

Archeological Consideration of DNA Typing

• •

-
- DNA
- 1. DNA Y
- 2. DNA
- DNA
- 1. DNA Typing
- 2. DNA Typing
-

가

가

21 가 가 10 가

가 , 가 ,

가

가 50

DNA(deoxyribonucleic acid)¹⁾ 가

. DNA (Friedrich Miescher)

가 1869

(nucleus) (acid)

(nucleic acid) , 가

74 . 1920

(Feulgen) DNA

DNA가 , DNA가

가 가

(Gregor Johann Mendel, 1822 1884)

가 20

가

(Feulgen), (Fred Griffith),

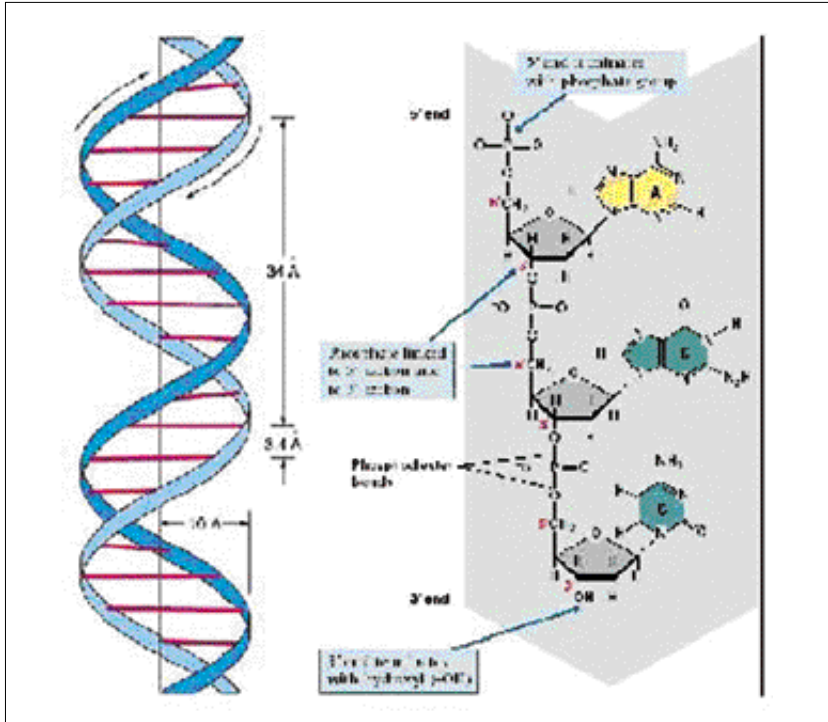
(Oswald Avery), (Macleod, McCarty), (Hershey and

1) DNA , 3

(nucleotide)가 . 가 DNA가 , 가

() DNA가

DNA (DNA sequence) , DNA



1. DNA

Chase) DNA가
 DNA가 , 4
 가 ,
 (Rosalind Franklin), (Maurice Huger Frederick Wilkins), (James
 D. Watson), (Francis Crick)
 3 1962 ([1]).
 가
 DNA
 가 , 가
 가 , 7, 80
 DNA ,
 가 .

DNA

,

.

, 가

.
가

가

,21 DNA

가

,

.

.

,

(key)

.

가

,

,

.

가

,

10

.

.

,

,

,

,

DNA

가

가

,

.

DNA

,

2

()

10

가

.

,
,

.

,

가 1

가 ([2]).

, 12 , 6

가 ,

가

가

가

가

가

가

가 가

가 (Wilhelm Ludwig Johansen), (Thomas Hunt Morgan)

