Sequence A		A	A	T	T	G	A
Sequence B		A	G	G	T	C	C
Sequence C		A	G	G	A	T	G
Sequence D		A	G	G	C	G	T
Consensus Sequence		A	G	G	T	G	N

FIG 1

Symbol	Meaning	Origin of designation
G	G	Guanine
A	A	Adenine
T	T	Thymine
C	C	Cytosine
R	G or A	puRine
Y	T or C	pYrimidine
M	A or C	aMino
K	G or T	Keto
S	G or C	Strong interaction (3 H bonds)
W	A or T	Weak interaction (2 H bonds)
H	A or C or T	not-G, H follows G in the alphabet
B	G or T or C	not-A, B follows A
V	G or C or A	not-T (not-U), V follows U
D	G or A or T	not-C, D follows C
N	G or A or T or C	aNy

FIG 2

Sequence A	A	A	T	T	G	A
Sequence B	A	G	G	T	C	C
Sequence C	A	G	G	A	T	G
Sequence D	A	G	G	C	G	T

A	4	1	0	1	0	1
C	0	0	0	1	1	1
G	0	3	3	0	2	1
T	0	0	1	2	1	1

a) Consensus Matrix

$$\ln \frac{(ni,j+pi)/(N+1)}{pi}$$

	1	2	3	4	5	6
A	1.2	0	-1.6	0	-1.6	0
C	-1.6	-1.6	-1.6	0	0	0
G	-1.6	.96	.96	-1.6	.59	0
T	-1.6	-1.6	0	.59	0	0

b) Weighted Matrix

FIG 3a

FIG 3b

Weighted Matrix

	1	2	3	4	5	6
A	1.2	0	-1.6	0	-1.6	0
C	-1.6	-1.6	-1.6	0	0	0
G	-1.6	.96	.96	-1.6	.59	0
T	-1.6	-1.6	0	.59	0	0

Test sequence **A G G T G C**

FIG 4

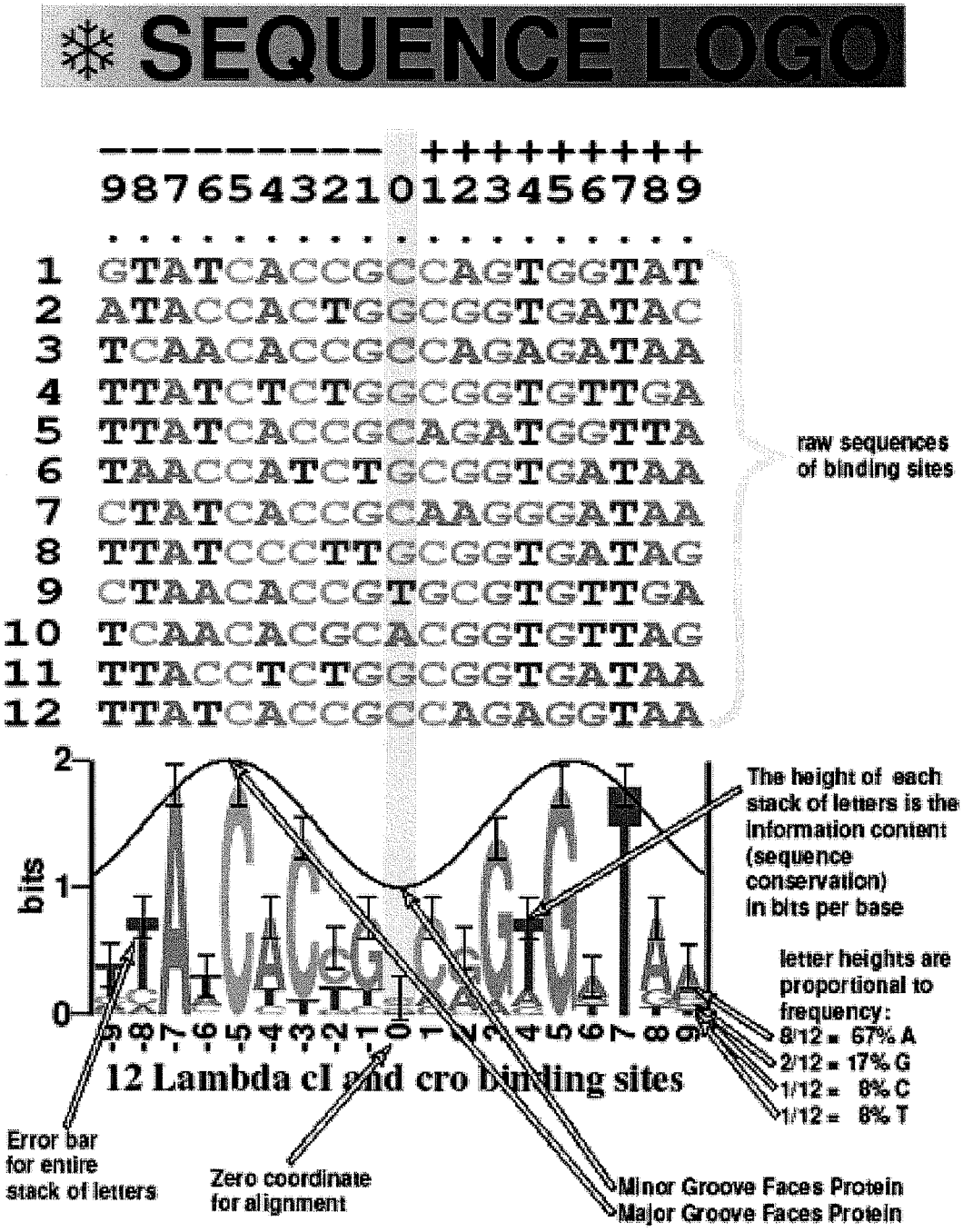
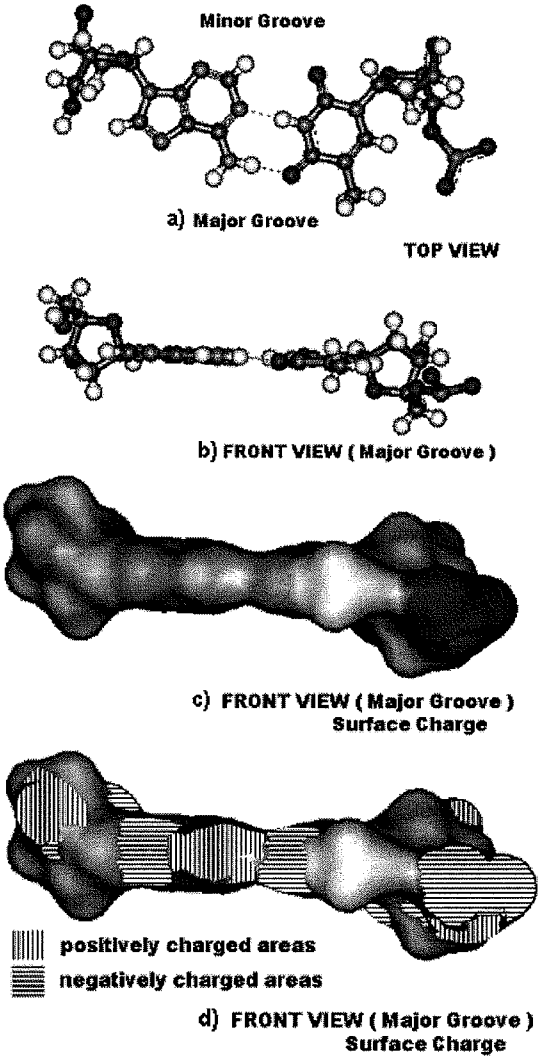

