

-A Genetic Analysis of Human Remains from
the Myeongam-ri Site, Asan City-

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ABSTRACT

In this study human bones and teeth, excavated from the Myeongam-ri site in Asan, Chungcheongnam-do Province, have been analysed by nuclear DNA typing and mitochondrial DNA sequencing methods. Twenty-one samples of long bones and twenty-seven samples of teeth from twenty-one individuals were collected and analysed. Among these thirteen teeth were successfully subjected to nuclear DNA extraction, quantification, and PCR(Polymerase Chain Reaction) amplification. Silver STR III (D16S539, D7S820, D13S317) multiplex PCR method was used in this study for a short tandem repeat (STR) analysis. Mitochondrial DNAs of tooth samples were also amplified and sequenced by a DNA sequencer. These analyses show that a sample from Burial no. 29 and one from Burial no. 38(right) possessed the same maternal inheritance. This may suggest that the Myeongam-ri cemetery was used by a kin group for a relatively long period of time.

DNA

1) (Chungnam National University Museum)
2) (Chungnam National University Archaeology)

90

(1, 2, 3).

99

가

404

가

가

가

(4).

가

550

(Photo 1-A).

9

Photo 1.
(A)
(B)



(A)



(B)

Table 1-1.








1	M-2	1(), 2		
2	M-10	1()		
3	M-13	1(), 1		
4	M-21	1(X)		
5	M-22	1(), 2		
6	M-24	1(), 2		
7	M-25	1(), 2		

Table 1-2.

8	M-26	1(), 2		
9	M-28()	1(), 2		
10	M-28()	1(X), 2		
11	M-29	1(), 1, 2		
12	M-32	1(), 1, 2		
13	M-33	2		
14	M-37()	2(), 1		
15	M-37()	1(), 1		

Table 1-3.

16	M-38()	1(), 1		<p>아산 평암리 송도 연골 M-38(a)</p>
17	M-38()	1(), 2		<p>아산 평암리 송도 연골 M-38(b)</p>
18	M-46	1(), 2,		<p>아산 평암리 송도 연골 M-46</p>
19	M-47	1(), 1,		<p>아산 평암리 송도 연골 M-47</p>
20	M-49()	1(), 1, 2		<p>아산 평암리 송도 연골 M-49(a)</p>
21	M-49()	1(), 1		<p>아산 평암리 송도 연골 M-49(b)</p>

: , : , X :

가 49

(Photo 1-B).

30

(5).

21

(Table 1).

.

2001 10

DNA 가

2002 2 9 8

가

가

1.

, 3 (D.W, distilled water) 3

vortexing

(Clean bench)

(UV, ultra violet)

30

30

UV가

12

50ml

, -78

DNA

LockLabs(Rocklabs LTD, New Zealand)

5

-78

2.

0.5M EDTA(pH 8.0) 2ml 가 5ml 10 15 ,
(6). EDTA (Ca²⁺) DNA
EDTA
. 15 가
3 3 , 10,000rpm 3

3.

DNA
가 DNA
(GeneClean for ancient DNA kit, Bio101)
(Fastprep FP120, Bio101) DNA
. DNA 1% agarose gel 100volt
, EtBr(ethidium bromide) (UV) DNA
(Photo 2). DNA가
(),
DNA
DNA -20

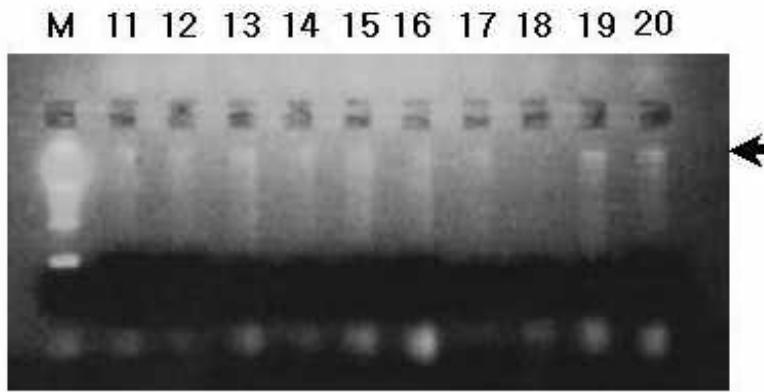
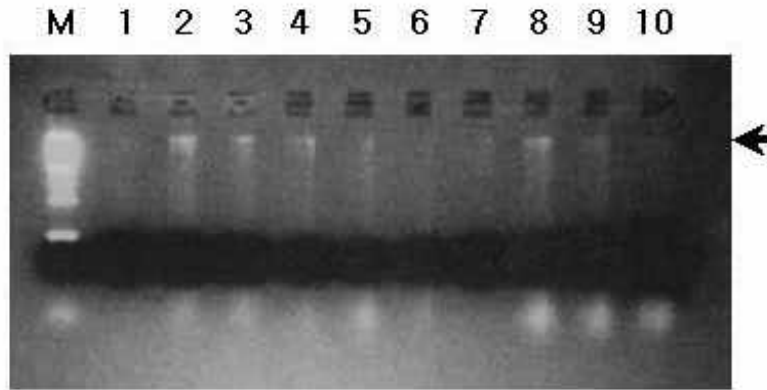


