SISTEMÁTICA FILOGENÉTICA

MÓDULO INFERENCIA FILOGENÉTICA

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MATRICES PARA INFERENCIA FILOGENÉTICA

Genus	Transformation series[a]														
	A[b]	B[b]	C[b]	D	E	F	G	H	I	J	K	L	M	N	O[b]
Acuaria	2	0	0	0	0	0	0	1	0	1	0	0	0	0	0
Ancyracanthopsis	0	1	2	0	0	0	0	1	0	1	0	0	0	0	1
Cosmocephalus	4	0	0	0	1	0	1	1	0	0	0	0	0	0	0
Desportesius	3	0	0	0	1	0	1	1	0	0	2	1	0	0	0
Echinuria	3	0	0	0	0	1	0	1	0	0	2	0	0	0	0
Molinacuaria	0	0	2	0	0	0	0	1	2	0	0	0	0	0	1
Paracuaria	1	0	0	0	1	0	0	1	0	0	0	0	0	0	0
Schistorophus	0	1	2	0	0	0	0	1	2	0	0	0	0	0	1
Sciadiocara	0	1	1	0	0	0	0	1	1	0	0	0	0	0	1
Seuratia	1	0	0	0	1	1	0	1	0	0	0	0	1	0	0
Skrjabinocerca	2	0	0	0	1	0	1	1	0	0	1	0	0	1	0
Skrjabinoclava	4	0	0	0	0	1	0	1	0	0	2	1	0	2	0
Sobolevicephalus	0	1	2	0	0	0	0	1	1	0	0	0	0	0	1
Stammerinema	3	0	0	0	0	1	0	1	0	0	1	0	0	0	0
Stegophorus	1	0	0	0	1	0	0	1	0	0	0	0	1	0	0
Synhimantus	3	0	0	0	1	0	0	1	0	0	0	0	0	2	0
Tikusanema	1	0	0	1	1	0	0	1	0	0	0	0	1	2	0
Spiroxys[c]	0	0	0	1	0	0	0	0	0	1	0	0	0	0	1

Scarites	C	T	T	A	G	A	T	C	G	T	A	C	C	A	A	-	-	-	A	A	T	A	T	T	A	C
Carenum	C	T	T	A	G	A	T	C	G	T	A	C	C	A	C	A	-	T	A	C	-	T	T	T	A	C
Pasimachus	A	T	T	A	G	A	T	C	G	T	A	C	C	A	C	T	A	T	A	A	G	T	T	T	A	C
Pheropsophus	C	T	T	A	G	A	T	C	G	T	T	C	C	A	C	-	-	-	A	C	A	T	A	T	A	C
Brachinus armiger	A	T	T	A	G	A	T	C	G	T	A	C	C	A	C	-	-	-	A	T	A	T	A	T	T	C
Brachinus hirsutus	A	T	T	A	G	A	T	C	G	T	A	C	C	A	C	-	-	-	A	T	A	T	A	T	A	C
Aptinus	C	T	T	A	G	A	T	C	G	T	A	C	C	A	C	-	-	-	A	C	A	A	T	T	A	C
Pseudomorpha	C	T	T	A	G	A	T	C	G	T	A	C	C	-	-	-	-	-	A	C	A	A	A	T	A	C

EJEMPLO CON CARNIVORA

1. Selección de taxones

Pregunta 1: ¿Cuales son las relaciones dentro de Carnivora?
Pregunta 2: ¿Los pinnipedos forman un grupo monofilético?










Grupo ajeno: Topo

EJEMPLO CON CARNIVORA

2. Lista de caracteres y estados de caracter

No.	Caracter	Estados
1	Ramificación de los maxiloturbinales	(0): Poco ramificado (1): Altamente ramificado
2	Forma del proceso paroccipital	(0): Erecto, (1): Convexo
3	# de incisivos inferiores	(0): 2, (1): 3:
4	Molar superior # 1	(0): presente, (1): ausente
5	Baculum (hueso peniano)	(0): presente, (1): ausente
6	Cola	(0): Larga, (1): corta
7	Halux (quinto dígito en la parte trasera de la pierna)	(0): prominente, (1): reducido o ausente
8	Garras	(0): No retraíbles, (1): retraíbles
9	Glándula prostática	(0): pequeño y simple, (1): grande, bilobado
10	Estructura del riñón	(0): simple, (1): conglomerado
11	Orejas externas	(0): presente, (1): ausente
12	Posición de los testículos	(0): escrotal, (1): abdominal