SEQUENCE LOGO
9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9
1 GTATCACCGCCAGTGGTAT
2 ATACCACTGGCGGTGATAC
3 TCAACACCGCCAGAGATAA
4 TTATCTCTGGCGGTGTTGA
5 TTATCACCGCCAGATGGTTA
6 TAACCATCTGCGGTGATAA
7 CTATCACCGCAAGGGATAA
8 TTATCCCTTGCGGTGATAG
9 CTAACACCGTGCGTGTTGA
10 TCAACACGCACGGTGTTAG
11 TTACCTCTGGCGGTGATAA
12 TTATCACCGCCAGAGGTAA
raw sequences of binding sites
bits
2
1
0
12 Lambda cI and cro binding sites
The height of each stack of letters is the information content (sequence conservation) in bits per base
letter heights are proportional to frequency:
8/12 = 67% A
2/12 = 17% G
1/12 = 8% C
1/12 = 8% T
Error bar for entire stack of letters
Zero coordinate for alignment
Minor Groove Faces Protein
Major Groove Faces Protein

FIG 5


Minor Groove
a) Major Groove
TOP VIEW
b) FRONT VIEW (Major Groove)
c) FRONT VIEW (Major Groove)
Surface Charge
positively charged areas
negatively charged areas
d) FRONT VIEW (Major Groove)
Surface Charge

FIGS 6a-d

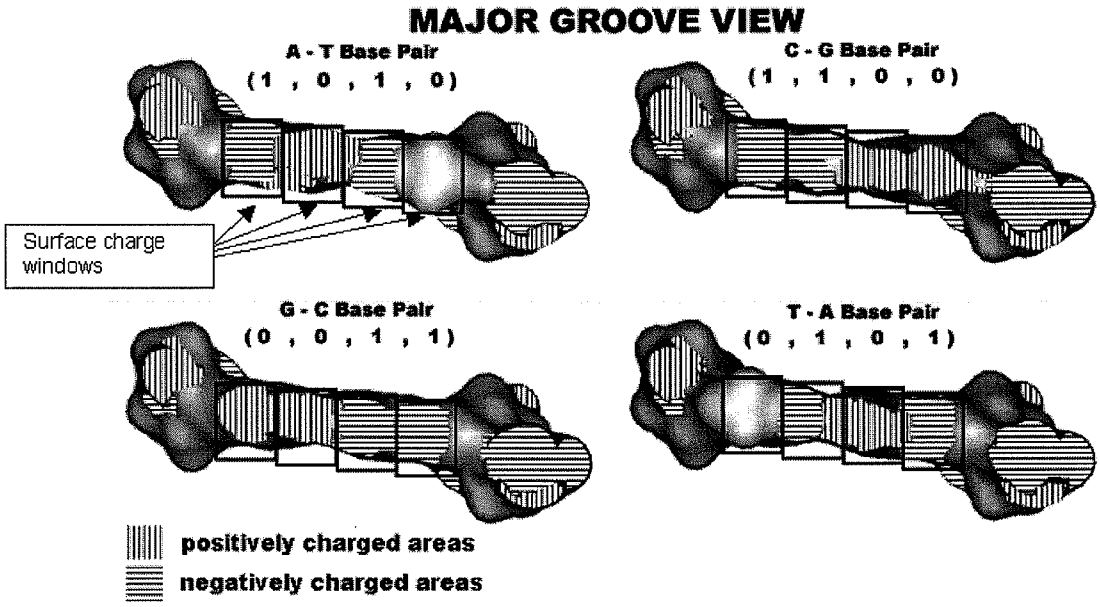
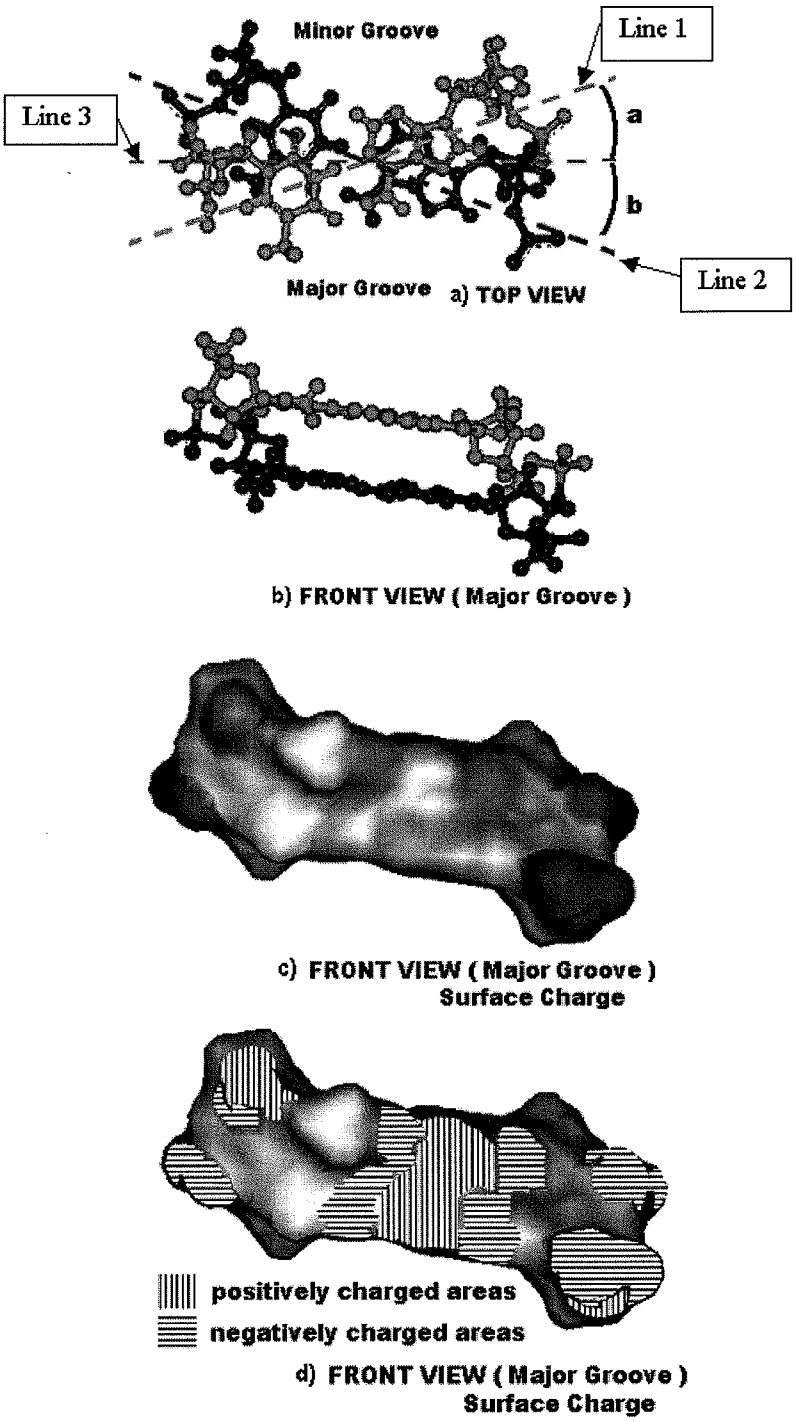