Photo 2.

DNA agarose
1% agarose gel
EtBr
가
(?)
DNA 가

UV
DNA

M : DNA 1Kb ladder

Lane 1 : M-2

Lane 2 : M-10

Lane 3 : M-13

Lane 4 : M-21

Lane 5 : M-22

Lane 6 : M-24

Lane 7 : M-25

Lane 8 : M-26

Lane 9 : M-28()

Lane 10 : M-28()

Lane 11 : M-29

Lane 12 : M-32

Lane 13 : M-37()

Lane 14 : M-37()

Lane 15 : M-38()

Lane 16 : M-38()

Lane 17 : M-46

Lane 18 : M-47

Lane 19 : M-49()

Lane 20 : M-49()

Table 2. STR

PCR condition	STR reaction
Initiation condition	95 11min
initiation denaturation	96 2min
Denaturation(10cycles) Annealing Extension	94 1min
	60 1min
	70 1.5min
Denaturation(20cycles) Annealing Extension	90 1min
	60 1min
	70 1.5min
Holding reaction	60 30min
	4 Holding forever

4.

DNA

(PCR, polymerase chain reaction)

DNA 가 STR(short tandem repeat) . STR Promega

STR (D16S539, D7S820, D13S317)

(Table 2). STR CTT, FFv

() .

(Hotstart Taq polymerase, Qiagen) ,

cycle

2% agarose gel

100volt

, EtBr

(UV)

-20

5.

(DNA Typing)

, 6% acrylamide-urea sequencing gel 45watt, 1200volt

2 sequencing . 4% gel 6% gel STR
, gel

6% gel sequencing . 6% gel 0.5M TBE(Trisma-base, Boric
acid, EDTA) 30 gel

(loci ladder) 2

(loading dye) 가 95

2

-4~0 . 30 gel

가 50 가 , 0.5M TBE

가 30cm gel 2/3

gel

6. Silver

가 gel , gel .

gel 가

가 . gel (poly-glove)

, Silver .

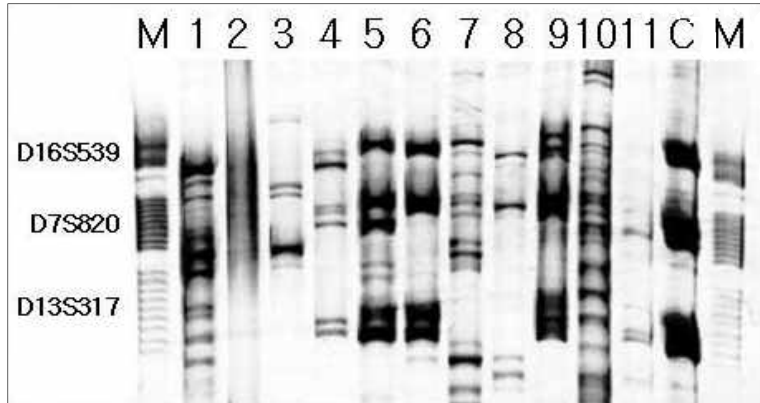


Photo 3.