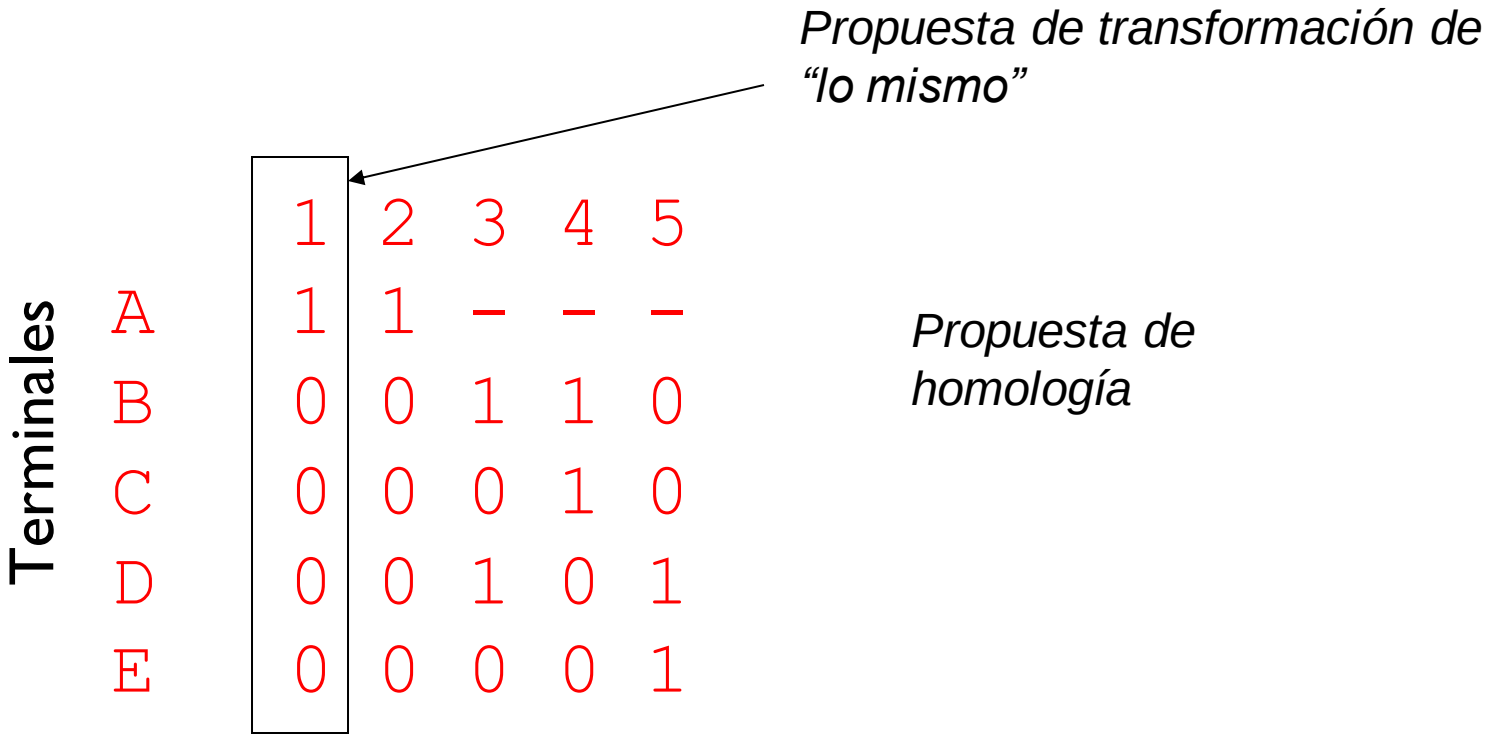
EJEMPLO CON CARNIVORA

3. Matriz morfológica codificada

	1 (4)	2 (21)	3 (32)	4 (45)	5 (52)	6 (54)	7 (56)	8 -	9 (59)	10 (60)	11 (61)	12 (62)	13 (40)	14 (50)	15 (51)	16 (1)	17 (2)	18 (3)	19 (24)	20 (26)
Outgroup	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cat	0	1	0	1	0	0	1	1	1	0	0	0	1	1	1	0	0	0	0	0
Hyena	0	1	0	1	0	0	1	0	1	0	0	0	1	1	1	1	0	0	0	0
Civet	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0
Dog	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Raccoon	1	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
Bear	1	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	1	1	0	1
Otter	1	0	0	0	1	0	0	0	0	1	0	0	1	0	1	1	1	0	0	0
Seal	1	0	1	0	1	1	0	0	0	1	1	1	0	1	1	1	?	0	1	1
Walrus	1	0	1	0	1	1	0	0	0	1	1	1	0	0	1	1	0	1	1	1
Sea lion	1	0	1	0	1	1	0	0	0	1	0	0	0	1	1	1	0	1	1	1