MAJOR GROOVE VIEW
A - T Base Pair
(1 , 0 , 1 , 0)
C - G Base Pair
(1 , 1 , 0 , 0)
Surface charge windows
G - C Base Pair
(0 , 0 , 1 , 1)
T - A Base Pair
(0 , 1 , 0 , 1)
positively charged areas
negatively charged areas

FIG 7


Minor Groove
Line 1
Line 3
a
b
Major Groove
a) TOP VIEW
Line 2
b) FRONT VIEW (Major Groove)
c) FRONT VIEW (Major Groove)
Surface Charge
positively charged areas
negatively charged areas
d) FRONT VIEW (Major Groove)
Surface Charge

FIGS 8a-d

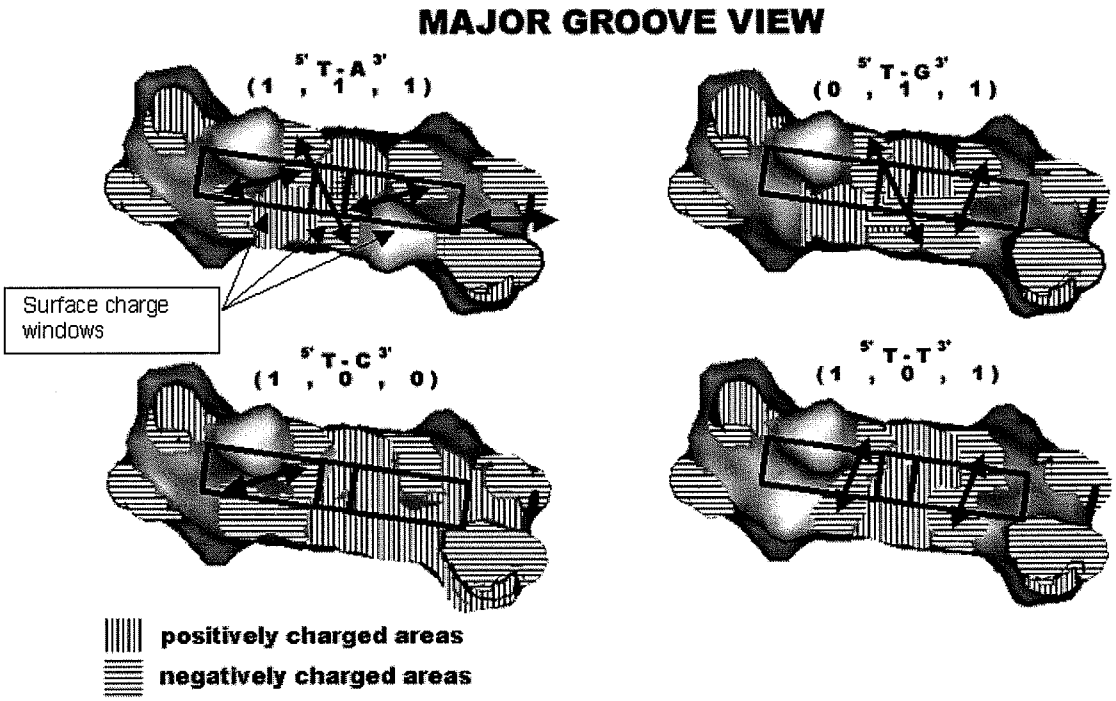

MAJOR GROOVE VIEW
5' T-A 3'
(1 , 1 , 1)
5' T-G 3'
(0 , 1 , 1)
Surface charge windows
5' T-C 3'
(1 , 0 , 0)
5' T-T 3'
(1 , 0 , 1)
positively charged areas
negatively charged areas

FIG 9

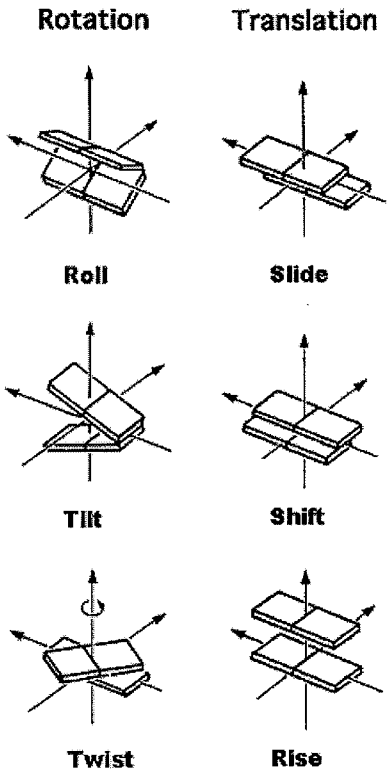


FIG 10

Sequence	A							A							T							T				
Nucleotide level representation	A							A							T							T				
	1	0	1	0				1	0	1	0				0	1	0	1				0	1	0	1	
Di-nucleotide level representation					A - A							A - T							T - T							
					1	0	1					1	0	1					1	0	1					
Surface charge representation of sequence	**1**	**0**	**1**	**0**	**1**	**0**	**1**	**1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**	**1**	**0**	**1**	**0**	**1**	**0**	**1**	

