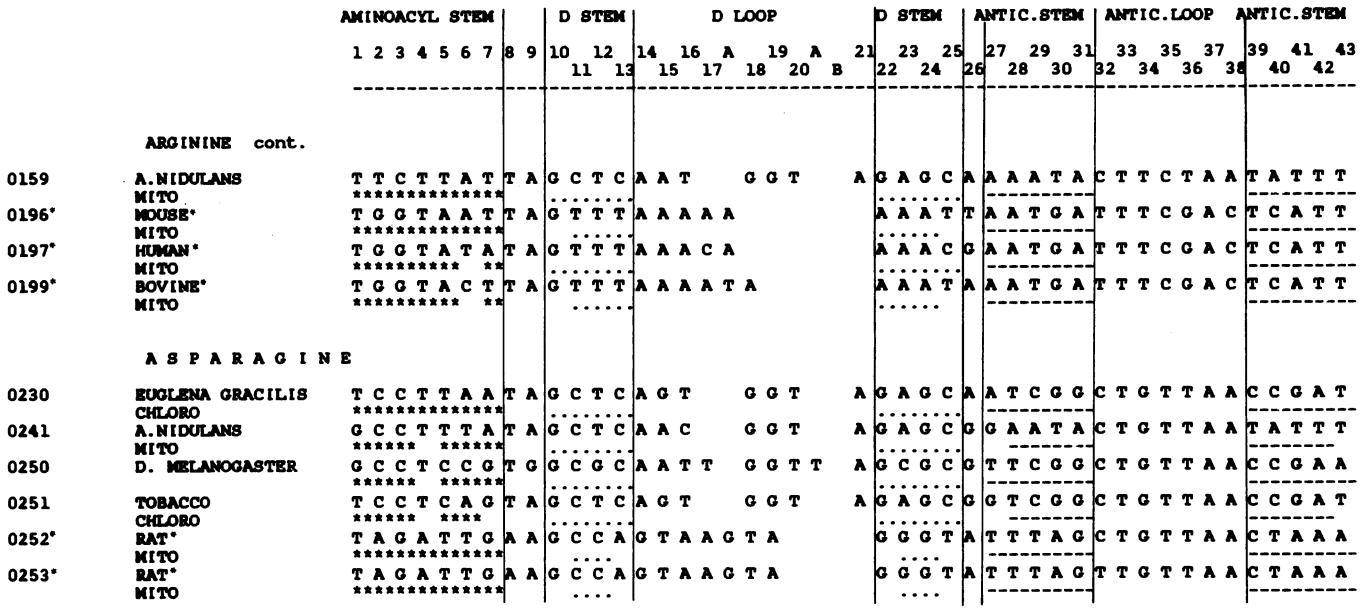

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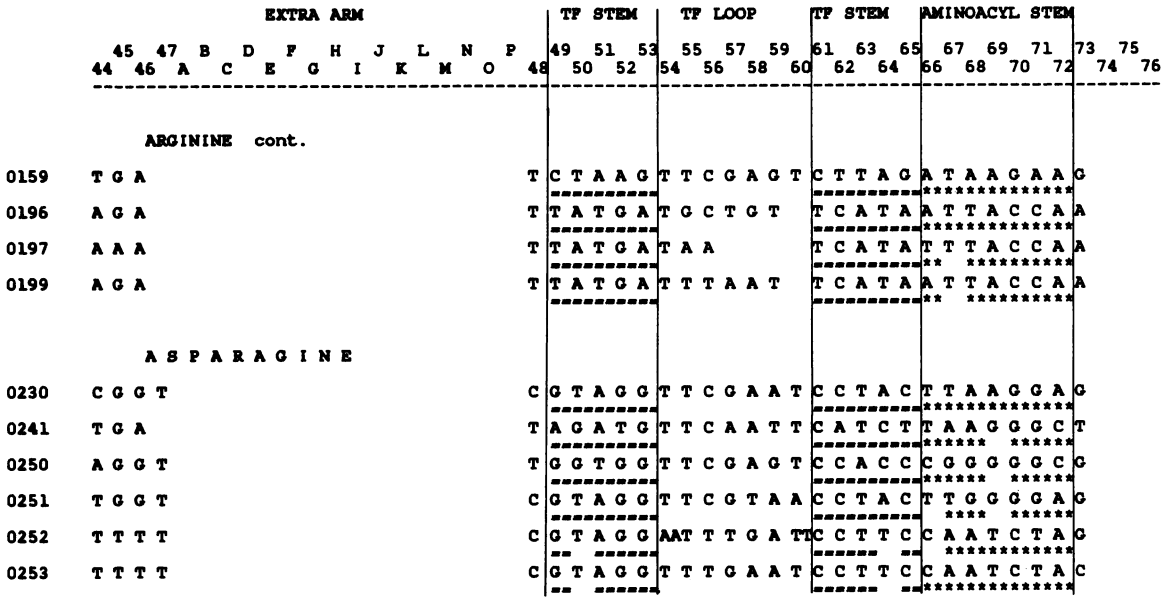

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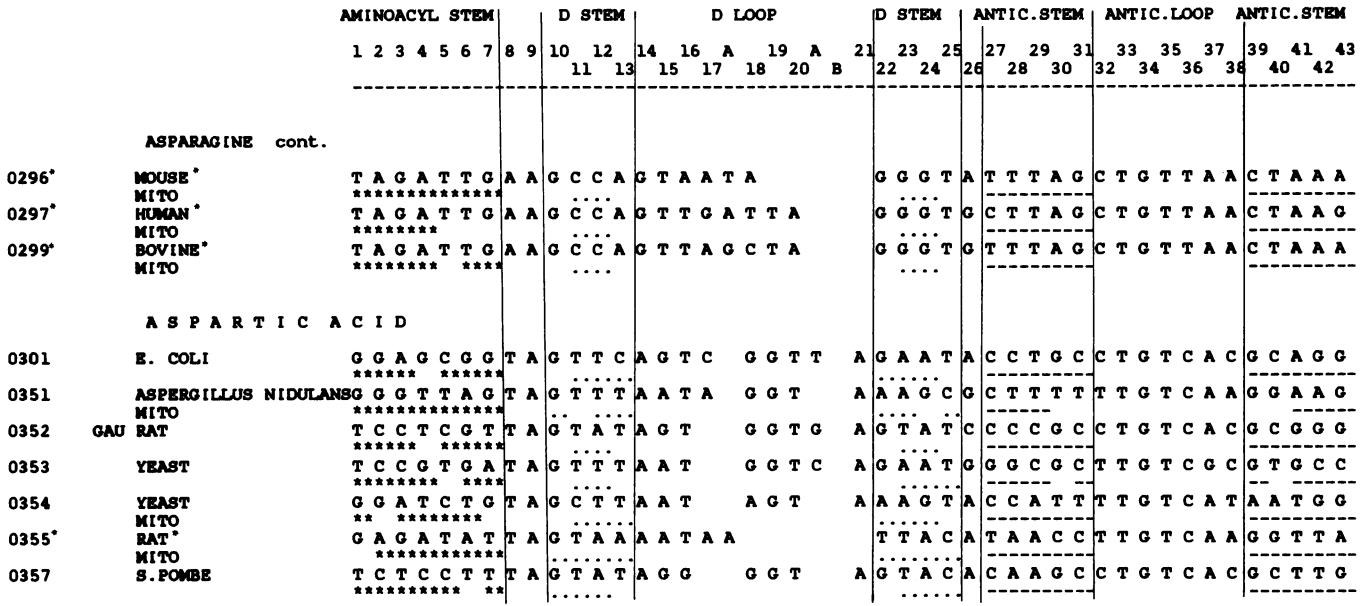

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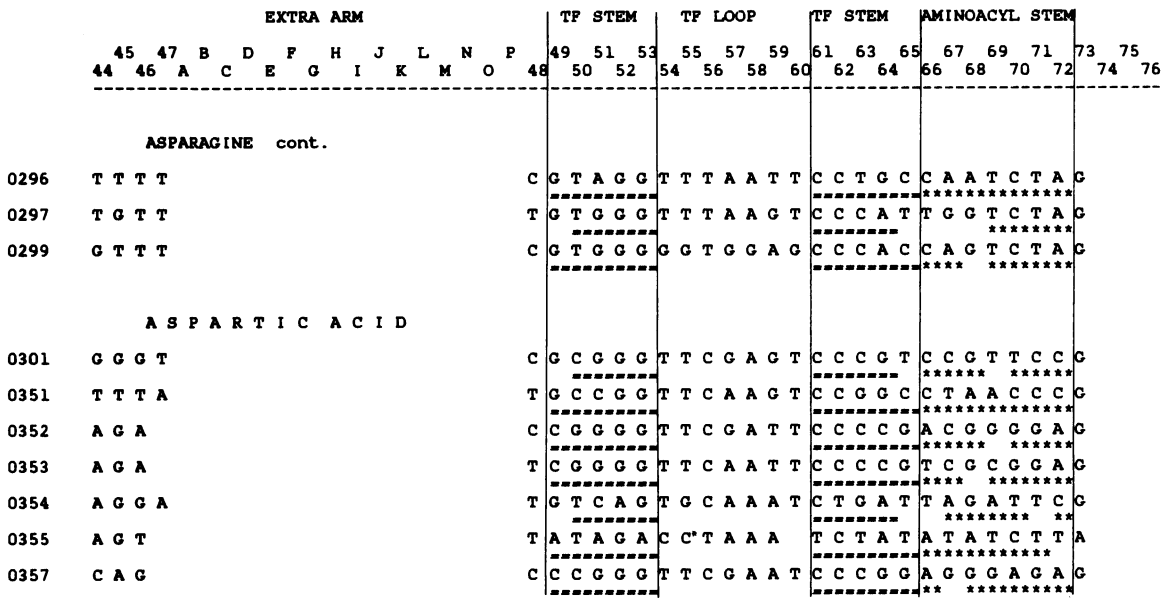

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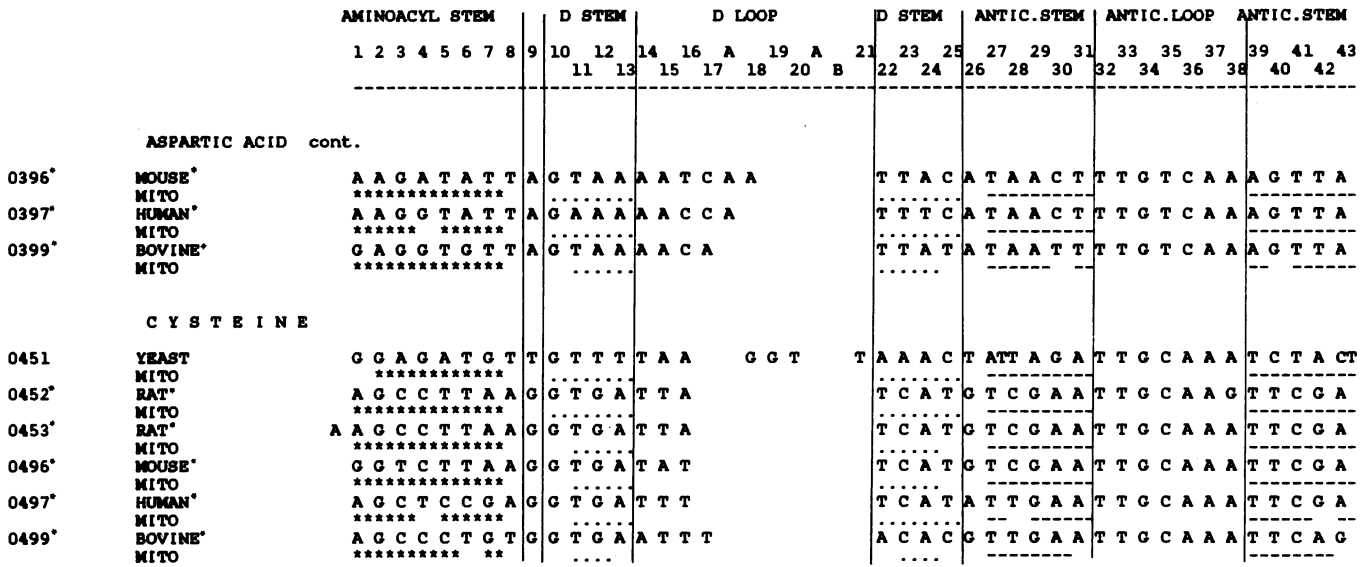