STR sequence
 STR (D16S539, D7S820,
 D13S317) kit
 6% acrylamide-
 urea gel
 Silver
 lane 5 6 band
 pattern

M : allele STR ladder

Lane 1 : M-2

Lane 2 : M-22

Lane 3 : M-24

Lane 4 : M-25

Lane 5 : M-28()

Lane 6 : M-29

Lane 7 : M-33

Lane 8 : M-37()

Lane 9 : M-38()

Lane 10 : M-46

Lane 11 : M-49()

C : control DNA

가

1~2

acid)

Silver

(7).

gel

Silver

gel

(over staining)

10%

(acetic

M-28() M-29 STR 가
(Photo 3). STR

STR

7. DNA

DNA

DNA(mtDNA) sequencing

DNA 5ul

mtDNA

primer sequence

mtDNA

HV1(15971 ~ 16410)

F15989/R16410

F15971/R16258

STR

가

가

Qiagen PCR purification

kit

oligomer

, Dye Terminator Cycle

Sequencing Kit

Perkin Elmer Prism 377 DNA Sequencer

Sequence Navigator

(8).

DNA forward

reverse sequence

Anderson sequence

mtDNA가

DNA sequence data

Vector NTI

suite(InforMax, USA)

mtDNA sequence

(Photo

4).

DNA

M-25, M-29,

M-38()

Anderson sequence

DNA가

, DNA

M-29 M-38()

가

```

1
m_25__L15 (1) ATTTTGNA AAAAGCCCTTAAA AAAAGCCAAA NGAAAAATGAGNAAACCCCTGNAAGAACCCAAACATTTT
m_29__L15 (1) -----TCCTTAAACNCTTGNAA--RANGCCAAAATTTA
m_38_____ (1) -----ATTTTAAAACCTTTTAAA AAAAACCAAAAAAATTTTAAAACCTTGAAN--AGCCCACTATTTNN
81 160
m_25__L15 (81) GGGGAAAAACNACCCTGGAGAGTTTNTANTTGGGAATATTTTINAAIAA AAAA AAAA AAAA TTTTINAGCCGNTTNG
m_29__L15 (35) TTT-AAAAAG----CNTGAAANNCCAAANNNTTANN-----TCCAAAGCCTTAGACTNATCCTTTTACGCCGCTATG
m_38_____ (67) NTTTTNNCCN-----NGAAATTT-----TTTTTAA-----CTTTAAAAAAGAAAAAATTTTTAGAAAAGTTTA
161 240
m_25__L15 (161) GAGAAANNAGNANGGCGGCCTTTTTTTNNAGGANNAGGGCCACCAAAAACNNGGACCCAGCTENAGGCATAAAA
m_29__L15 (105) AATTAGACTACA TTACTGCCAGCCAC---ATGAAATTTGTACGG--GACCACAAATCTTGACCACCTGTACTACATAAA
m_38_____ (132) AAGAAA AAA CAANNNGNCAATTTTC---ATGANATTTSCACGG--TACCAATAATCTTGACCACCTGTACTACATAAA
241 320
m_25__L15 (241) AACCCAAACCACATCAAAACCCCCGCCCCAGGGTACAAGGAGGGGAGGAAAAGTTTCACTATGACACAAAAACGG
m_29__L15 (181) AACCCAAACCACATCAAAACCCCCGCCCAAGCTTACAAGCAGTA CAGCAATCAAGCTTCACTATGACACAAACCTG
m_38_____ (208) AACCCAAACCACATCAAAACCCCCGCCCAAGCTTACAAGCAGTA CAGCAATCAAGCTTCACTATGACACAAACCTG
321 400
m_25__L15 (321) GGACTCNAAGGCACCCCCACCCACTGGGGACCAAAAANNTAACCATCCITTAANNNGNAGGACANANGNCATT
m_29__L15 (261) CACTCAAAAGCACCCCTCACCCACTGGATACCAACAAAGCTATGCCACCTTAAACGTAATAGTACTATAAGCATT
m_38_____ (288) CACTCAAAAGCACCCCTCACCCACTGGATACCAACAAAGCTATGCCACCTTAAACGTAATAGTACTATAAGCATT
401 480
m_25__L15 (401) TACGGGCANAGGANATTANNGGNA AACCCNTTTGGGNCAGGGGNNCCGCCANNAAGGGGNNCC-----
m_29__L15 (341) TACGTRCAGAGCAATTAACTCTCAAT-CCCTTCTCGCCCGCATGGATGACCCGCCCAATAGGGGTCCCTTGACCAC
m_38_____ (368) TACGTRCAGAGCAATTAACTCTCAAT-CCCTTCTCGCCCGCATGGATGACCCGCCCAATAGGGGTCCCTTGACCAC
481 491
m_25__L15 (473) -----
m_29__L15 (420) CATATCAAAA
m_38_____ (447) CATCTCAAA-