FIG 11

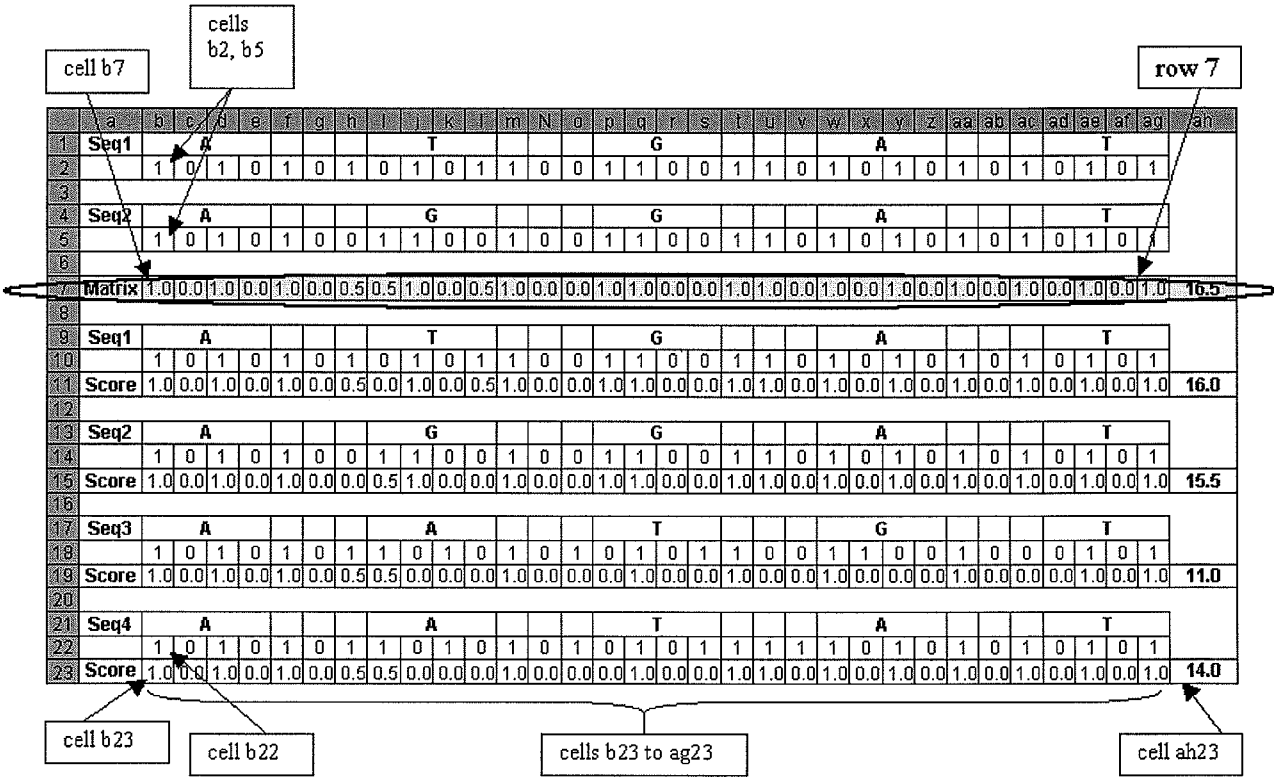
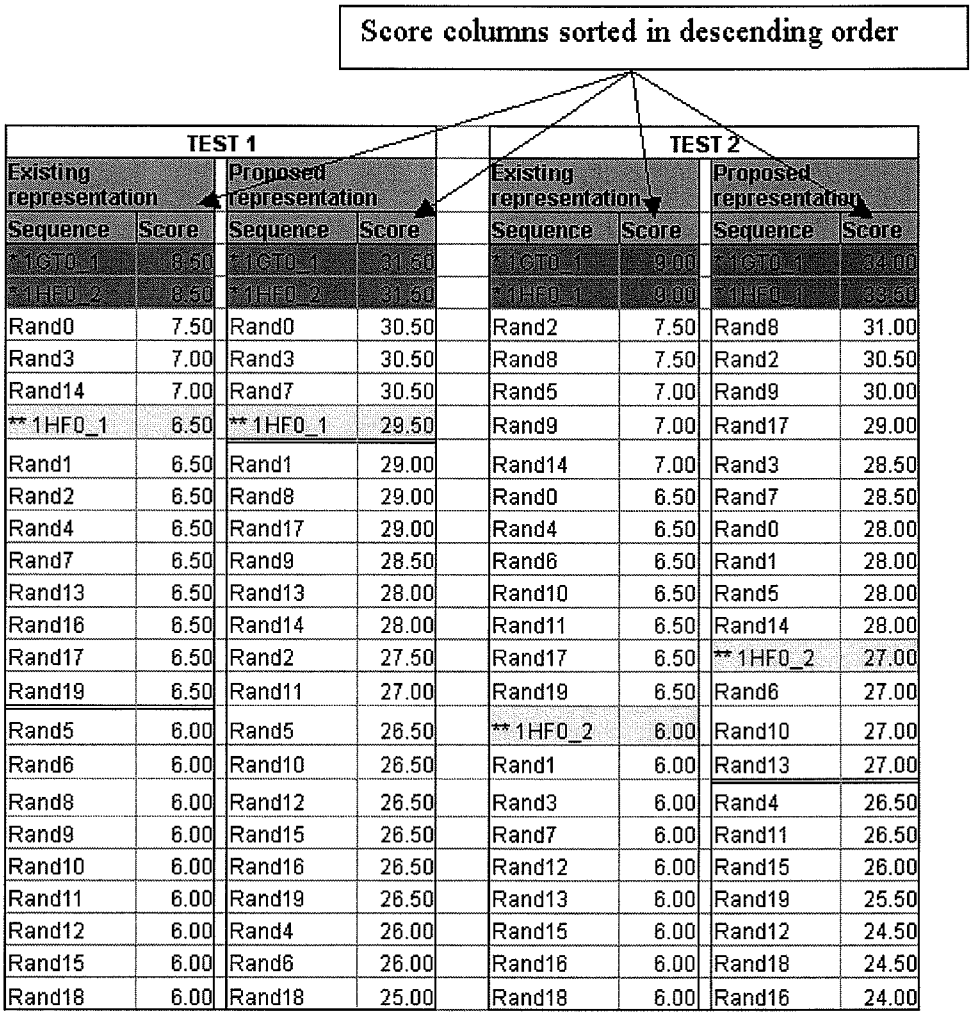