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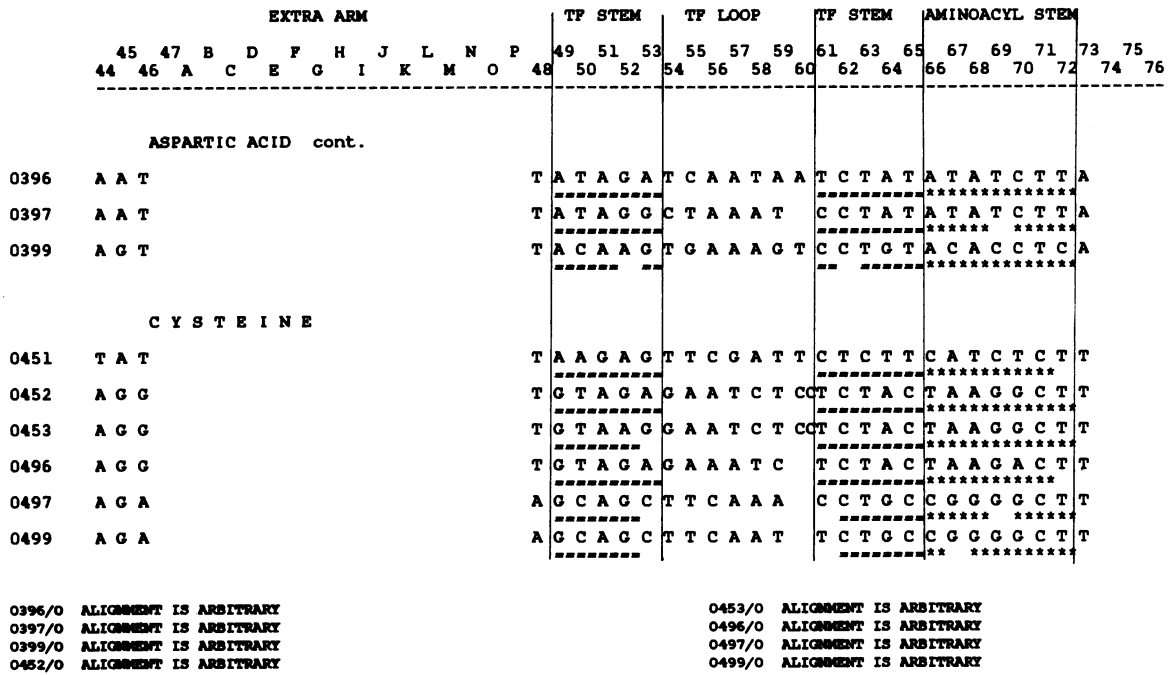
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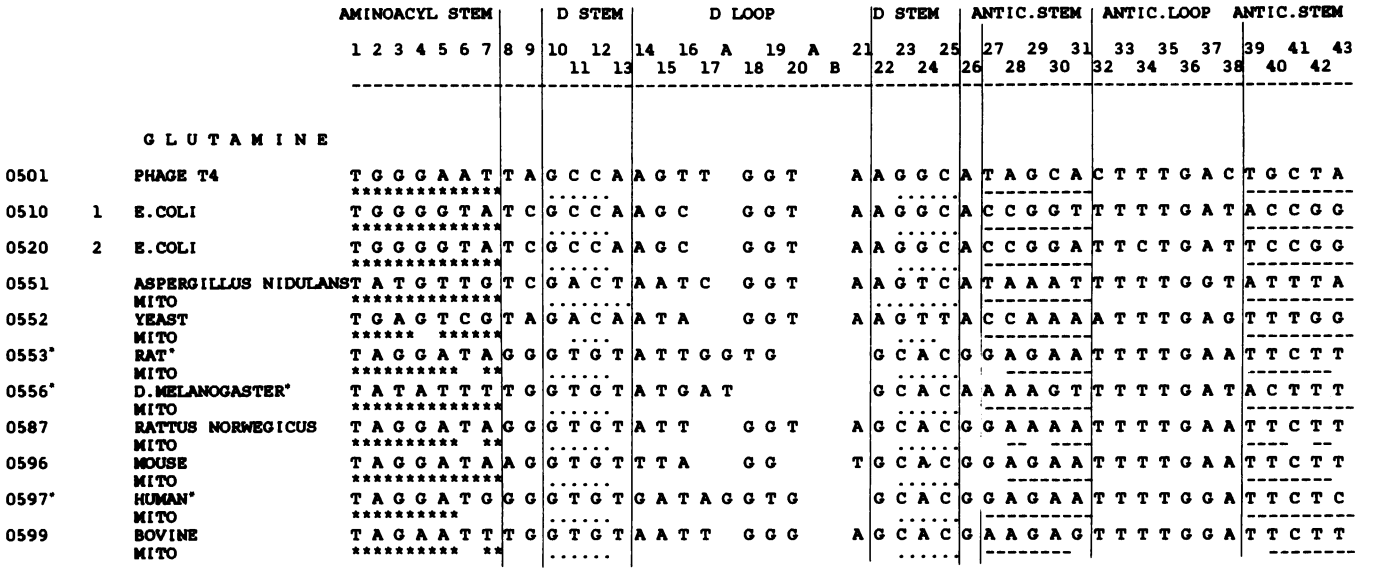

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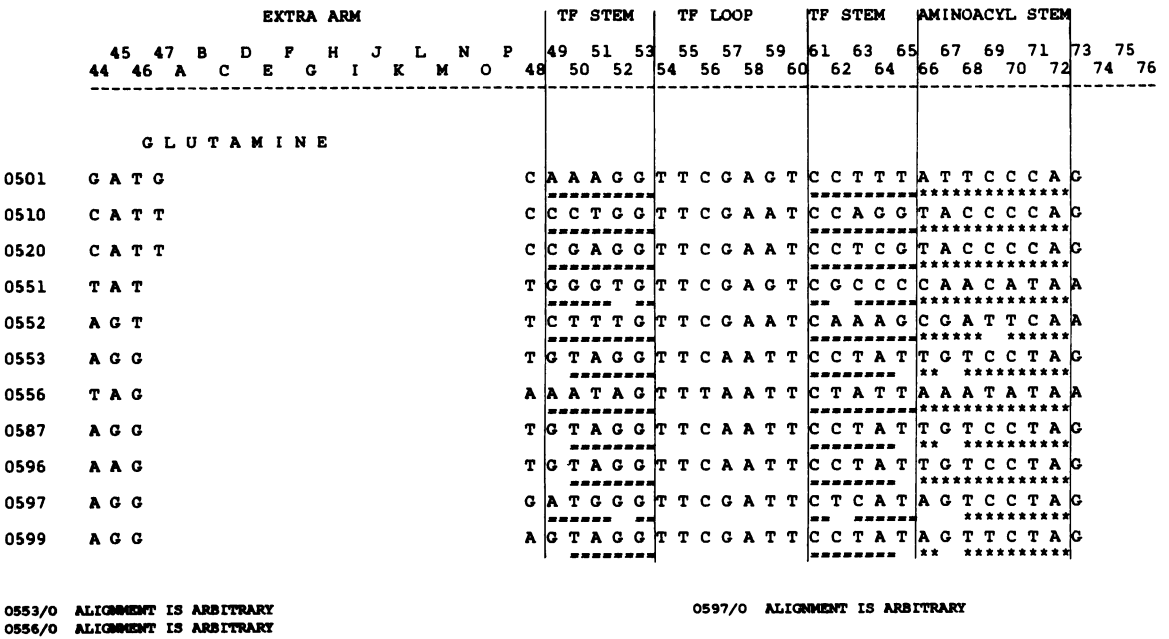

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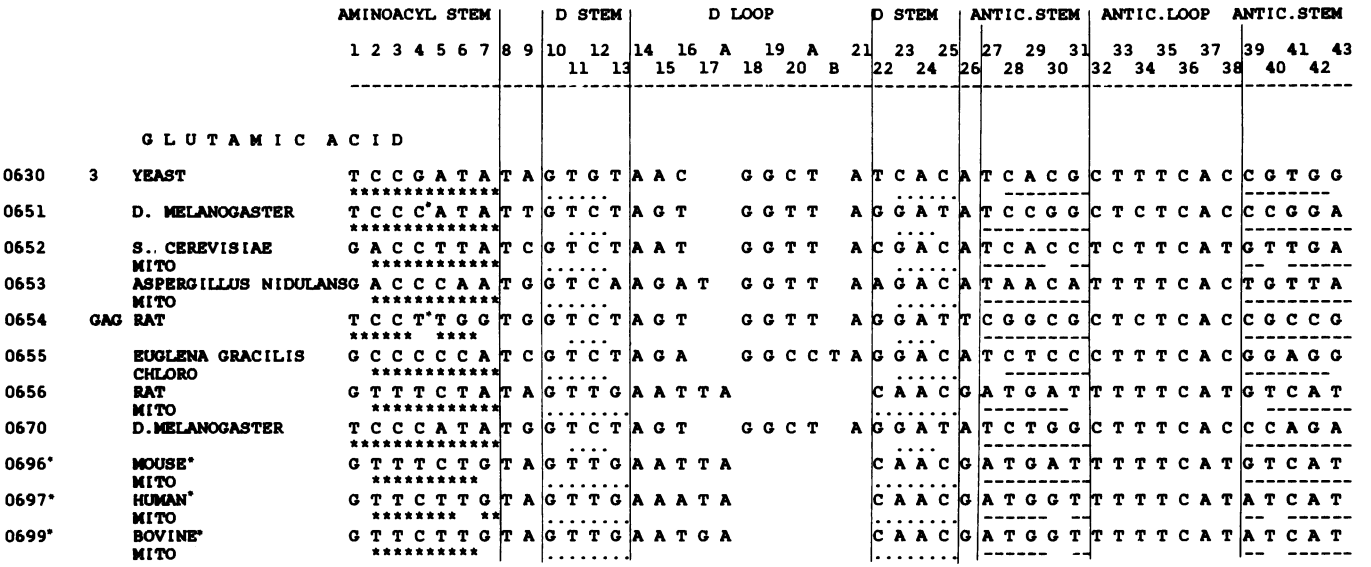

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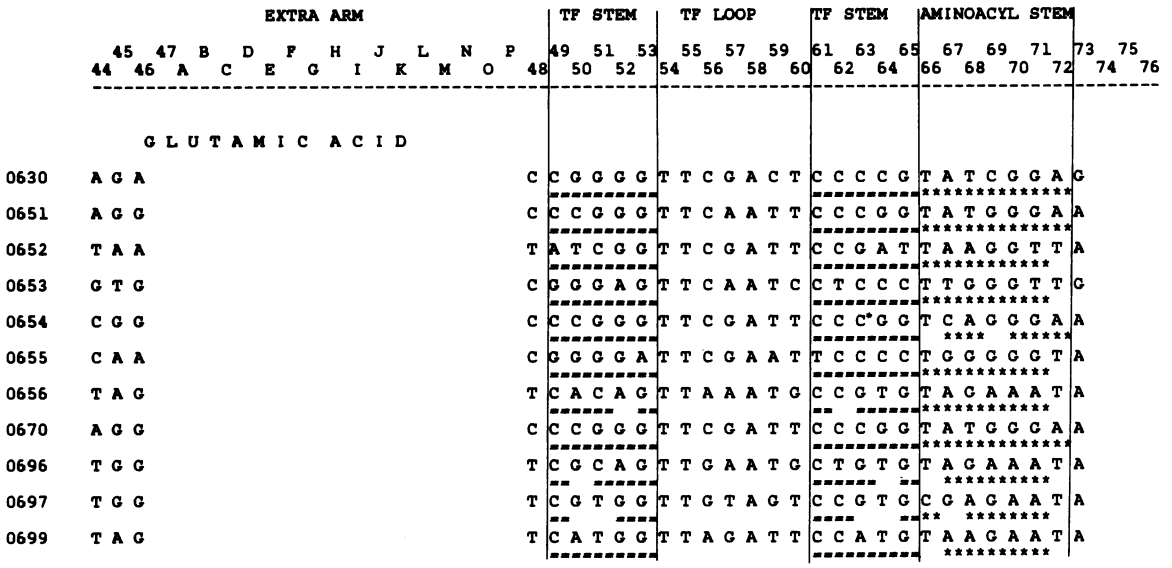

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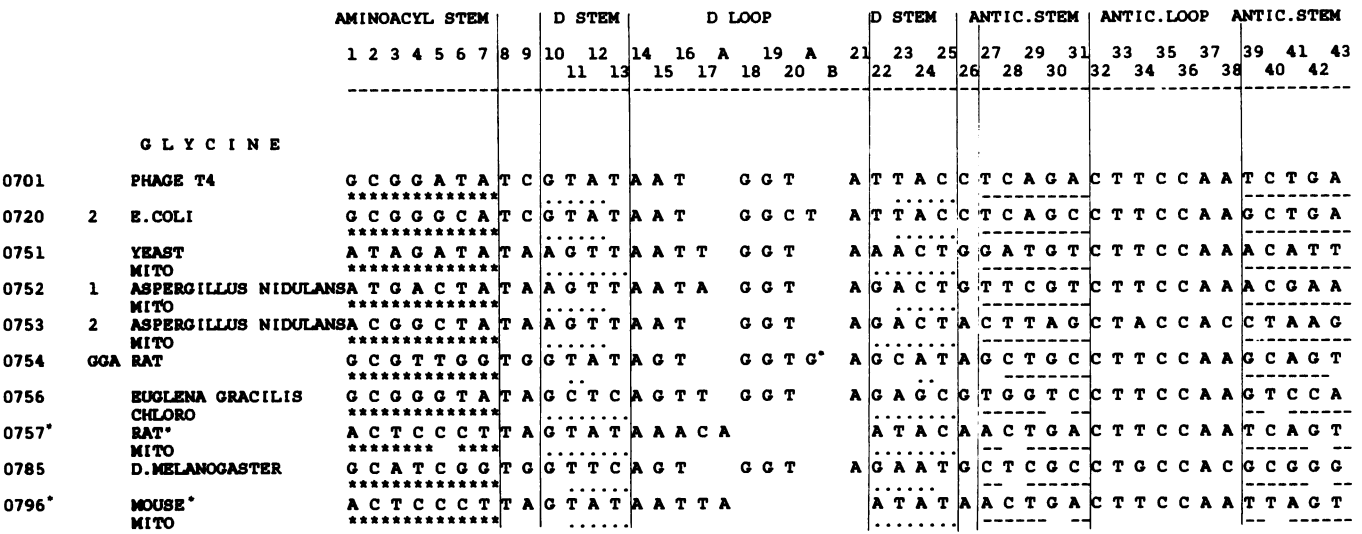

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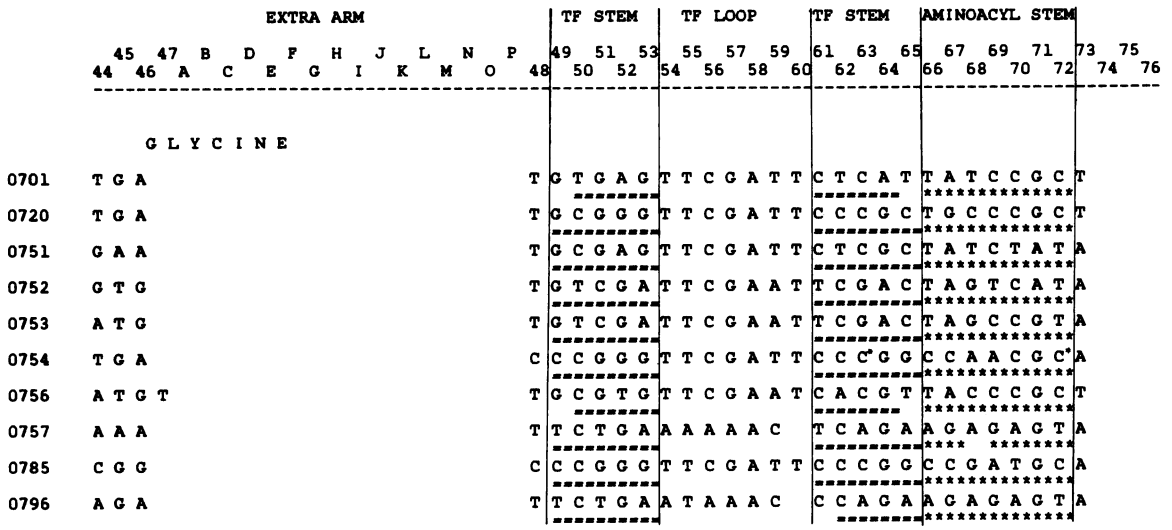