가

([3]). 가

2) 가 ,

가

3) , 가

2) 가 . 가

3) B-L b-1 ,

B-L, b-1 . 2 4 2

BL , 2 b1 , B L, b 1 가 B-L, b-1

B-1, b-L 가 가 ,

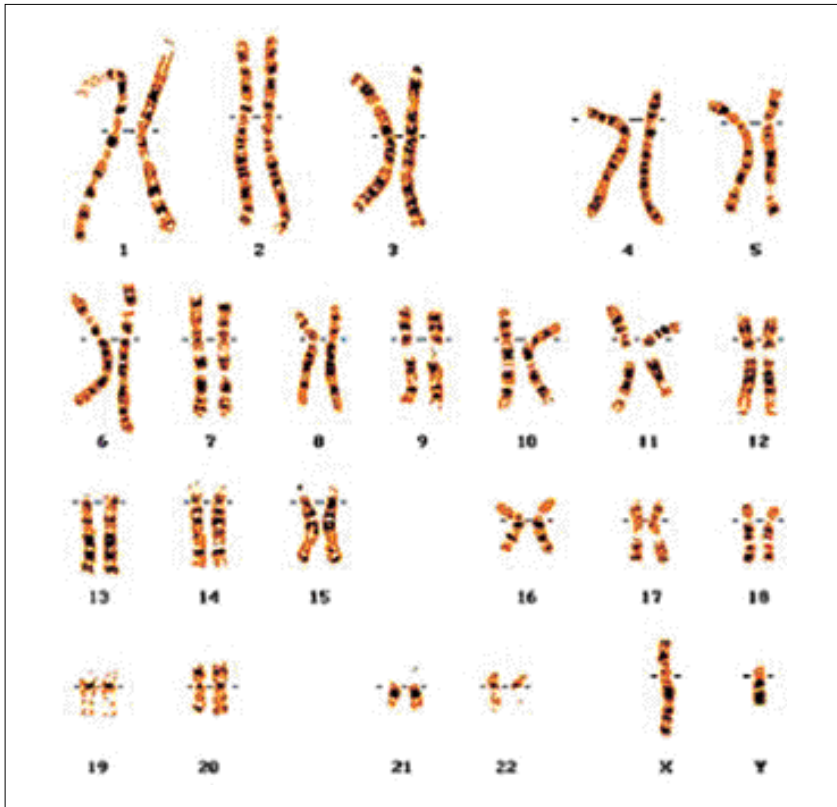
가

() .2 가 .

가

4) .
 23 , 23 , 46
 DNA
 가 , , 가
 가 ,
 가 , DNA
 가 , 가
 가
 DNA Typing()
 DNA Typing DNA ,
 (personal identification) , ,
 ,
 DNA ,
 , ,
 DNA Typing
 (parentage identification), (criminal identification),
 (personal identification), (archeology) 가
 가 DNA Typing 가
 DNA Y - DNA
 DNA(mitochondrial DNA, mtDNA) DNA ([4]).
 DNA .

4) 1 , 4 , (chiasma) .
 가 , 가
 가 , (recombination) .



2.

22

X, Y
가

가

46

1. DNA Y

(1) DNA

chondria) DNA DNA 가 (mito-

DNA

DNA(mtDNA) 13

RNA)

가 .D

mtDNA

(ribonucleic acid,

(hypervariable region)

가

16,569

37

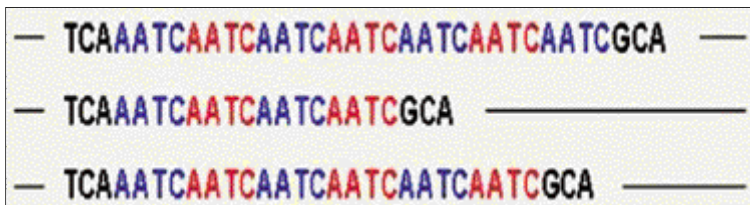
2. DNA

(1) VNTR (variable number tandem repeat)

DNA 가 (repetitive sequence) , 2 가 가 (variable number tandem repeat; VNTR) , 가 가 . DNA (tandem repeat sequence) (polymerase chain reaction, PCR) DNA 가 ([7]). DNA VNTR(가 9~80) DNA 가 .

(2) STR (short tandem repeat)

DNA 가 가 . STR(short tandem repeat) 2~5 , VNTR(variable number of tandem repeat) 9~80 . VNTR STR, 4 가 tetranucleotide repeats PCR DNA DNA STR 가 .



3. STR - AATC

(A), (T), (C)가 AATC

(3) RFLP(restriction fragment length polymorphism)

1970 DNA (length polymorphism) 가 .
 DNA (restriction enzyme) DNA DNA
 가
 가
 DNA 가 DNA
 (restriction fragment length polymorphism; RFLP)
 ([7]).
 DNA DNA
 (electrophoresis) RFLP DNA
 DNA DNA
 , 가 DNA DNA
 DNA 가 (Southern blotting)
 DNA
 (probe) X -
 가 가
 , DNA 가 ,
 .
 DNA
 DNA
 DNA 90
 ,
 ,
 ([9]).
 99
 404 , 3000
 (,)

가 ([10]).

‘ DNA ’ . DNA

가 가

DNA Typing

10

(PCR)

가가

DNA

DNA Typing

DNA

1. DNA Typing

DNA , DNA , DNA (PCR),
DNA sequencing DNA profile

(1)

DNA RNA

DNA

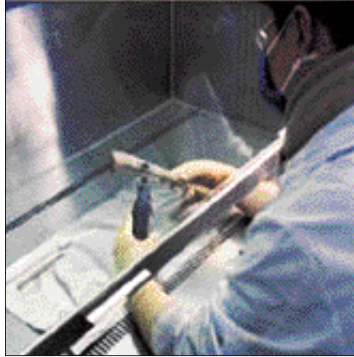
DNA ([11]).
DNA

DNA

DNA가

DNA

(2) (PCR, Polymerase Chain Reaction)



4.

(PCR, polymerase chain reaction)

1980

K.