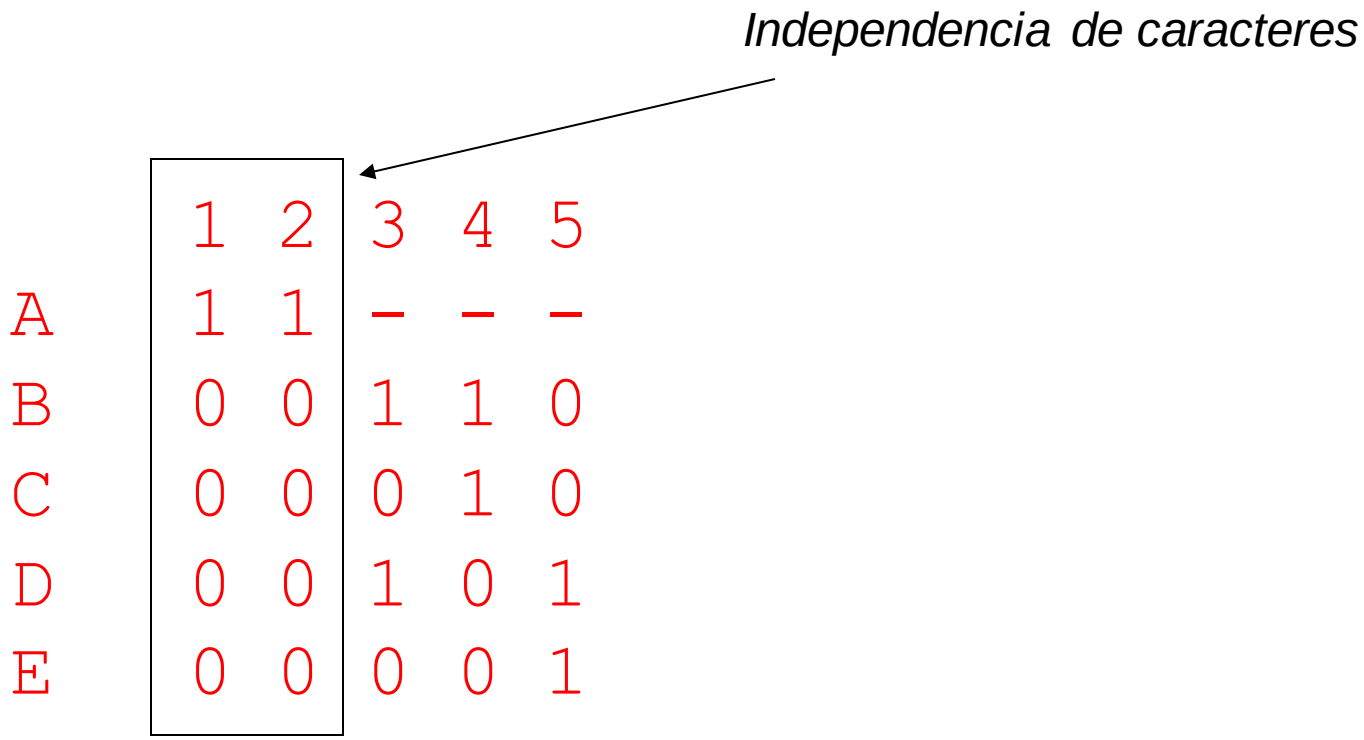
CARACTERES PARA INFERIR FILOGENIAS

Codificación de los caracteres



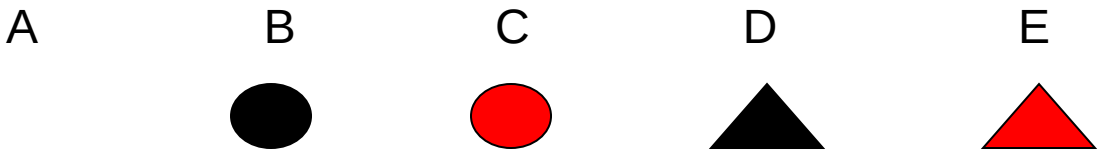
CARACTERES PARA INFERIR FILOGENIAS

Codificación de los caracteres



CARACTERES PARA INFERIR FILOGENIAS

Codificación de los caracteres



Codificación compuesta multiestado con una sola serie de transformación

1 ausente

2 redondo negro

3 redondo rojo

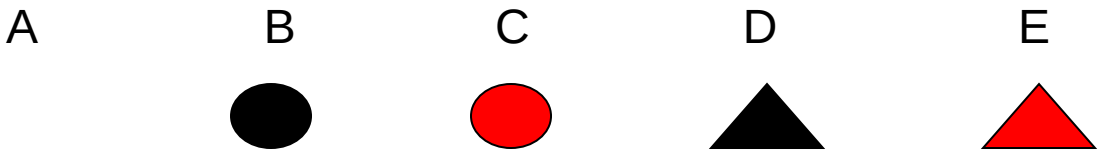
4 triángulo negro

5 triángulo rojo

A 1
B 2
C 3
D 4
E 5

CARACTERES PARA INFERIR FILOGENIAS

Codificación de los caracteres



Codificación intermedia dos doble estado y uno de presencia

1 Presencia del atributo: (0) ausente, (1) presente

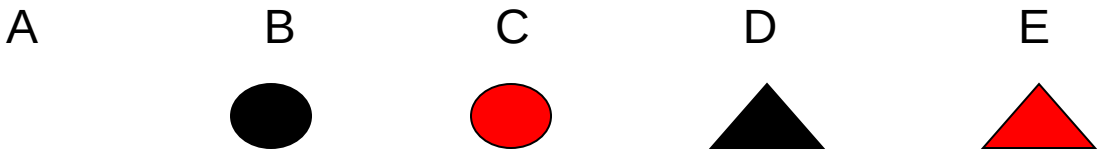
2 Color: rojo (0), negro (1)

3 Forma: circular (0), triangular (1)

	1	2	3
A	0	-	-
B	1	1	0
C	1	0	1
D	1	1	0
E	1	0	1

CARACTERES PARA INFERIR FILOGENIAS

Codificación de los caracteres