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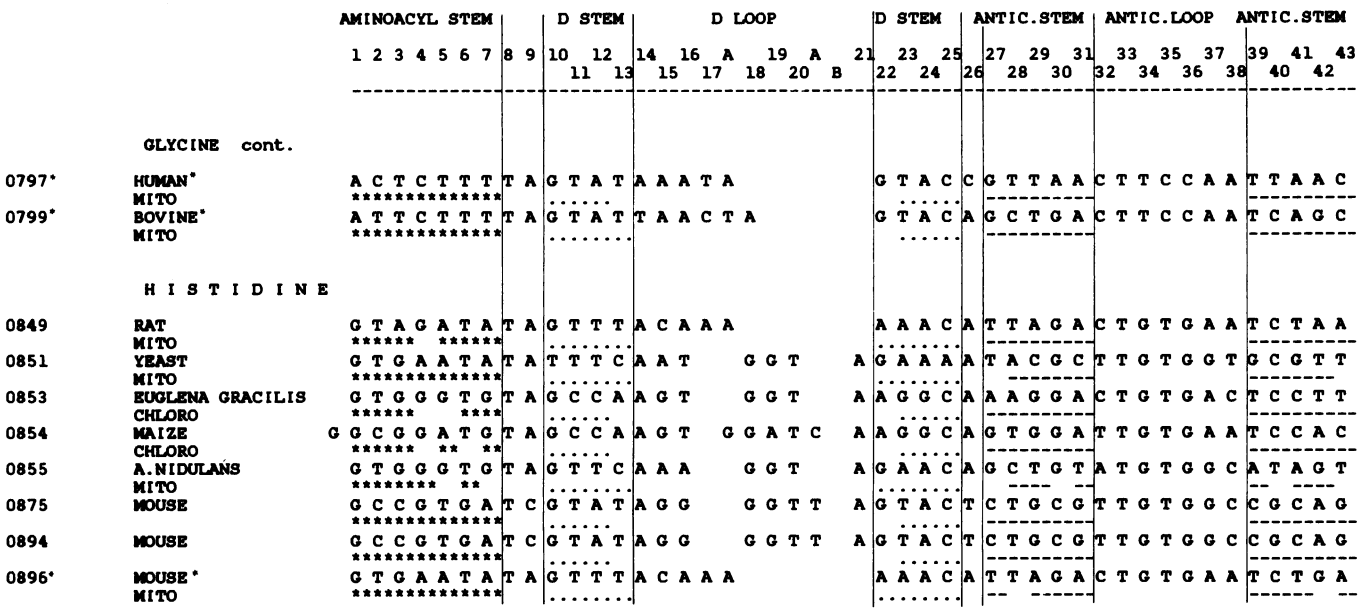

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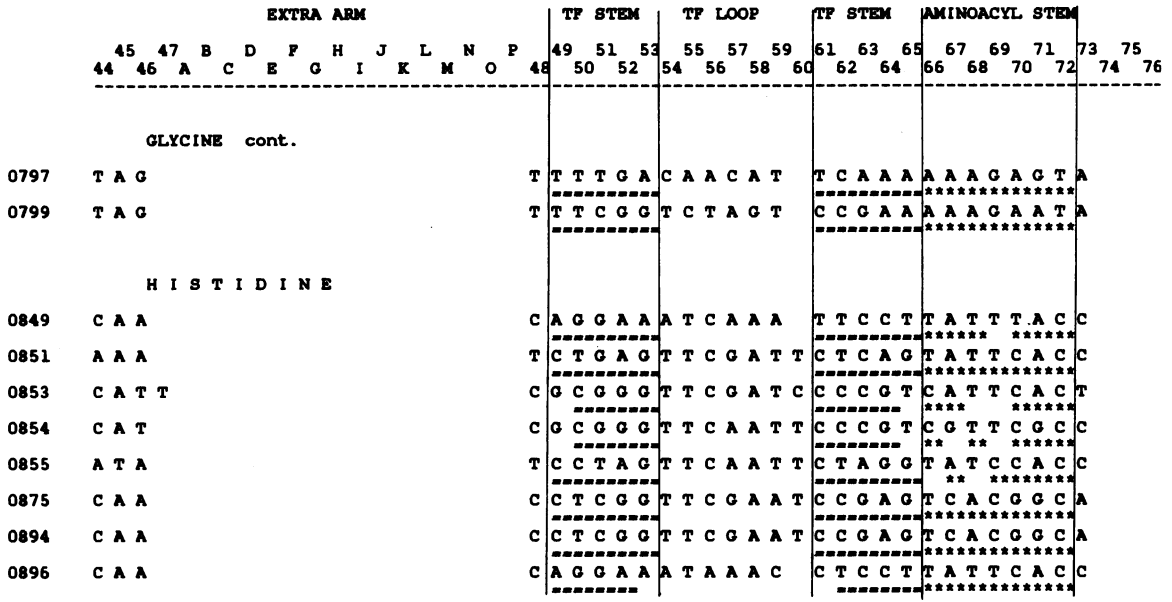
0853 M.J.HOLLINGSWORTH, R.B. HALLICK (1982) J. BIOL. CHEM. IN PRESS
0854 Z.SCHWARZ, S.O.JOLLY, A.A.STEINMETZ, L.BOGORAD (1981) PROC. NATL. ACAD. SCI. USA 78, 3423–3427
0855 R.METZKET, H.G.KOECHEL, N.BAZAK, H.KUENTZEL (1982) NUCL. ACIDS RES. 10, 4783–4794
0875 J.H.HAN, J.D.HARDING (1982) NUCL. ACIDS RES. 10, 4891–4900
0894 J.H.HAN, J.D.HARDING (1982) NUCL. ACIDS RES. 10, 4891–4900
0896 M.J.BIBB, R.A.VAN ETTEN, C.T.WRIGHT, M.W.WALBERG, D.A.CLAYTON (1981) CELL 26, 167–180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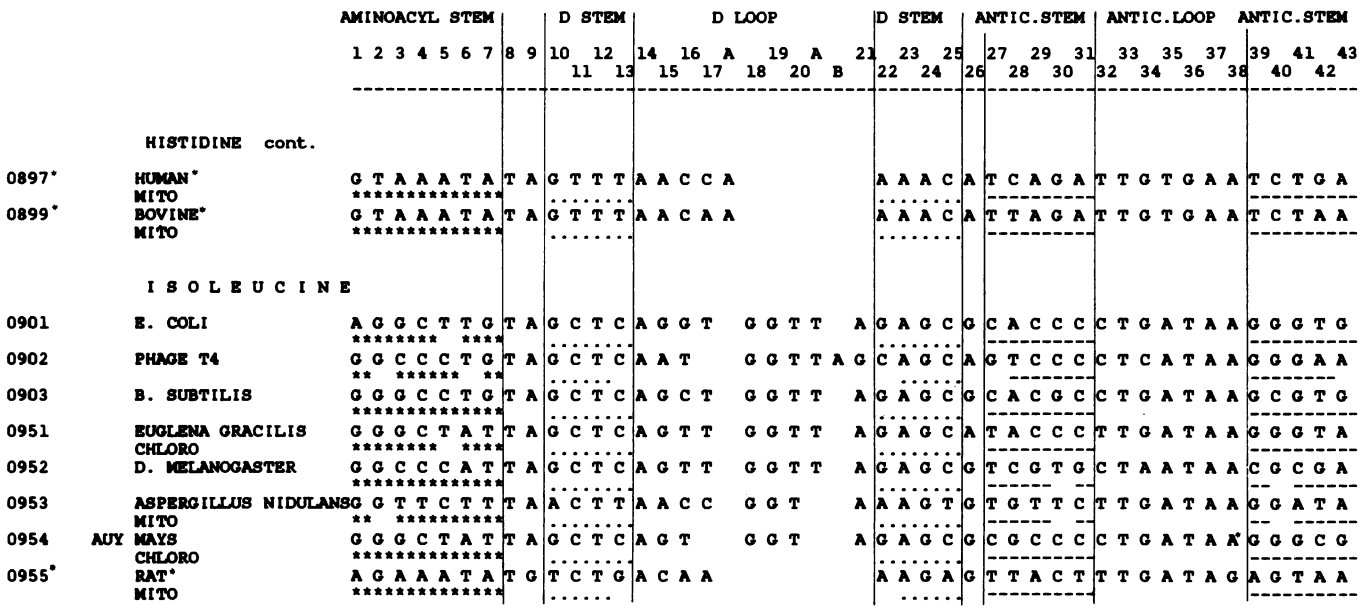


0897 S.ANDERSON ET AL. (1981) NATURE 290, 457-465

0899 S.ANDERSON, M.H.L.DE BRUIJN, A.R.COULSON, I.C.EPERON, F.SANGER, I.G.YOUNG (1982) J. MOL. BIOL. 156, 683-717

0901 T.SEKIYA, S.NISHIMURA (1979) NUCL. ACIDS RES. 6, 575-592

0902 K.FUKADA, J.ABELSON (1980) J.MOL.BIOL. 139, 377-391

0903 K.LOUGHEED, E.LUND, E.DAHLBERG (1982) NUCL. ACIDS RES. 10, 1607-1624

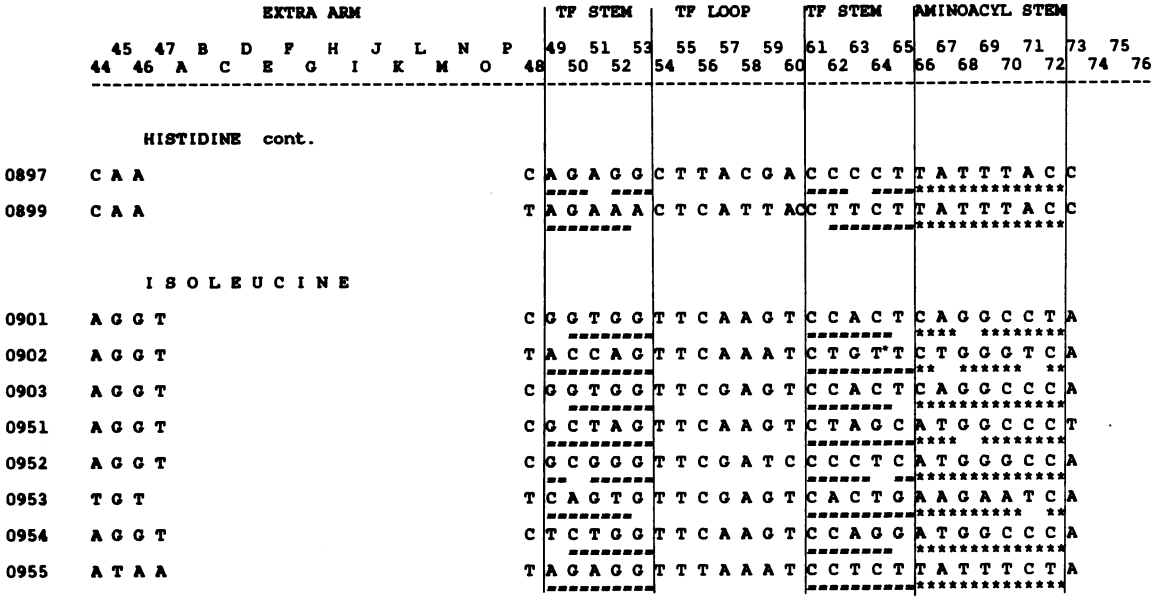
0951 L.GRAF, H.KOESSEL, E.STUTZ (1980) NATURE 286, 908-910; E.M.OROCZO, JR., K.E.RUSHLOW, J.R.DODD, R.B. HALLICK (1980) J. BIOL. CHEM. 255, 10997-11003

0952 B.HOVEMANN, S.SHARP, H.YAMADA, D.SOELL (1980) CELL 19, 889-895 R.R.ROBINSON, N.DAVIDSON (1981) CELL 23, 251-259

0953 H.G.KOECHEL, C.M.LAZARUS, N.BASAK, H.KUENTZEL (1981) CELL 23, 625-633

0954 W.KOCH, K.EDWARDS, H.KOESSEL (1981) CELL 25, 203-213; COMPARE P.GUILLEMAUT, J.H.WEIL (1982) NUCL. ACIDS RES. 10, 1653-1659

0955 P.CANTATORE, C.DE BENEDETTO, G.GADALETA, R.GALLERANI, A.M.KROON, M.HOLTROP, C.LANAVE, G.PEPE, C.QUAGLIARIELLO, C.SACCONE, S.SBISA (1982) NUCL. ACIDS RES. 10, 3279-3289



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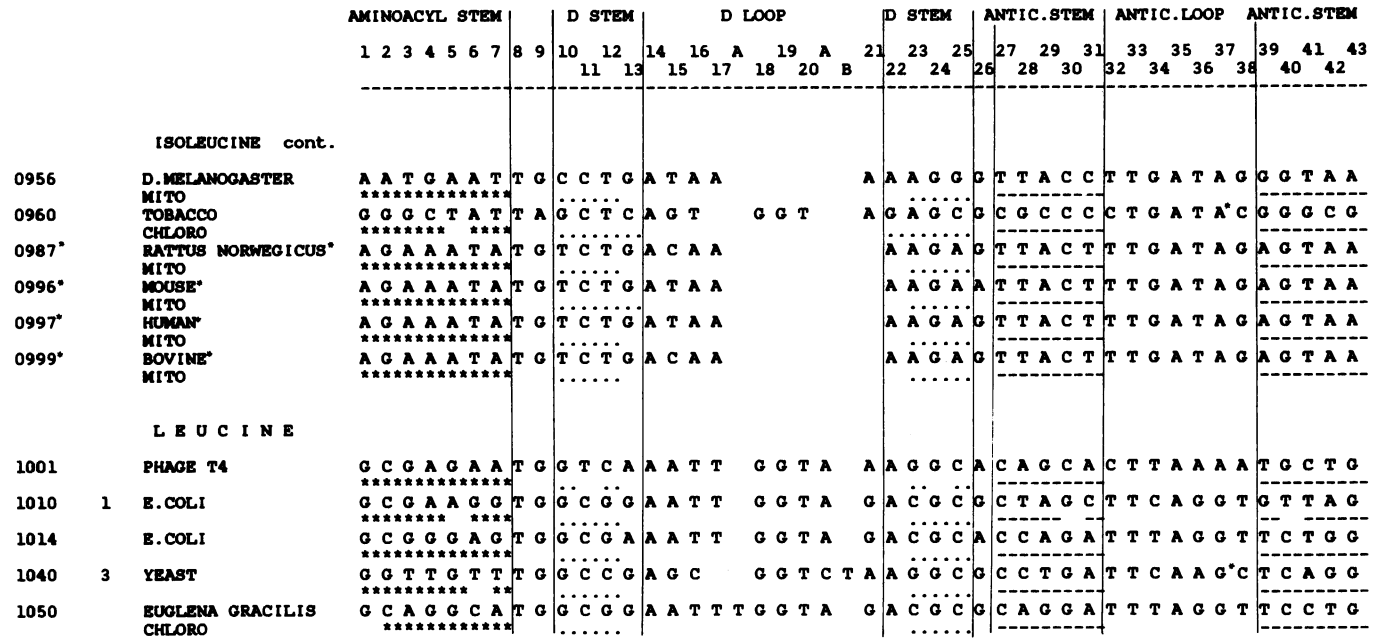