cells
b2, b5
cell b7
row 7
cell b23
cell b22
cells b23 to ag23
cell ah23

FIG 12

Score columns sorted in descending order

TEST 1				TEST 2				TEST 3			
Existing representation		Proposed representation		Existing representation		Proposed representation		Existing representation		Proposed representation	
Sequence	Score	Sequence	Score	Sequence	Score	Sequence	Score	Sequence	Score	Sequence	Score
*1GU4	13.00	*1GU4	47.33	*1GU5	11.67	*1GU4	45.00	*1GU4	13.00	*1GU4	48.67
*1GTW	12.33	*1GTW	44.33	*1H88	11.67	*1H88	44.00	*1GTW	12.33	*1GTW	45.67
*1GU5	10.67	*1GU5	41.00	*1GU4	11.33	*1GU5	43.00	*1H88	10.67	*1H88	43.33
Rand19	9.33	**1H88	39.33	Rand1	9.67	**1GTW	39.67	Rand8	10.00	Rand16	40.00
Rand5	9.33	Rand5	39.33	Rand16	9.67	Rand16	39.67	Rand16	9.67	Rand8	39.00
**1H88	8.67	Rand16	38.33	**1GTW	9.33	Rand1	38.00	Rand1	9.33	Rand14	38.67
Rand1	8.67	Rand17	37.67	Rand19	9.00	Rand12	37.67	**1GU5	8.67	Rand17	37.00
Rand2	8.67	Rand6	37.33	Rand4	8.67	Rand14	37.67	Rand19	8.67	Rand1	37.00
Rand6	8.67	Rand12	37.00	Rand8	8.67	Rand2	37.33	Rand4	8.67	**1GU5	36.67
Rand12	8.67	Rand2	37.00	Rand12	8.67	Rand11	37.00	Rand17	8.67	Rand3	36.33
Rand17	8.67	Rand14	37.00	Rand5	8.33	Rand5	36.67	Rand5	8.33	Rand5	36.33
Rand8	8.33	Rand1	36.00	Rand2	8.33	Rand6	36.67	Rand6	8.33	Rand6	36.00
Rand16	8.33	Rand4	36.00	Rand6	8.33	Rand3	36.33	Rand14	8.33	Rand4	36.00
Rand4	8.00	Rand19	35.67	Rand14	8.33	Rand8	35.67	Rand13	8.00	Rand12	35.33
Rand18	8.00	Rand3	35.67	Rand3	8.00	Rand4	35.67	Rand3	8.00	Rand2	34.00
Rand0	7.67	Rand8	35.33	Rand11	8.00	Rand19	35.00	Rand12	8.00	Rand9	33.67
Rand14	7.67	Rand11	35.33	Rand13	8.00	Rand17	35.00	Rand10	7.33	Rand19	33.67
Rand15	7.67	Rand15	34.67	Rand0	7.67	Rand15	33.67	Rand0	7.33	Rand11	33.67
Rand3	7.67	Rand9	34.00	Rand17	7.67	Rand9	33.33	Rand2	7.33	Rand13	33.33
Rand7	7.00	Rand18	32.67	Rand15	7.67	Rand13	33.00	Rand18	7.33	Rand10	32.33
Rand11	7.00	Rand13	31.67	Rand18	7.33	Rand10	32.67	Rand7	7.00	Rand15	31.67
Rand13	7.00	Rand7	31.33	Rand10	7.33	Rand18	31.33	Rand9	6.67	Rand0	30.33
Rand10	6.67	Rand0	31.00	Rand7	7.00	Rand0	31.33	Rand15	6.67	Rand7	30.00
Rand9	6.00	Rand10	30.67	Rand9	6.67	Rand7	31.00	Rand11	6.33	Rand18	29.67