Mullis

PCR

가

가

, PCR DNA

([7]). PCR DNA

DNA

가

DNA

(3) (Electrophoresis)

(electrophoresis)

가

()

가 ()

가

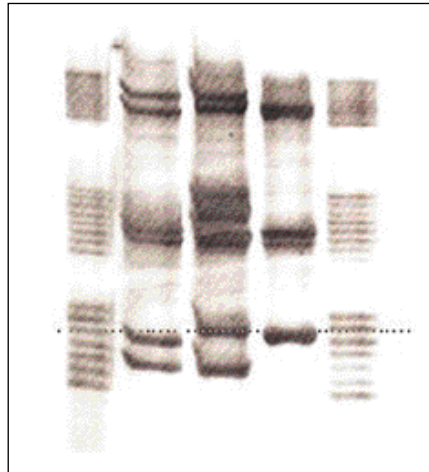
).

STR DNA

DNA

가

([3]



5. acrylamide - urea gel(6%) Sequencing

DNA

2. DNA Typing

가

가

DNA가

가

가

가

DNA

DNA

가

DNA

가

가

가

가

(1)

(A), (T), (G), (C)
가

23, 46
가

가 STR 가

가 STR 가

5 가 STR STR1 STR5
5.3%, 11.1%, 8.5%, 10.8%, 9.2%

5 STR 0.0004969%

1, 20 5 STR
1 가 ([4]). 10
STR 가

13
STR

(2)

STR 2

STR 가

“ ”가 99.9%가
가

(3) (Forensic study)

DNA DNA

DNA (FBI) ([12]).
100%

(4) (archeology)

1997 가 DNA DNA ([13]). DNA

DNA DNA DNA DNA ([14]).
가 , 가

가 ' research() ' 가 ' study() ',
' approach' 가 ' approach'
가 0 1
가 가 1

, 0 1 가 가 , ,

.

,

,

DNA ,

DNA ,

([15]). ,

‘ DNA ’ 가 가

< >

- [1] . . , , , 1992
- [2] Jeffeys AJ., Wilson V., and Thein. SL. Nature 1985; 314; 67 - 73
- [3] Lubert Stryer. freeman. Biochemistry. fourth edition. 1995
- [4] Chung YB. DNA Typing. Inje university press. 1996
- [5] Anderson S, Bankier AT, Barrell GB, de Bruijn MHL. Nature Sequence and organization of the human mitochondrial genome. 1981; 290: 457
- [6] Peter Forster,2 Arne Rohl, Petra Lunnemann, Catrin Brinkmann, Tatiana Zerjal. Am. J. Hum. Genet. A Short Tandem Repeat Based Phylogeny for the Human Y Chromosome. 2000; 67: 182 - 196
- [7] , , , 1997
- [8] Technical Manual. GenePrint STR Systems. Promega. 1985
- [9] Matthias Krings, Helga Geisert, Ralf W. Schmitz, Heike Kraintzki, and Svante Paabo. Proc. Natl. Acad. Sci. DNA sequence of the mitochondrial hypervariable region from the Neandertal type specimen. 1999; 96; 5581 - 5585

- [10] Lee KS, Chung YJ, Han SH, Lee MH, Han MS, and Choi DH.
Conservation Studies 1999; 20; 5 - 19
- [11] Masahiro Sasaki, Hirohi Shiono, Tohru Fukushima, Keiko Shimizu.
Forensic Science International. Human identification by genotyping of personal
articles.
1997; 90; 65 - 75
- [12] Holland MM. and Parsons TJ. Mitochondrial DNA sequencing analysis -
Validation and use for forensic casework. Central police university press.
1999
- [13] John H. Relethford. Proc. Natl. Acad. Sci. Ancient DNA and the origin of mod-
ern humans. 2001; 98; 390 - 391
- [14] Lluís Quintana - Murci, Ornella Semino, Hans - J. Bandelt, Giuseppe Passarino.
Nature. Genetic evidence of an early exit of Homo sapiens sapiens from Africa
through eastern Africa. 1999; 23; 437 - 441
- [15] Seo MS, Lee KS, Chung YJ, and Lee MH. Conservation Studies.
Personal identification of the excavated ancient human bone through molecu-
lar - biological methods. 2001; 22; 27 - 40

ABSTRACT

Archeological Consideration of DNA Typing

Lee, Kyu - Sik · Seo, Min - Seok · Chung, Yong - Jae
Conservation Science Division, National Research Institute of Cultural Properties

It has not been a long time since we recognize that a word 'DNA' is not unfamiliar with us. Development of biology give us so much of benefits of civilization and so we call the 21th century as 'biological period'. It has not been a long time that archeology made contact with biology. With biological development, DNA typing analysis has been accomplished extensively since 1990's. We know through mitochondrial DNA base sequencing analysis that the Neanderthal man is not the origin of the human race and ancient human race set out from Africa. Biological science technology, which is polymerase chain reaction(PCR) or electrophoresis etc., made these results possible. A contact between biology, especially genetics, and archeology is getting accomplished through these current. If genetics keep in contact with archeological foundation, we know not only about ancient populations in the Korean Peninsula, but also origin of human race. This field is so-called 'DNA Archeology'. This field is of help to person identification and children discrimination as like a forensic science. We make every effort for great possibilities from co-ownership of these two fields and these fields needs to convert a recognition, especially.