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0996 M.J.BIBB, R.A.VAN ETTEN, C.T.WRIGHT, M.W.WALBERG, D.A.CLAYTON (1981) CELL 26, 167-180

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1010 G.DUESTER, R.K.CAMPEN, W.M.HOLMES (1981) NUCL. ACIDS RES. 9, 2121-2139

1014 N.NAKAJIMA, H.OZEKI, Y.SHIMURA (1981) CELL 23, 239-249

1040 D.M.STANDRING, A.VENEGAS, W.J.RUTTER (1981) PROC. NATL. ACAD. SCI. 78, 5963-5967

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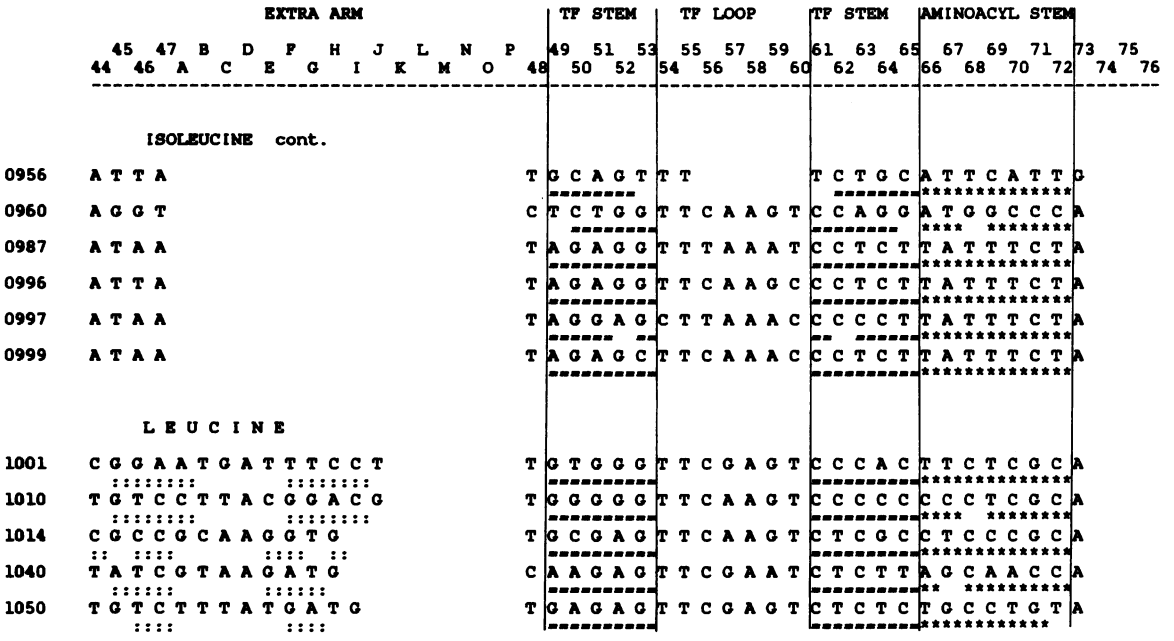

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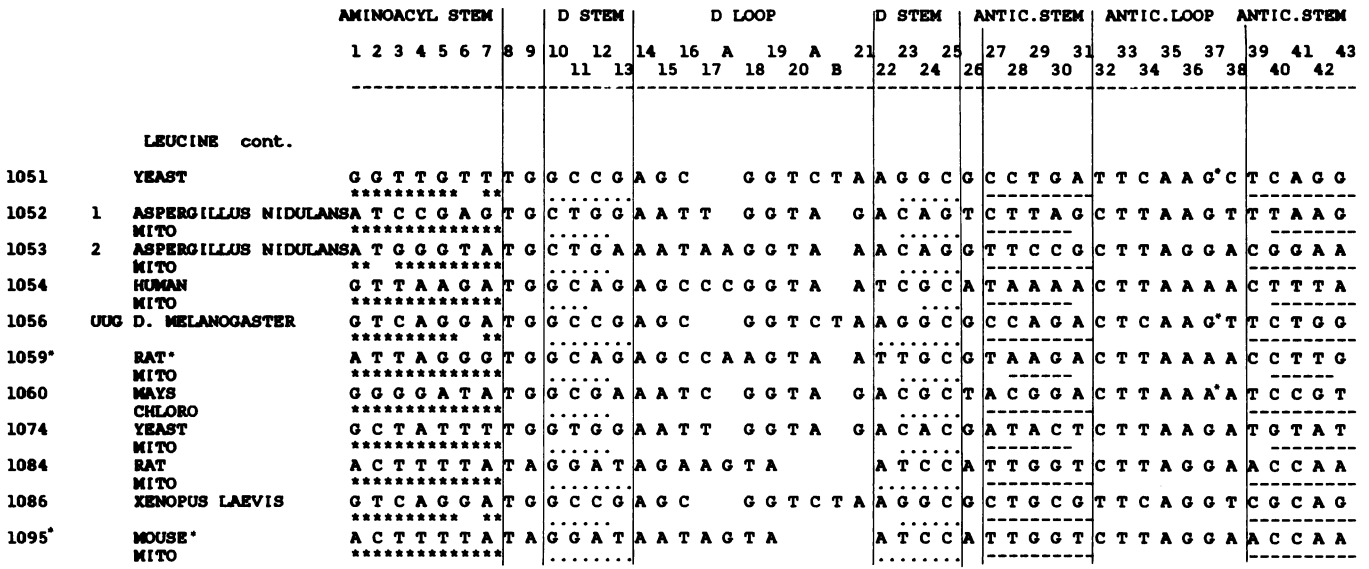

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1052 H.G.KOECHEL, C.M.LAZARUS, N.BASAK, H.KUENTZEL (1981) CELL 23, 625–633

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1059 G.SACCONE, P.CANTATORE, G.GADALETA, R.GALLERANI, C.LANAVE, G.PEPE A.M.KROON (1981) NUCL. ACIDS RES. 9, 4139–4148

1060 A.STEINMETZ, E.J.GUBBINS, L.BOGORAD (1982) NUCL. ACIDS RES. 10, 3027–3037

1074 B.BERLANI, S.G.BONITZ, G.CORUZZI, M.NOBREGA, A.TZAGOLOFF (1980) NUCL. ACIDS RES. 8, 5017–5030

1084 R.GROSSKOPF, H.FELDMANN (1981) CURR. GEN. 4, 191–196

1086 G.GALLI, H.HOFSTETTER, M.L.BIRNSTIEL (1981) NATURE 294, 626–631

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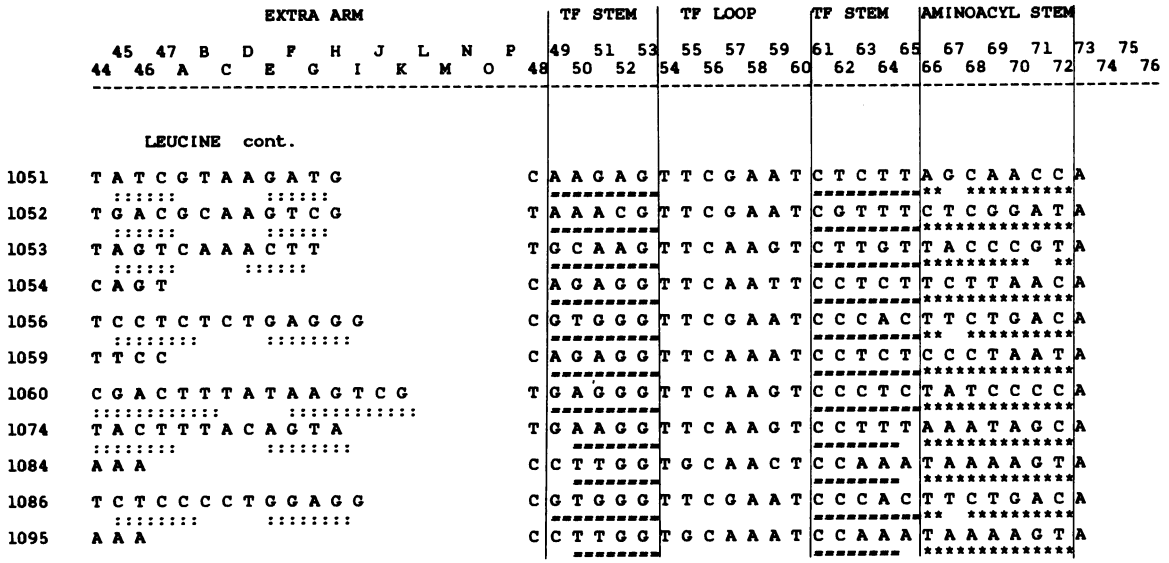

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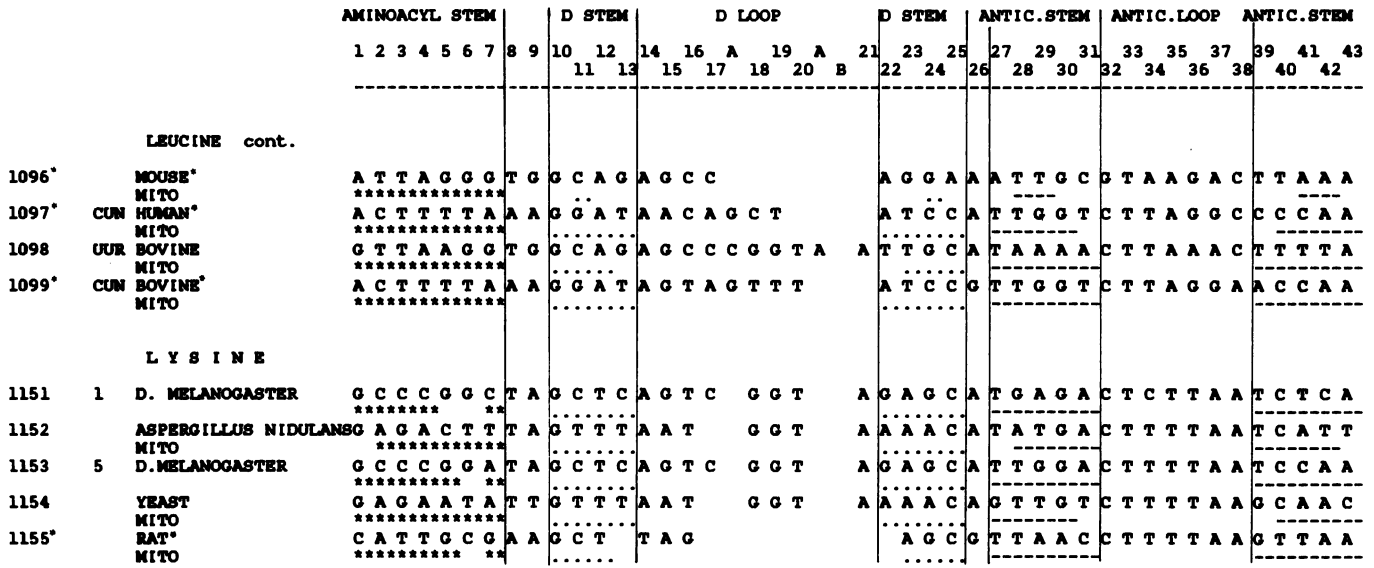

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1098 S.ANDERSON, M.H.L.DEBRUIJN, A.R.COULSON, I.C.EPERON, F.SANGER, I.G.YOUNG, J. MOL. BIOL. 156, 683-717

1099 S.ANDERSON, M.H.L.DEBRUIJN, A.R.COULSON, I.C.EPERON, F.SANGER, I.G. YOUNG (1982) J. MOL. BIOL. 156, 683-717

1151 D.DEFRANCO, O.SCHMIDT, D.SOELL (1980) PROC. NATL. ACAD. SCI. USA 77, 3365-3368

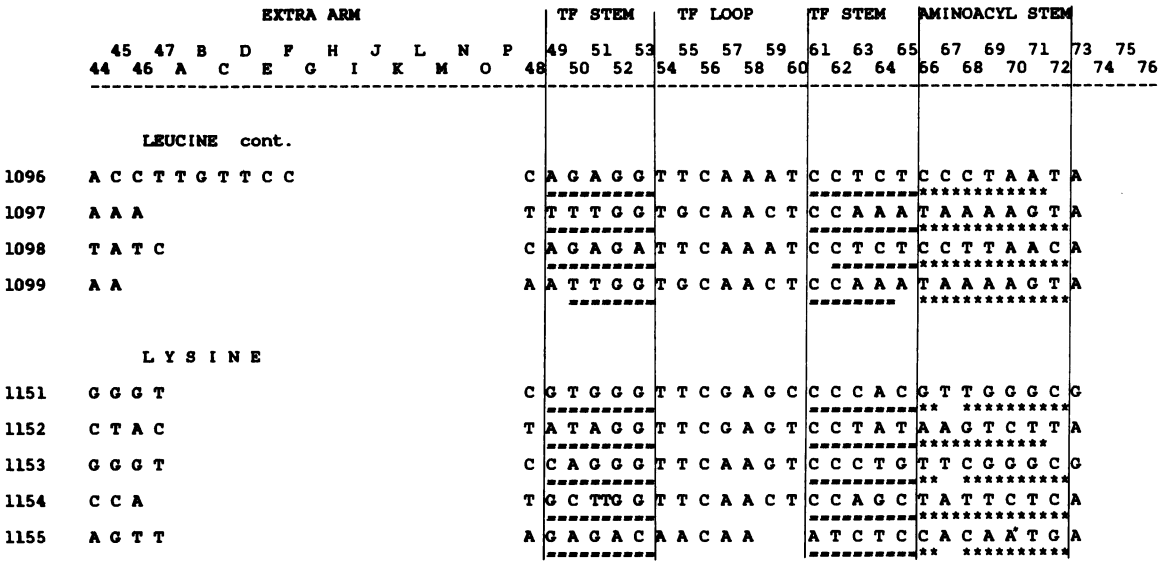
B.HOVEMANN, S.SHARP, H.YAMADA, D.SOELL (1980) CELL 19, 889-895

1152 H.G.KOECHEL, C.M.LAZARUS, N.BASAK, H.KUENTZEL (1981) CELL 23, 625-633

1153 D.DEFRANCO, K.B.BURKE, S.HAYASHI, G.M.TENER, R.C.MILLER, JR., D.SOELL (1982) NUCL. ACIDS RES. 10, 5799-5806

1154 S.G.BONITZ, A.TZAGOLOFF (1980) J. BIOL. CHEM. 255, 9075-9081

1155 P.CANTATORE, C.DE BENEDETTO, G.GADALETA, R.GALLERANI, A.M.KROON, M.HOLTROP, C.LANAVE, G.PEPE, C.QUAGLIARIELLO, C.SACCONE, E.SBISA (1982) NUCL. ACIDS RES. 10, 3279-3289