Codificación reductiva presencia ausencia de todas las condiciones

1 características presente (0), ausente (1)

2 rojo presente (0), ausente (1)

3 negro presente (0), ausente (1)

4 triángulo presente (0), ausente (1)

5 círculo presente (0), ausente (1)

	1	2	3	4	5
A	1	-	-	-	-
B	0	0	1	1	0
C	0	1	0	1	0
D	0	0	1	0	1
E	0	1	0	0	1

EJEMPLO CON CARNIVORA

3. Matriz morfológica codificada

OTROS CÓDIGOS:

- Polimorfismos (12) o [12], (A)
- No aplicable: (–) o (9) o (?)

- Gap: (–); solo para ADN o AAs

- Faltante: (–) o (9) o (?)

- Ambiguedad (ADN): Código IUPAC

IUPAC Code	Mnemonic	Meaning	Complement
A	**A**denine	A	T
C	**C**ytosine	C	G
G	**G**uanine	G	C
T/U	**T**hymidine	T	A
K	**K**eto	G or T	M
M	A**m**ino	A or C	K
S	**S**trong	C or G	S
W	**W**eak	A or T	W
R	Pu**r**ine	A or G	Y
Y	P**y**rimidine	C or T	R
B	not A	C or G or T	V
D	not C	A or G or T	H
H	not G	A or C or T	D
V	not T and not U	A or C or G	B
N	a**n**y	G or A or T or C	N