FIG 13



TEST 1				TEST 2			
Existing representation		Proposed representation		Existing representation		Proposed representation	
Sequence	Score	Sequence	Score	Sequence	Score	Sequence	Score
* 1GT0_1	8.50	* 1GT0_1	31.50	* 1GT0_1	9.00	* 1GT0_1	34.00
* 1HF0_2	8.50	* 1HF0_2	31.50	* 1HF0_1	9.00	* 1HF0_1	33.50
Rand0	7.50	Rand0	30.50	Rand2	7.50	Rand8	31.00
Rand3	7.00	Rand3	30.50	Rand8	7.50	Rand2	30.50
Rand14	7.00	Rand7	30.50	Rand5	7.00	Rand9	30.00
** 1HF0_1	6.50	** 1HF0_1	29.50	Rand9	7.00	Rand17	29.00
Rand1	6.50	Rand1	29.00	Rand14	7.00	Rand3	28.50
Rand2	6.50	Rand8	29.00	Rand0	6.50	Rand7	28.50
Rand4	6.50	Rand17	29.00	Rand4	6.50	Rand0	28.00
Rand7	6.50	Rand9	28.50	Rand6	6.50	Rand1	28.00
Rand13	6.50	Rand13	28.00	Rand10	6.50	Rand5	28.00
Rand16	6.50	Rand14	28.00	Rand11	6.50	Rand14	28.00
Rand17	6.50	Rand2	27.50	Rand17	6.50	** 1HF0_2	27.00
Rand19	6.50	Rand11	27.00	Rand19	6.50	Rand6	27.00
Rand5	6.00	Rand5	26.50	** 1HF0_2	6.00	Rand10	27.00
Rand6	6.00	Rand10	26.50	Rand1	6.00	Rand13	27.00
Rand8	6.00	Rand12	26.50	Rand3	6.00	Rand4	26.50
Rand9	6.00	Rand15	26.50	Rand7	6.00	Rand11	26.50
Rand10	6.00	Rand16	26.50	Rand12	6.00	Rand15	26.00
Rand11	6.00	Rand19	26.50	Rand13	6.00	Rand19	25.50
Rand12	6.00	Rand4	26.00	Rand15	6.00	Rand12	24.50
Rand15	6.00	Rand6	26.00	Rand16	6.00	Rand18	24.50
Rand18	6.00	Rand18	25.00	Rand18	6.00	Rand16	24.00

FIG 14