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		LYSINE cont.								
1196*		MOUSE*	A C T A T G	A A	G C T A		G A G C	G T T A A C	C T T T T A	A G T T A A
		MITO	**********		.....		.....	----------		----------
1197*		HUMAN*	C A C T G T A	A A	G C T A	A C T	T A G C	A T T A A C	C T T T T A	A G T T A A
		MITO	**********		.....		.....	----------		----------
1199*		BOVINE*	C A C T A A G	A A	G C T A	T A	T A G C	A C T A A C	C T T T T A	A G T T A G
		MITO	****** ******		.....		.....	----------		----------
		METHIONINE								
1210		E.COLI	G G C T A C G T	A	G C T C	A G T T G G T T A	G A G C	A C A T C A	C T C A T A A	T G A T G
			**********		.....		.....	----------		----------
1251	3	YEAST	G C T T C A G T	A	G C T C	A G T A G G A A	G A G C	G T C A G T	C T C A T A A	T C T G A
			****** ******		.....		.....	----------		----------
1252		HUMAN	A G C A G A G T	G	G C G C	A G C G G A A	G C G T	G C T G G G	C C C A T A A	C C C A G
			**********		.....		.....	----------		----------
1254	1	ASPERGILLUS NIDULANS	G C C A A A G T	A	G T T T	A A T G G T A	G A A C	A A T A A T	T T C A T G A	A T T A A
		MITO	**********		.....		.....	----------		--------
1255	2	ASPERGILLUS NIDULANS	A G A C T A T	A	G C T T	A A T C G G T A	A A G C	G A A C C A	C T C A T G A	T G G T T
		MITO	**********		.....		.....	----------		----------
1256		EUGLENA GRACILIS	G G C T C A G T	A	G C T C	A G A G G A T A	G A G C	A G G G G A	T T C A T A A	G C C C T
		CHLORO	**********		.....		.....	------		------
1296*		MOUSE*	A G T A A G G T	C	A G C T	A A T T A	A G C T	A T C G G G	C C C A T A C	C C C G A
		MITO	******** ****		.....		.....	----------		----------
1297*		HUMAN*	A G T A A G G T	C	A G C T	A A A T A	A G C T	A T C G G G	C C C A T A C	C C C G A
		MITO	******** ****		.....		.....	----------		----------

1196 M.J.BIBB, R.A.VAN ETTEN, C.T.WRIGHT, M.W.WALBERG, D.A.CLAYTON (1981) CELL 26, 167-180

1197 S.ANDERSON ET AL. (1981) NATURE 290, 457-465

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1210 N.NAKAJIMA, H.DEEKI, Y.SHIMURA (1981) CELL 23, 239-249

1251 J.OLAH, H.FELDMANN (1980) NUCL. ACIDS RES. 8, 1975-1986

1252 T.SANTOS, M.KASLOFF (1981) CELL 23, 699-709

1254 H.G.KOECHEL, C.M.LAZARUS, N.BASAK, H.KUENTZEL (1981) CELL 23, 625-633

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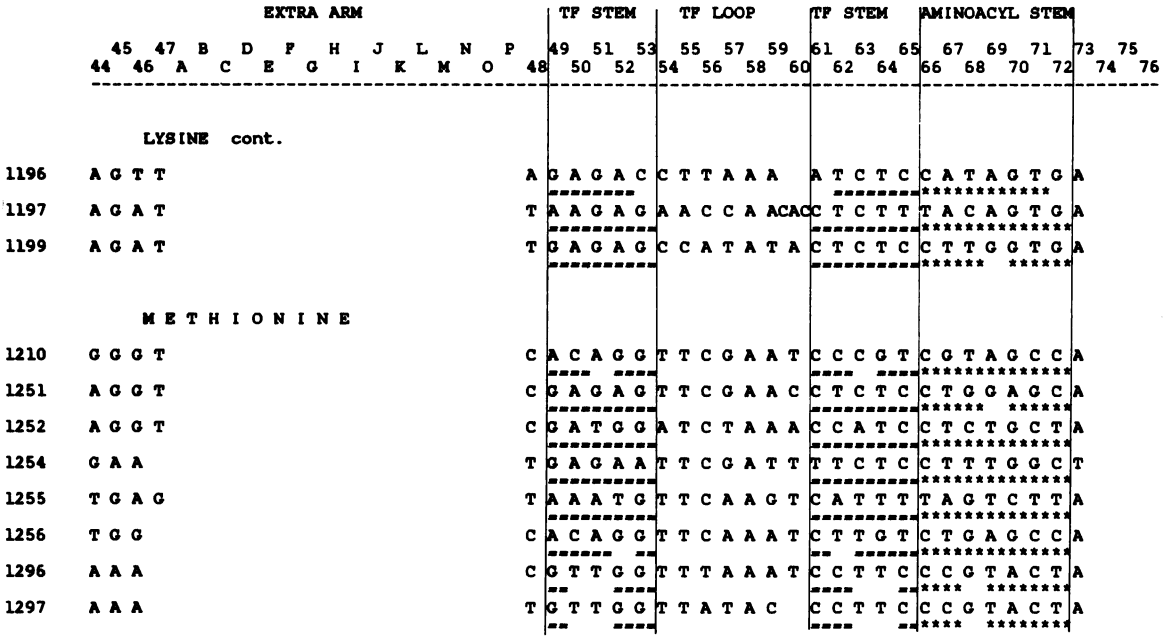
1256 M.HOLLINGSWORTH, R.B. HALLICK (1982) J. BIOL. CHEM. IN PRESS

1296 M.J.BIBB, R.A.VAN ETTEN, C.T.WRIGHT, M.W.WALBERG, D.A.CLAYTON (1981) CELL 26, 167-180

1297 S.ANDERSON (1981) NATURE 290, 457-465



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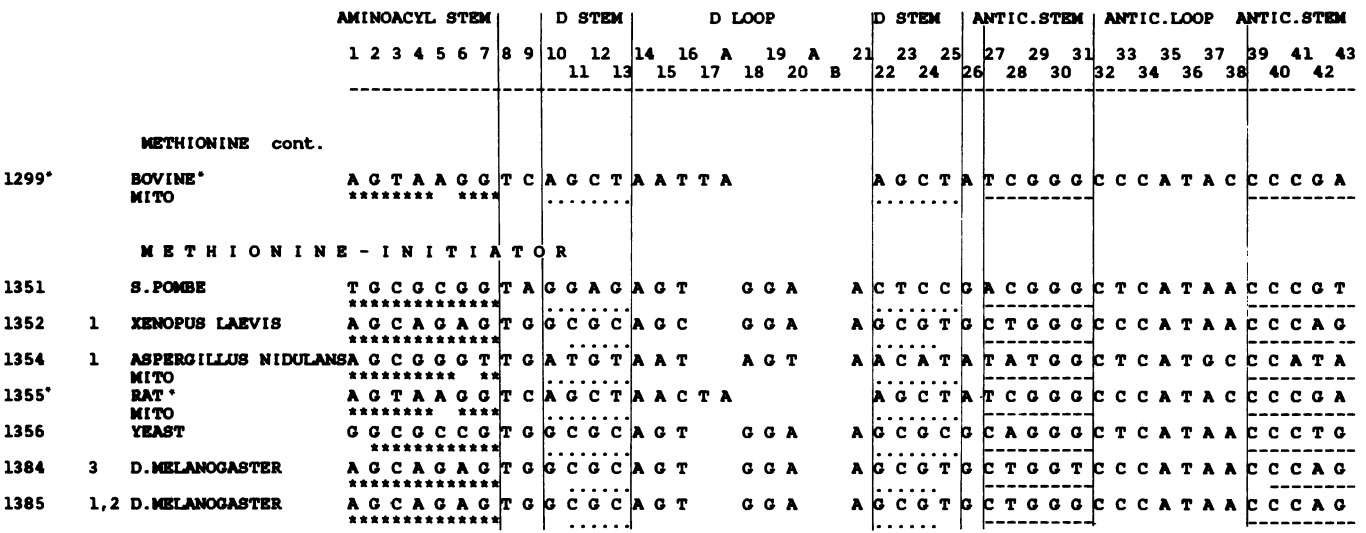

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1351 J.MAO, O.SCHMIDT, D.SOELL (1980) CELL 21, 509-516

1352 J.L.TELFORD, A.KRESSMANN, R.A. KOSKI, R.GROSSCHEDL, F.MUELLER, S.G. CLARKSON, ML. BIRNSTIEL (1979) PROC. NATL. ACAD. SCI. USA 76, 2590-2594
A.KRESSMANN, H.HOFSTETTER, E.DI CAPUA, R.GROSSCHEDL, M.L.BIRNSTIEL (1979) NUCL. ACIDS RES. 7, 1749-1763

1354 H.G.KOECHEL, C.M.LAZARUS, N.BASAK, H.KUENTZEL (1981) CELL 23, 625-633

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1356 A.VENEGAS, E.GONZALEZ, P.BULL, P.VALENZUELA (1982) NUCL. ACIDS RES. 10, 1093-1096

1384 S.SHARP, D.DEFRANCO, M.SILBERKLANG, H.A.HOSBACH, T.SCHMIDT, E.KUBLI, J.P.GERGEN, P.C.WENSINK, D.SOELL (1981) NUCL. ACIDS RES. 9, 5867-5882

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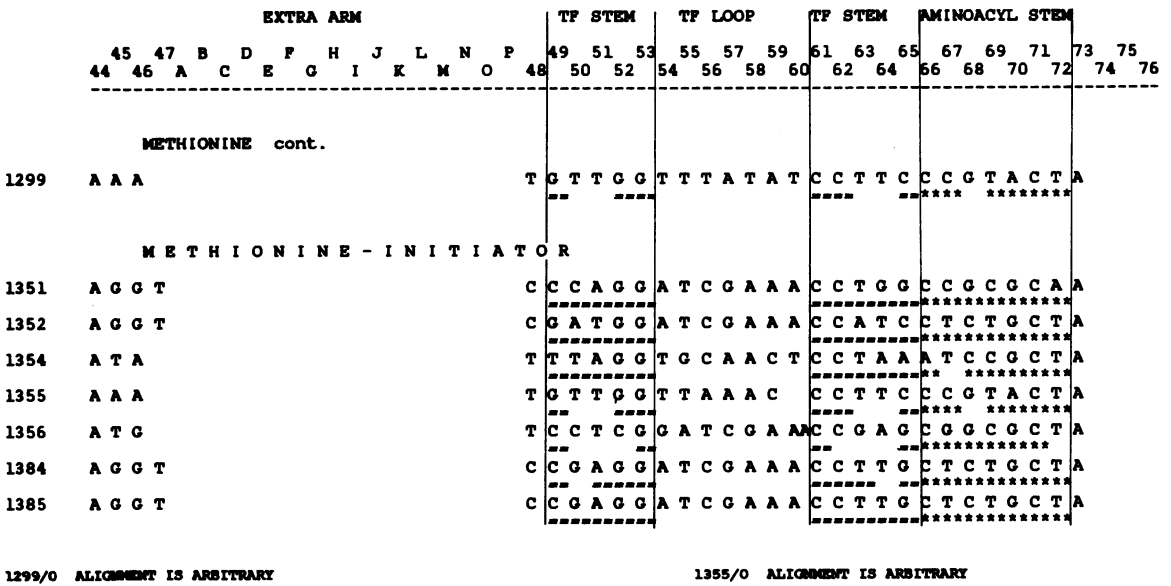

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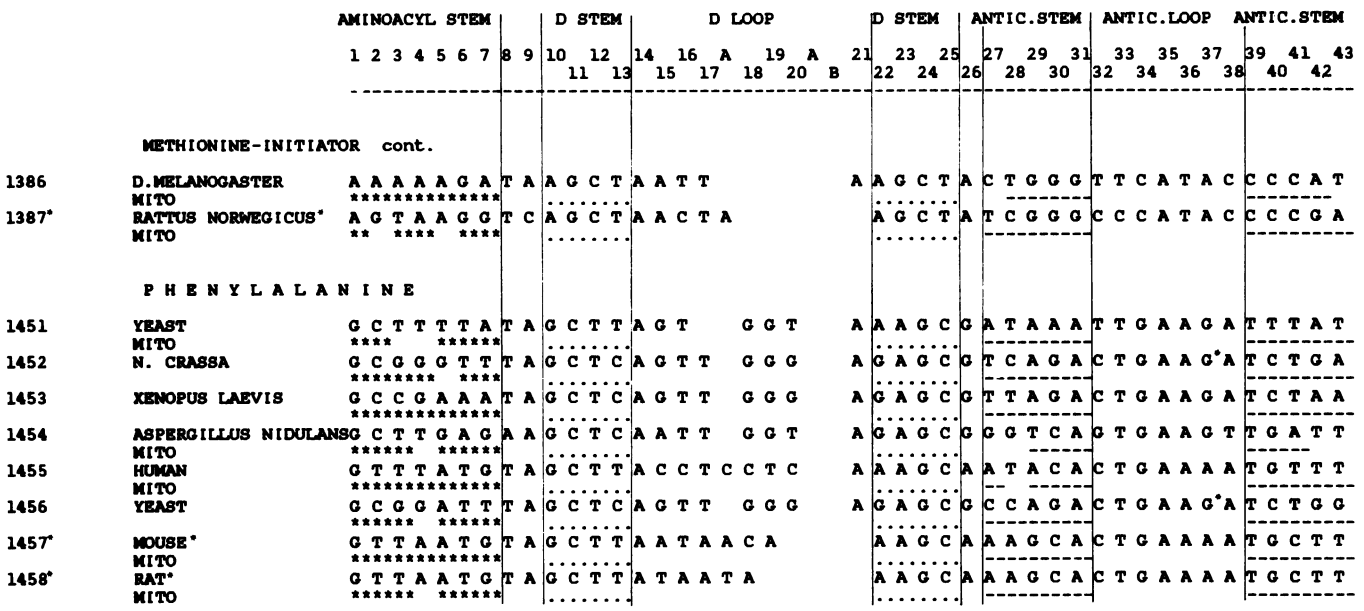