Taller # 1

https://github.com/jaaguirresant/Sistematica-Filogenetica/blob/master/clase_1/Taller_matrices.md

```
#NEXUS

[
Data from:

Hayasaka, K., T. Gojobori, and S. Horai. 1988. Molecular phylogeny
    and evolution of primate mitochondrial DNA. Mol. Biol. Evol.
    5:626-644.
]

begin data;
    dimensions ntax=12 nchar=898;
    format datatype=dna interleave=no gap=-;
    matrix

Tarsius_syrichta    AAGTTTCATTGGAGCCACCACTCTTATAATTGCCCATGGCCTCACCTCCTCCCTATTATTTTGCCTAGCA
Lemur_catta         AAGCTTCATAGGAGCAACCATTCTAATAATCGCACATGGCCTTACATCATCCATATTATTCTGTCTAGCC
Homo_sapiens        AAGCTTCACCGGCGCAGTCATTCTCATAATCGCCCACGGGCTTACATCCTCATTACTATTCTGCCTAGCA
Pan                 AAGCTTCACCGGCGCAATTATCCTCATAATCGCCCACGGACTTACATCCTCATTATTATTCTGCCTAGCA
Gorilla             AAGCTTCACCGGCGCAGTTGTTCTTATAATTGCCCACGGACTTACATCATCATTATTATTCTGCCTAGCA
Pongo               AAGCTTCACCGGCGCAACCACCCTCATGATTGCCCATGGACTCACATCCTCCCTACTGTTCTGCCTAGCA
Hylobates           AAGCTTTACAGGTGCAACCGTCCTCATAATCGCCCACGGACTAACCTCTTCCCTGCTATTCTGCCTTGCA
Macaca_fuscata      AAGCTTTTCCGGCGCAACCATCCTTATGATCGCTCACGGACTCACCTCTTCCATATATTTCTGCCTAGCC
M_mulatta           AAGCTTTTCTGGCGCAACCATCCTCATGATTGCTCACGGACTCACCTCTTCCATATATTTCTGCCTAGCC
M_fascicularis      AAGCTTCTCCGGCGCAACCACCCTTATAATCGCCCACGGGCTCACCTCTTCCATGTATTTCTGCTTGGCC
M_sylvanus          AAGCTTCTCCGGTGCAACTATCCTTATAGTTGCCCATGGACTCACCTCTTCCATATACTTCTGCTTGGCC
Saimiri_sciureus    AAGCTTCACCGGCGCAATGATCCTAATAATCGCTCACGGGTTTACTTCGTCTATGCTATTCTGCCTAGCA

    ;

end;
```

```
#NEXUS
[written Tue Mar 14 20:37:25 COT 2017 by Mesquite  version 3.2 (build 801) at
Julians-MacBook-Pro.local/192.168.0.6]

BEGIN TAXA;
    TITLE Taxa;
    DIMENSIONS NTAX=12;
    TAXLABELS
        Tarsius_syrichta Lemur_catta Homo_sapiens Pan Gorilla Pongo Hylobates
Macaca_fuscata M_mulatta M_fascicularis M_sylvanus Saimiri_sciureus
    ;

END;


BEGIN CHARACTERS;
    TITLE  Character_Matrix;
    DIMENSIONS  NCHAR=897;
    FORMAT DATATYPE = DNA GAP = - MISSING = ?;
    MATRIX
    Tarsius_syrichta
AAGTTTCATTGGAGCCACCACTCTTATAATTGCCCATGGCCTCACCTCCTCCCTATTATTTTGCCTAGCAAATACAAACTACGAACGAGT
```

```
#NEXUS

BEGIN DATA;
    DIMENSIONS  NTAX=12 NCHAR=897;
    FORMAT DATATYPE = DNA GAP = - MISSING = ?;
    MATRIX
    Tarsiussyrichta   AAGTTTCATTGGAGCCACCACTCTTATAATTGCCCATGGCCTCACCTCCTCCCTATTATTTTGCCTAGCAAATACAAACTACGAACGAGTC
    Lemurcatta        AAGCTTCATAGGAGCAACCATTCTAATAATCGCACATGGCCTTACATCATCCATATTATTCTGTCTAGCCAACTCTAACTACGAACGAATC
    Homosapiens       AAGCTTCACCGGCGCAGTCATTCTCATAATCGCCCACGGGCTTACATCCTCATTACTATTCTGCCTAGCAAACTCAAACTACGAACGCACT
    Pan               AAGCTTCACCGGCGCAATTATCCTCATAATCGCCCACGGACTTACATCCTCATTATTATTCTGCCTAGCAAACTCAAATTATGAACGCACC
    Gorilla           AAGCTTCACCGGCGCAGTTGTTCTTATAATTGCCCACGGACTTACATCATCATTATTATTCTGCCTAGCAAACTCAAACTACGAACGAACC
    Pongo             AAGCTTCACCGGCGCAACCACCCTCATGATTGCCCATGGACTCACATCCTCCCTACTGTTCTGCCTAGCAAACTCAAACTACGAACGAACC
    Hylobates         AAGCTTTACAGGTGCAACCGTCCTCATAATCGCCCACGGACTAACCTCTTCCCTGCTATTCTGCCTTGCAAACTCAAACTACGAACGAACT
    Macacafuscata     AAGCTTTTCCGGCGCAACCATCCTTATGATCGCTCACGGACTCACCTCTTCCATATATTTCTGCCTAGCCAATTCAAACTATGAACGCACT
    Mmulatta          AAGCTTTTCTGGCGCAACCATCCTCATGATTGCTCACGGACTCACCTCTTCCATATATTTCTGCCTAGCCAATTCAAACTATGAACGCACT
    Mfascicularis     AAGCTTCTCCGGCGCAACCACCCTTATAATCGCCCACGGGCTCACCTCTTCCATGTATTTCTGCTTGGCCAATTCAAACTATGAGCGCACT
    Msylvanus         AAGCTTCTCCGGTGCAACTATCCTTATAGTTGCCCATGGACTCACCTCTTCCATATACTTCTGCTTGGCCAACTCAAACTACGAACGCACC
    Saimiriscisureus  AAGCTTCACCGGCGCAATGATCCTAATAATCGCTCACGGGTTTACTTCGTCTATGCTATTCTGCCTAGCAAACTCAAATTACGAACGAATT

;


END;
```

```
begin mrbayes;
    set autoclose=yes nowarn=yes;
    lset nst=6 rates=invgamma;
    unlink statefreq=(all) revmat=(all) shape=(all) pinvar=(all);
    prset applyto=(all) ratepr=variable;
    mcmcp ngen= 10000000 relburnin=yes burninfrac=0.25 printfreq=1000  samplefreq=1000 nchains=4 savebrlens=yes;
    mcmc;
    sumt;
end;
```