```

Photo 4. M-25, M-29, M-38() DNA (alignment sequence)

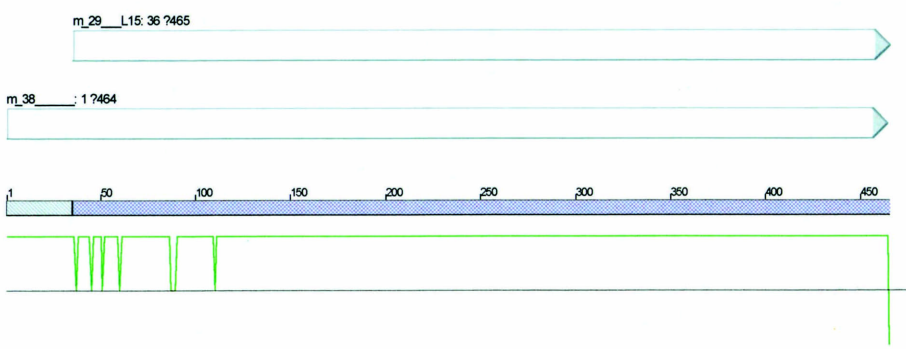


Photo 5. DNA M-29 M-38() (over lap sequence) M-29 M-38() DNA NTI DNA suite computer analysis

(Photo 5).

.
 ,
 ,
 .
 ,
 . DNA , DNA가
 , (PCR)
 . (PCR)
 , DNA
 , DNA
 , DNA
 , DNA
 가 DNA
 , STR (D16S539, D7S820, D13S317)가
 . 6% acrylamide-urea sequencing gel
 11 DNA ,
 가 , M-28() M-29
 가
 . , STR

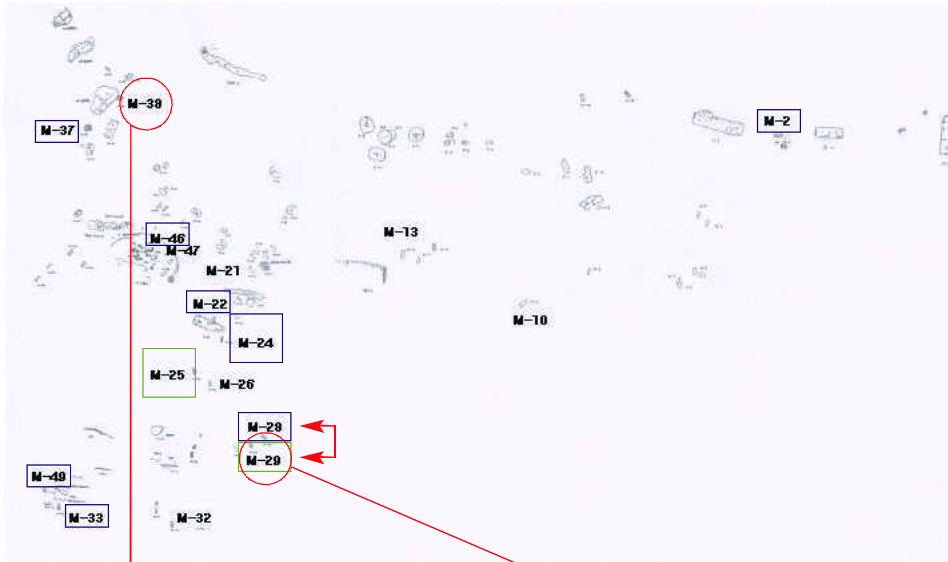


Photo 6.



M-38



M-29

21

11 STR (short tandem repeat)
 (),
 M-28() M-29
 ()가
 DNA
 , M-25, M-29, M-38(
) 3 ()
 , M-29
 M-38()
 가 ()

STR , STR CTT, FFV ,
 STR (PCR)

DNA DNA(mtDNA)

DNA Anderson sequence

primer 가 , M-25,

M-29, M-38() DNA DNA sequencing

DNA sequence가 3

Anderson sequence DNA ,

DNA sequence data Vector NTI suite(InforMax, USA) M-29

M-38() 가 .

(Photo 6). 100

가

가

가 DNA

DNA ,

,

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