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1387 D.R.WOLSTENHOLM, C.M.-R.FAURON, J.M.GODDARD (1982) GENE IN PRESS

1451 D.L.MILLER, W.C.MARTIN, H.D.PHAM, J.E.DONELSON (1980) J.BIOL. CHEM. 254, 11735-11740

1452 E.SELKER, C.YANOFSKY (1980) NUCL. ACIDS RES. 8, 1033-1042

1453 F.MUELLER, S.G.CLARKSON (1980) CELL 19, 345-353

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1455 I.C.EPERON, S.ANDERSON, D.P.NIERLICH (1980) NATURE 286, 460-467
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1456 P.VALENZUELA, A.VENEGAS, F.WEINBERG, R.BISHOP, W.J.RUTTER (1978) PROC. NATL. ACAD. SCI. USA 75, 190-194

1457 M.KOBAYASHI, T.SEKI, K. YAGINUMA, K.KOIKE (1981) GENE 16, 297-307

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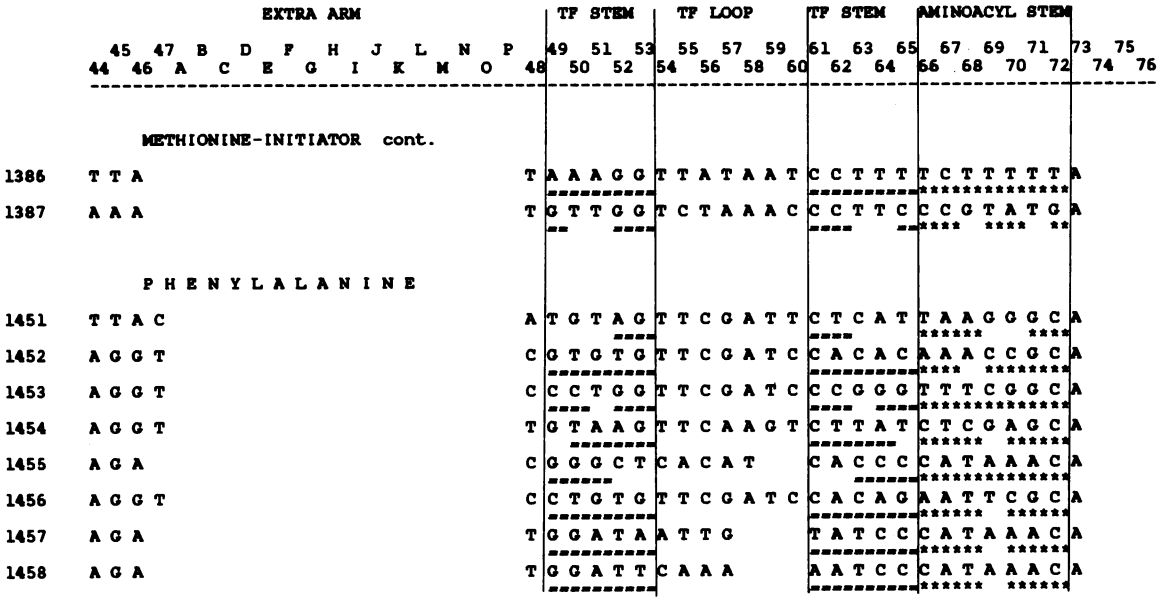

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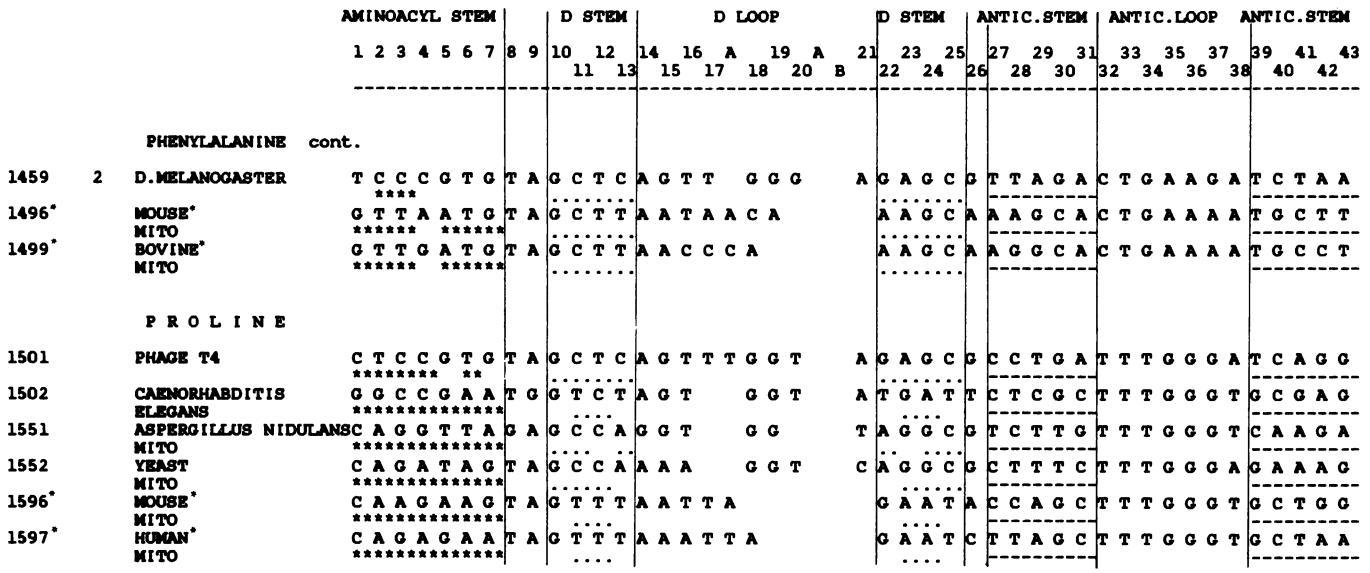

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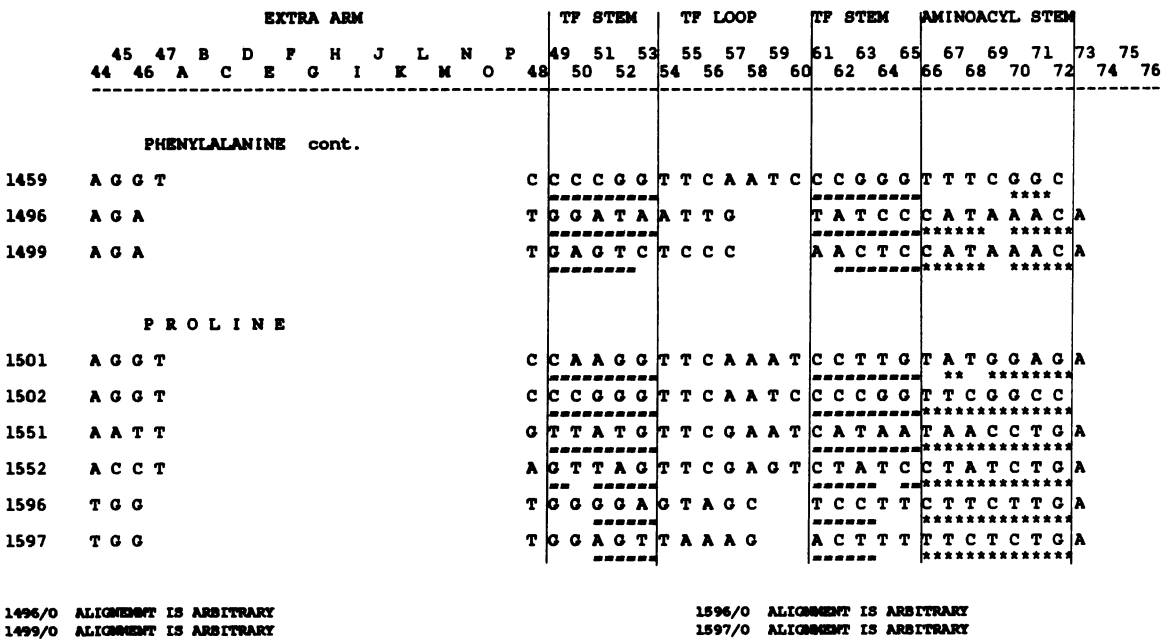
1596 M.J.BIBB, R.A.VAN ETTEN, C.T.WRIGHT, M.W.WALBERG, D.A.CLAYTON (1981) CELL 26, 167–180

1597 S.ANDERSON ET AL. (1981) NATURE 290, 457–465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PROLINE
1501 A G G T C C A A G G T T C A A A T C C T T G T A T G G A G A
1502 A G G T C C C G G G T T C A A T C C C C G G T T C G G C C
1551 A A T T G T T A T G T T C G A A T C A T A A T A A C C T G A
1552 A C C T A G T T A G T T C G A G T C T A T C C T A T C T G A
1596 T G G T G G G G A G T A G C T C C T T C T T C T G A
1597 T G G T G G A G T T A A A G A C T T T T T C T C T G A
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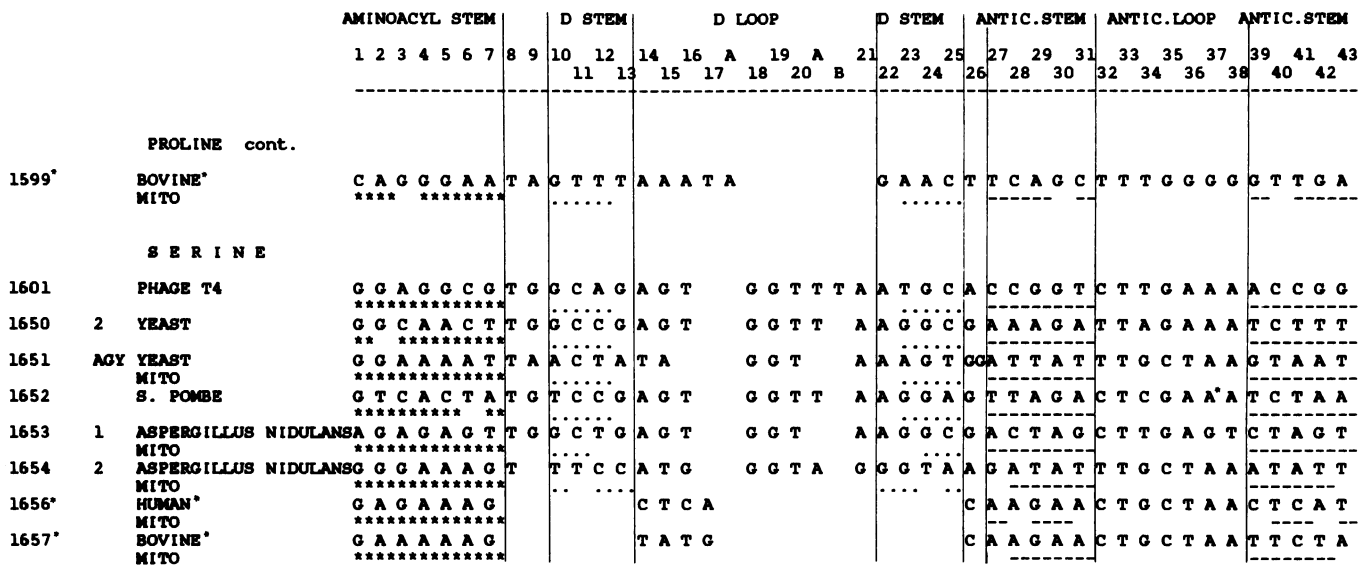

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1654 H.G.KOECHEL, C.M.LAZARUS, N.BASAK, H.KUENTZEL (1981) CELL 23, 625-633

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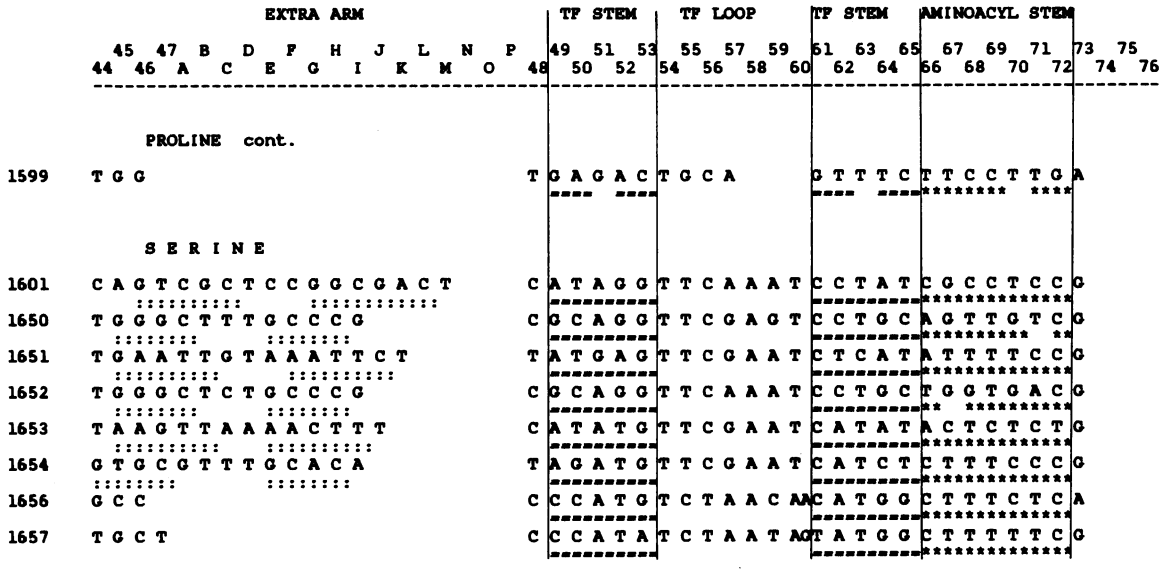
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TF STEM
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44 46 A C E G I K M O 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76
PROLINE cont.
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SERINE
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1656 G C C C C C A T G T C T A A C A A C A T G G C T T T C T C A
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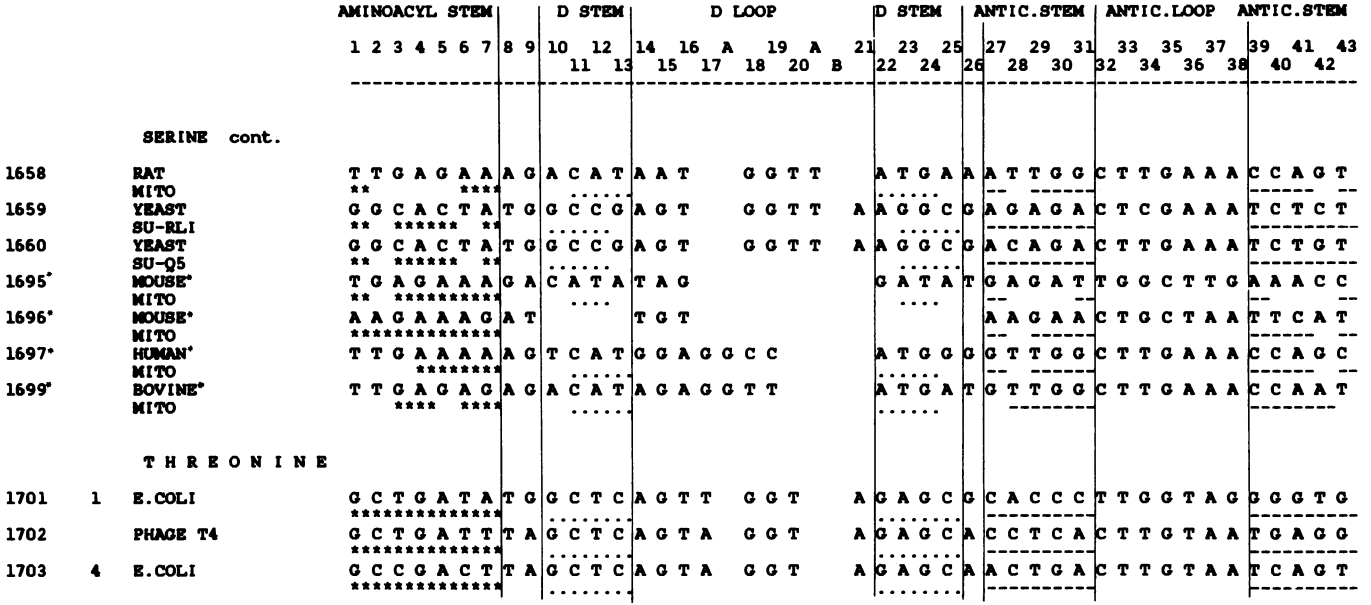