Phyllip

```
12 897
Tarsius_sy AAGTTTCATTGGAGCCACCACTCTTATAATTGCCCATGGCCTCACCTCCTCCCTATTATTTTGCCTAGCAAATACAAAC
Lemur_catt AAGCTTCATAGGAGCAACCATTCTAATAATCGCACATGGCCTTACATCATCCATATTATTCTGTCTAGCCAACTCTAAC
Homo_sapie AAGCTTCACCGGCGCAGTCATTCTCATAATCGCCCACGGGCTTACATCCTCATTACTATTCTGCCTAGCAAACTCAAAC
Pan        AAGCTTCACCGGCGCAATTATCCTCATAATCGCCCACGGACTTACATCCTCATTATTATTCTGCCTAGCAAACTCAAAT
Gorilla    AAGCTTCACCGGCGCAGTTGTTCTTATAATTGCCCACGGACTTACATCATCATTATTATTCTGCCTAGCAAACTCAAAC
Pongo      AAGCTTCACCGGCGCAACCACCCTCATGATTGCCCATGGACTCACATCCTCCCTACTGTTCTGCCTAGCAAACTCAAAC
Hylobates  AAGCTTTACAGGTGCAACCGTCCTCATAATCGCCCACGGACTAACCTCTTCCCTGCTATTCTGCCTTGCAAACTCAAAC
Macaca_fus AAGCTTTTCCGGCGCAACCATCCTTATGATCGCTCACGGACTCACCTCTTCCATATATTTCTGCCTAGCCAATTCAAAC
M_mulatta  AAGCTTTTCTGGCGCAACCATCCTCATGATTGCTCACGGACTCACCTCTTCCATATATTTCTGCCTAGCCAATTCAAAC
M_fascicul AAGCTTCTCCGGCGCAACCACCCTTATAATCGCCCACGGGCTCACCTCTTCCATGTATTTCTGCTTGGCCAATTCAAAC
M_sylvanus AAGCTTCTCCGGTGCAACTATCCTTATAGTTGCCCATGGACTCACCTCTTCCATATACTTCTGCTTGGCCAACTCAAAC
Saimiri_sc AAGCTTCACCGGCGCAATGATCCTAATAATCGCTCACGGGTTTACTTCGTCTATGCTATTCTGCCTAGCAAACTCAAAT
```

```
nstates dna;
xread
897 12
Tarsius_syrichta    AAGTTTCATTGGAGCCACCACTCTTATAATTGCCCATGGCCTCACCTCCTCCCTATTATTTTGCCTAGCA
Lemur_catta AAGCTTCATAGGAGCAACCATTCTAATAATCGCACATGGCCTTACATCATCCATATTATTCTGTCTAGCCAACTCTAA
Homo_sapiens    AAGCTTCACCGGCGCAGTCATTCTCATAATCGCCCACGGGCTTACATCCTCATTACTATTCTGCCTAGCAAACT
Pan AAGCTTCACCGGCGCAATTATCCTCATAATCGCCCACGGACTTACATCCTCATTATTATTCTGCCTAGCAAACTCAAATTATGAAC
Gorilla AAGCTTCACCGGCGCAGTTGTTCTTATAATTGCCCACGGACTTACATCATCATTATTATTCTGCCTAGCAAACTCAAACTAC
Pongo   AAGCTTCACCGGCGCAACCACCCTCATGATTGCCCATGGACTCACATCCTCCCTACTGTTCTGCCTAGCAAACTCAAACTAC
Hylobates   AAGCTTTACAGGTGCAACCGTCCTCATAATCGCCCACGGACTAACCTCTTCCCTGCTATTCTGCCTTGCAAACTCAAA
Macaca_fuscata  AAGCTTTTCCGGCGCAACCATCCTTATGATCGCTCACGGACTCACCTCTTCCATATATTTCTGCCTAGCCAATT
M_mulatta   AAGCTTTTCTGGCGCAACCATCCTCATGATTGCTCACGGACTCACCTCTTCCATATATTTCTGCCTAGCCAATTCAAA
M_fascicularis  AAGCTTCTCCGGCGCAACCACCCTTATAATCGCCCACGGGCTCACCTCTTCCATGTATTTCTGCTTGGCCAATT
M_sylvanus  AAGCTTCTCCGGTGCAACTATCCTTATAGTTGCCCATGGACTCACCTCTTCCATATACTTCTGCTTGGCCAACTCAAA
Saimiri_sciureus    AAGCTTCACCGGCGCAATGATCCTAATAATCGCTCACGGGTTTACTTCGTCTATGCTATTCTGCCTAGCA
;
```

```
proc /;
comments 0
;
```