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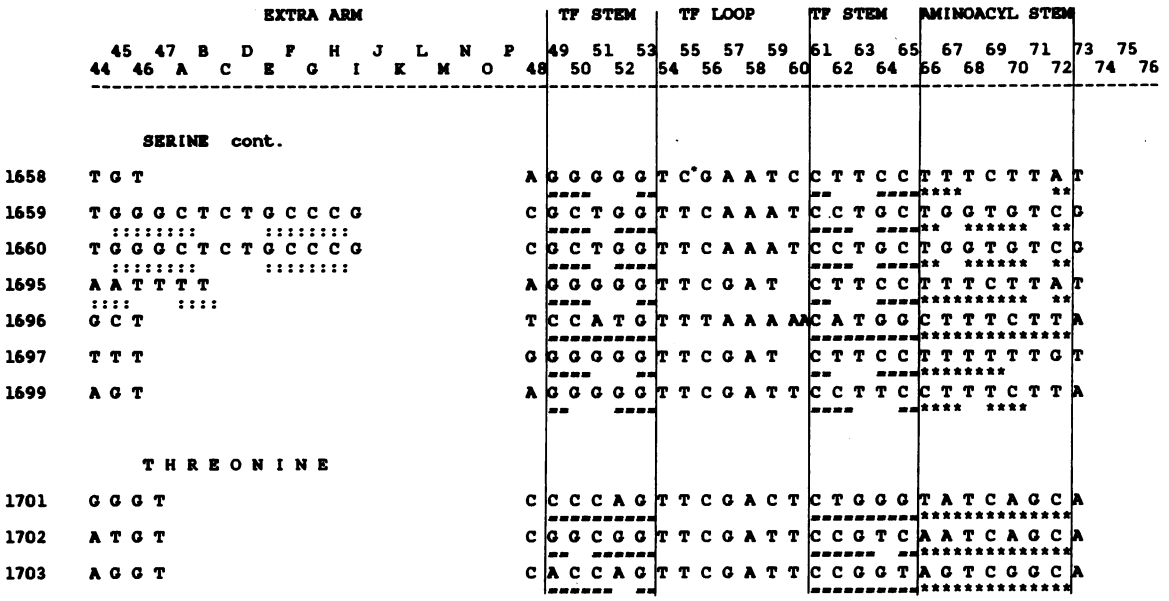

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1697/0 ALIGNMENT IS ARBITRARY
1698/0 ALIGNMENT IS ARBITRARY
1699/0 ALIGNMENT IS ARBITRARY

			AMINOACYL STEM		D STEM	D LOOP	D STEM	ANTIC.STEM	ANTIC.LOOP	ANTIC.STEM
			1 2 3 4 5 6 7	8 9	10 12 11 13	14 16 A 19 A 21 15 17 18 20 E	22 23 25 22 24	26 27 29 31 28 30	32 33 35 37 34 36 38	39 41 43 40 42
		THREONINE cont.								
1704	3	E.COLI	G C T G A T A	T A	G C T C	A G T T G G T	A G A G C	G C A C C	C T T G G T A A	G G G T G
			**********		.....	.....	.....	-----	----------	----------
1710	3	E.COLI	G C T G A T A	T A	G C T C	A G T T G G T	A G A G C	G C A C C	C T T G G T A A	G G G T G
			**********		.....	.....	.....	-----	----------	----------
1751		YEAST	G T A A A T A	T A	A T T T	A A T G G T	A A A A T	G T A T G T	T T T T A G G T	G C A T A
		MITO	**********		.....	.....	.....	-----	----------	----------
1752		S.CEREVISIAE	G T T A T A T	T A	G C T T	A A T T G G T	A G A G C	A T T C G T	T T T G T A A T	C G A A
		MITO	**********		.....	.....	.....	--------	----------	--------
1753		ASPERGILLUS NIDULANS	G C C C G G T	T A	G C A T	A A A A G T	A A T G T	A T C C G T	T T T G T A A T	C G G A
		MITO	******** ****		.....	.....	.....	--------	----------	--------
1754		SPINACH	G C C C C T T	T A	A C T C	A G T G G T	A G A G T	A A C G C C	A T G G T A A G	G C G T
		CHLORO	**********		.....	.....	.....	-----	----------	----------
1796*		MOUSE*	G T C T T G A	T A	G T A T	A A A C A	T T A C T	C T G G T C	T T G T A A A	C C T G
		MITO	**********		.....	.....	.....	-- -----	----------	------ --
1797*		HUMAN*	G T C C T T G	T A	G T A T	A A A C T A	A T A C A	C C A G T C	T T G T A A A	C C G G
		MITO	**********		.....	.....	.....	---- ----	----------	---- ----
1799*		BOVINE*	G T C T T T G	T A	G T A C	A T C T A	A T A T A	C T G G T C	T T G T A A A	C C A G
		MITO	********** **		....		....	----------	----------	----------
		T R Y P T O P H A N								
1801		E.COLI	A G G G G C G	T A	G T T C	A A T T G G T	A G A G C	A C C G G T	C T C C A A A	A C C G G
			**********		.. ....		.... ..	----------	----------	----------
1851		ASPERGILLUS NIDULANS	A A G A G T A	T A	G T T T	A A T G G T	A A A A C	T G T A A G	C T T C A A C	C T T A T
		MITO	**********		.....	.....	.....	----------	----------	----------

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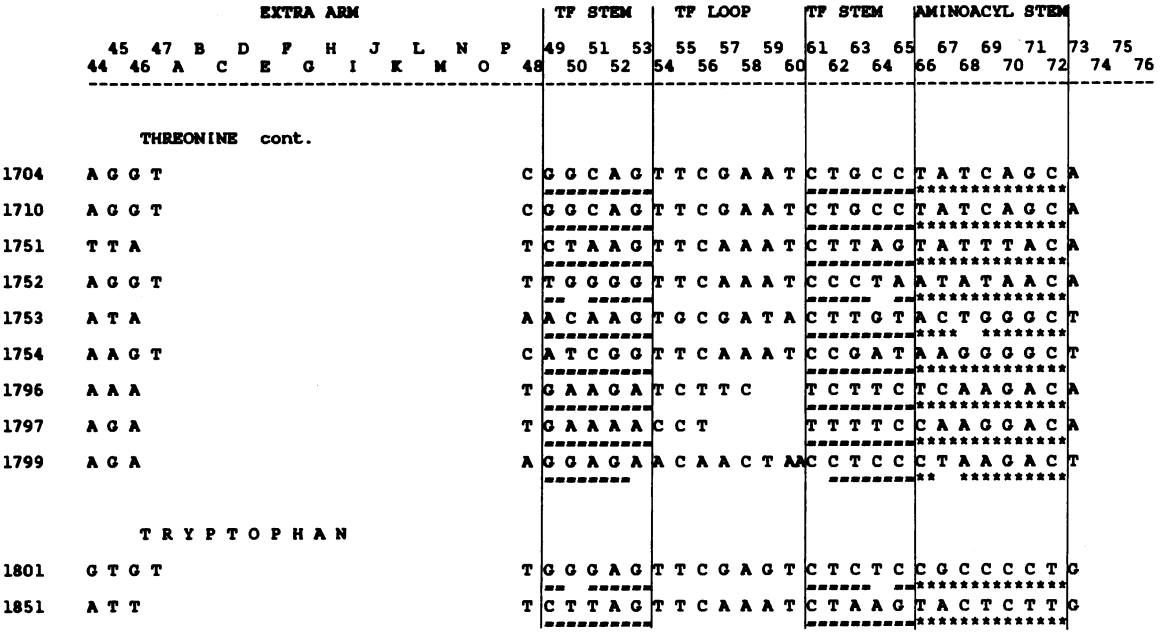
EXTRA ARM
TF STEM
TF LOOP
TF STEM
AMINOACYL STEM
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44 46 A C E G I K M O 48
49 51 53
50 52
54
55 57 59
56 58 60
61 63 65
62 64
66
67 69 71
68 70 72
73 75
74 76
THREONINE cont.
1704 A G G T C G G C A G T T C G A A T C T G C C T A T C A G C A
1710 A G G T C G G C A G T T C G A A T C T G C C T A T C A G C A
1751 T T A T C T A A G T T C A A A T C T T A G T A T T T A C A
1752 A G G T T T G G G G T T C A A A T C C C T A A T A T A A C A
1753 A T A A A C A A G T G C G A T A C T T G T A C T G G G C T
1754 A A G T C A T C G G T T C A A A T C C G A T A A G G G G C T
1796 A A A T G A A G A T C T T C T C T T C T C A A G A C A
1797 A G A T G A A A A C C T T T T T C C A A G G A C A
1799 A G A A G G A G A A C A A C T A A C C T C C C T A A G A C T
TRYPTOPHAN
1801 G T G T T G G G A G T T C G A G T C T C T C C G C C C C T G
1851 A T T T C T T A G T T C A A A T C T A A G T A C T C T T G
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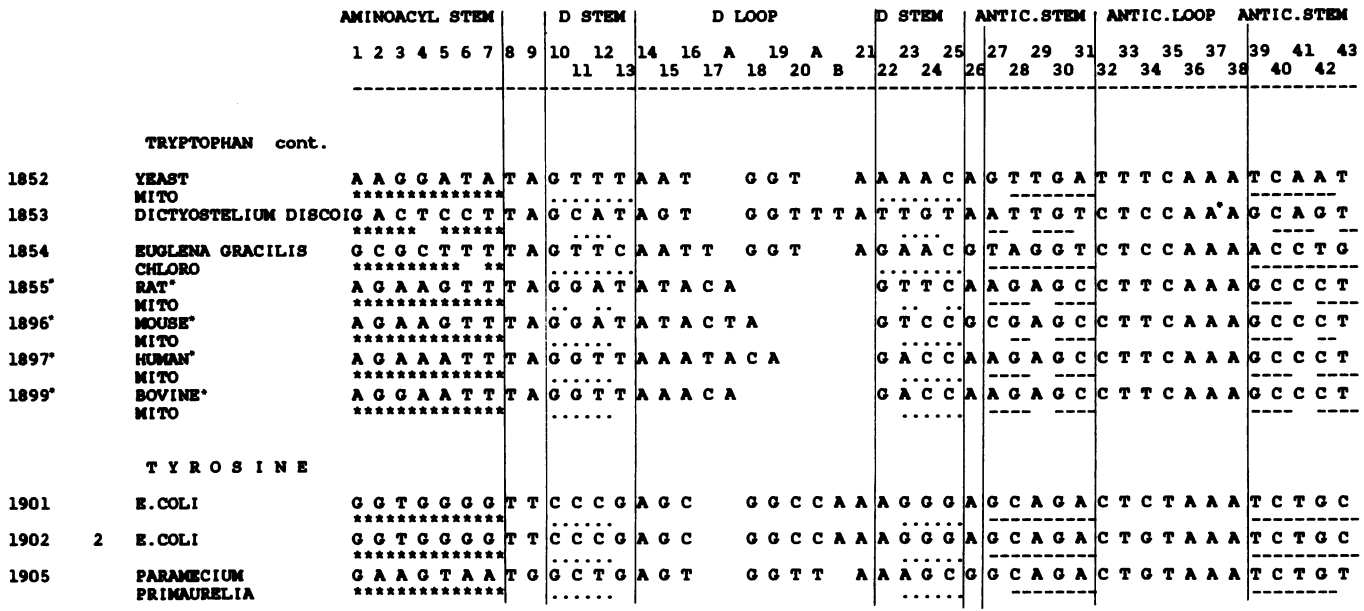

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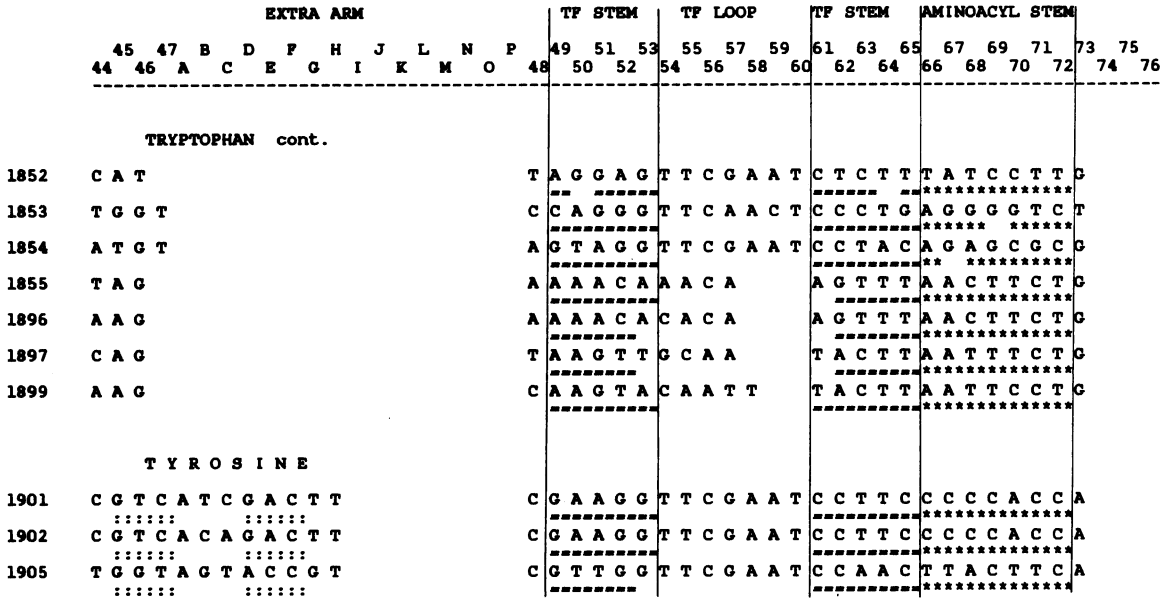

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1899/0 ALIGNMENT IS ARBITRARY

		AMINOACYL STEM		D STEM	D LOOP		D STEM	ANTIC.STEM	ANTIC.LOOP	ANTIC.STEM
		1 2 3 4 5 6 7	8 9	10 12 11 13	14 16 A 19 A 21 15 17 18 20 B		23 25 22 24 26	27 29 31 28 30	33 35 37 32 34 36 38	39 41 43 40 42
	TYROSINE cont.									
1947	A.NIDULANS	A G G A A G G	G T	C C G T	A T G T T G G T T	T	A C G G	G T T G A G	C T G T A A A	C T C A A
	MITO	**********		.....	.....		.....	----------	----------	----------
1951	YEAST	C T C T C G G	T A	G C C A	A G T T G G T T T A		A G G C	G C A A G A	C T G T A A*	A T C T T G
		****** ******		.....	.....		.....	----------	----------	----------
1952	YEAST	C T C T C G G	T A	G C C A	A G T T G G T T T A		A G G C	G C A A G A	C T T T A A*	A T C T T G
	SUP 4	****** ******		.....	.....		.....	----------	----------	----------
1953	XENOPUS LEAVIS	C C T T C G A	T A	G C T C	A G C T G G T	A	G A G C	G G A G G A	C T G T A A A	T C C T T
		**********		.....	.....		.....	-------		--------
1954	EUGLENA GRACILIS	G A G T T G T	T G	C C C G	A G T G G T T A A		T G G G	G G C G G A	T T G T A A A	T C C G C
	CHLORO	******** ****		.....	.....		.....	----------	----------	----------
1955*	RAT*	G G T A A A A	T G	G C T G	A G T		A A G C	A T T A G A	C T G T A A A	T C T A A
	MITO	**********		.....	.....		.....	----------	----------	----------
1958	XENOPUS LAEVIS	C C T T C G A	T A	G C T C	A G C T G G T	A	G A G C	G G A G G A	C T G T A G A	T C C T T
		**********		.....	.....		.....	-------		--------
1996*	MOUSE*	G G T A A A A	T G	G C T G	A G T		A A G C	A T T A G A	C T G T A A A	T C T A A
	MITO	**********		.....	.....		.....	----------	----------	----------
1997*	HUMAN*	G G T A A A A	T G	G C T G	A G T G		A A G C	A T T G G A	C T G T A A A	T C T A A
	MITO	**********		.....	.....		.....	---- ----	----------	---- ----
1999*	BOVINE*	G G T A A A A	T G	G C T G	A G C A		A A G C	A T T A G A	C T G T A A A	T C T A A
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1947 R.METZKER, H.G.KOECHEL, N.BAZAK, H.KUENTZEL (1982) NUCL. ACIDS RES. 10, 4783-4794

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1958 F.A.LASKI, B.ALZNER-DEWEERD, U.L.RAJBHANDARY, P.A.SHARP (1982) NUCL. ACIDS RES. 10, 4609-4626 (1982)

1996 M.J.BIBB, R.A.VAN ETTEN, C.T.WRIGHT, M.W.WALBERG, D.A.CLAYTON (1981) CELL 26, 167-180

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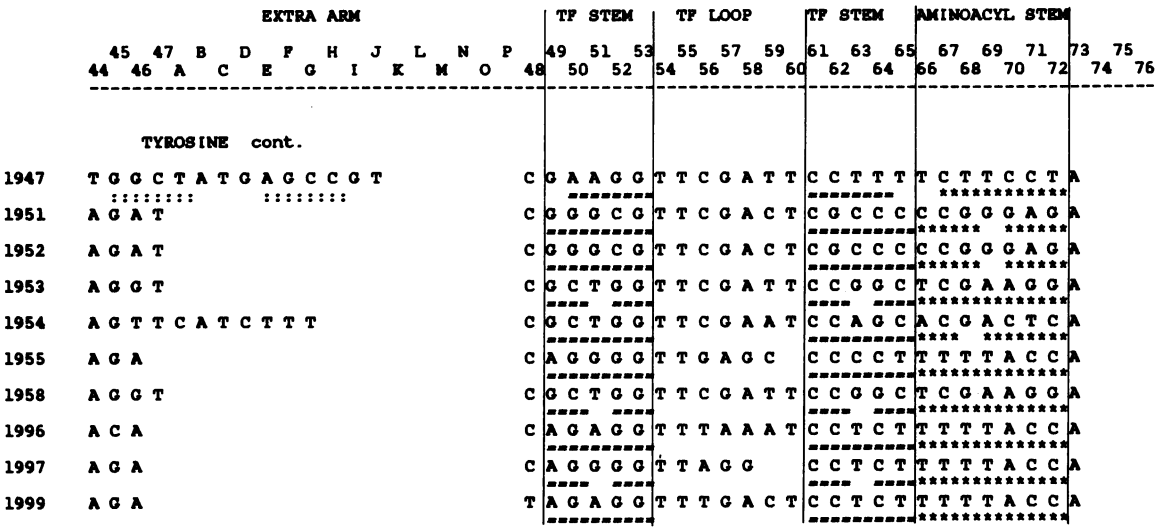
1999 S.ANDERSON, M.H.L.DEBRUIJN, A.R.COULSON, I.C.EPERON, F.SANGER, I.G.YOUNG (1982) J. MOL. BIOL. 156, 683-717



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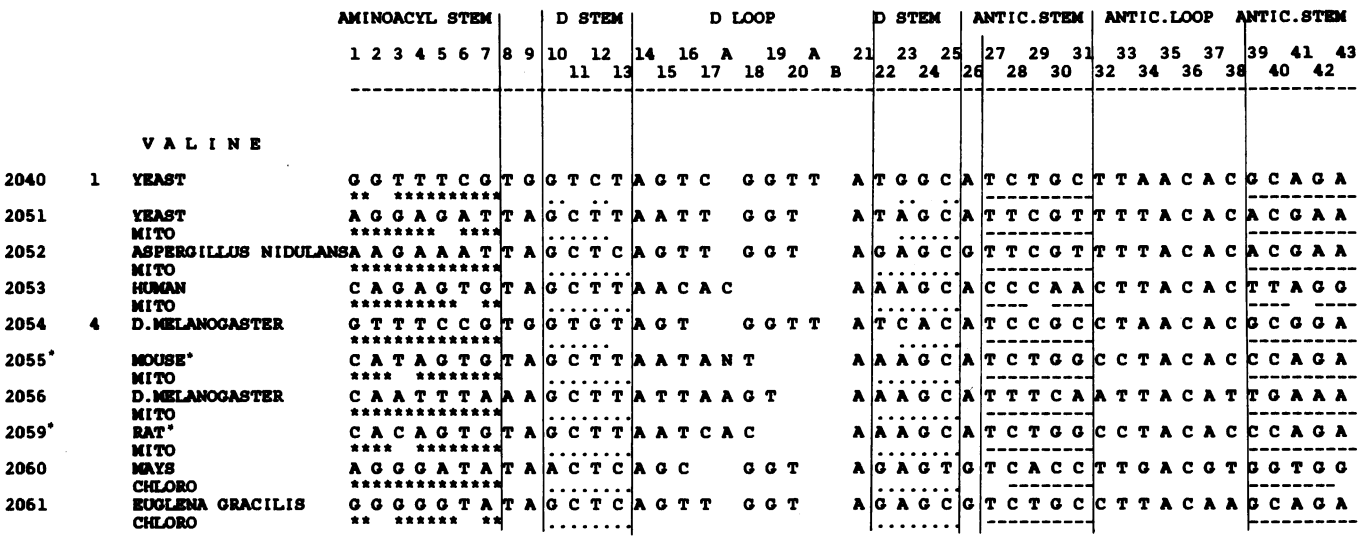

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2051 D.MILLER, C.SIGURDSON, N.C.MARTIN, J.E.DOWELSON (1980) NUCL. ACIDS RES. 8, 1435-1442
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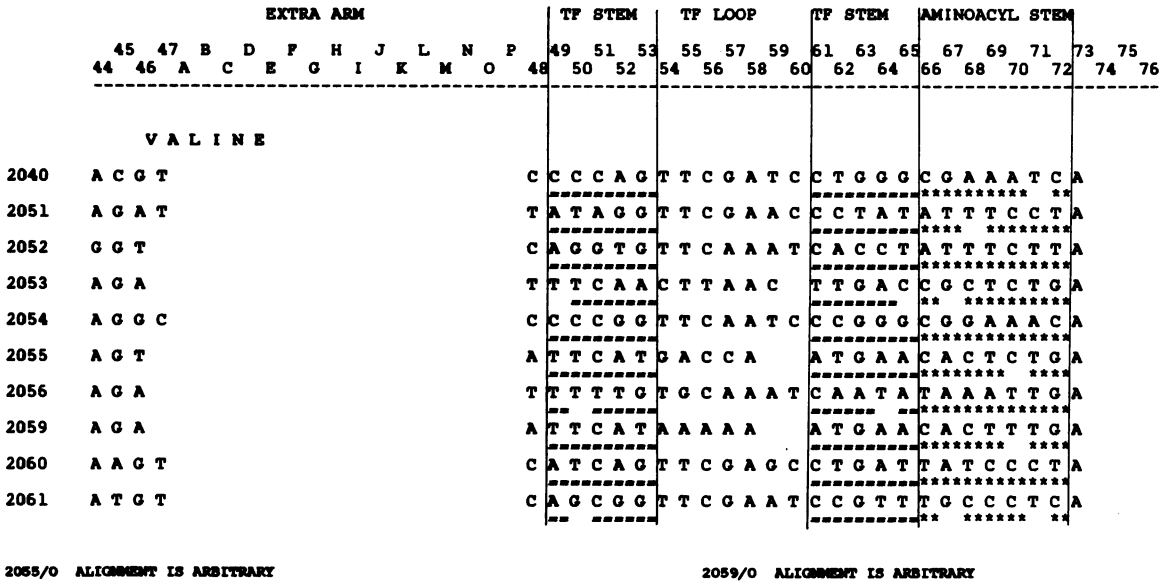
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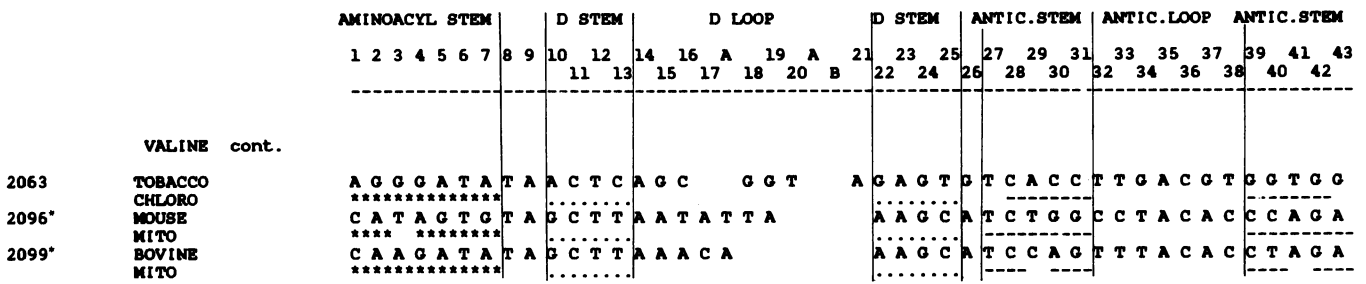

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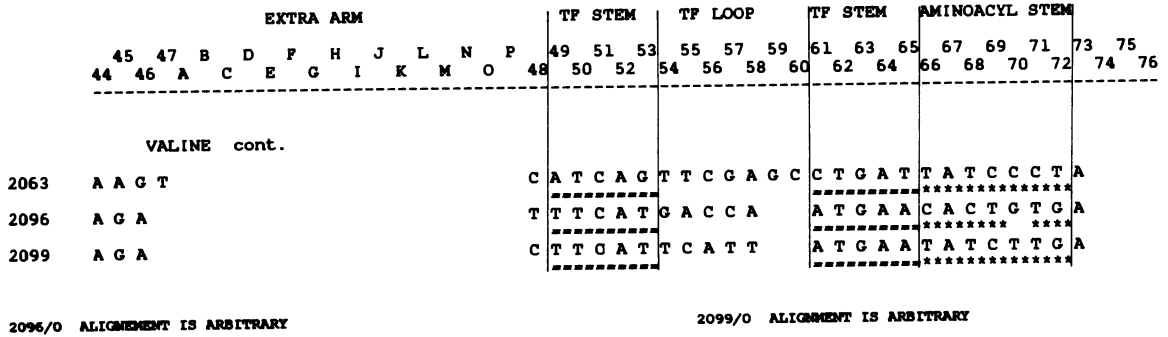
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VALINE cont.
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2096/0 ALIGNMENT IS ARBITRARY
2099/0 ALIGNMENT IS ARBITRARY