XREAD O TNT

```
xread
'indel characters coded using 2xread using the "simple gap coding" method of SIMMONS, M. P
5800 168
A_acicu_J1                  2-31302-12322101002322123 2-312012212013122---------01-002011032
A_allen_J68                 2-31302-12322101002322123 2-312012012013123---------01-002011032
A_altoc_J80                 ??????????????????????????????????????????????????????????????????
A_amori_J2                  2-31302-12322101002322123 2-312010212013122---------01-002011032
A_amori_J81                 2-31302-12322101002322123 2-312010212013122---------01-002011032
A_ander_J147_T              -----02-12322101002322123 2-312010212013122---------01-002011032
R_sp_no_J139                ----302-12322101002322123 2-312012212013122---------01-002011032
;
cc - .;
proc/;

#
$
;
cn {0 sequence_1 A C G T /;
{1 sequence_2 A C G T /;
{2 sequence_3 A C G T /;
{3 sequence_4 A C G T /;
{4 sequence_5 A C G T /;
{5 sequence_6 A C G T /;
{6 sequence_7 A C G T /;
{7 sequence_8 A C G T /;
{8 sequence_9 A C G T /;
{9 sequence_10 A C G T /;
{10 sequence_11 A C G T /;
{11 sequence_12 A C G T /;
{12 sequence_13 A C G T /;
{13 sequence_14 A C G T /;
{14 sequence_15 A C G T /;
{15 sequence_16 A C G T /;
```