

The Application of Forensic DNA Analysis in Sexual Assault Cases in Taiwan

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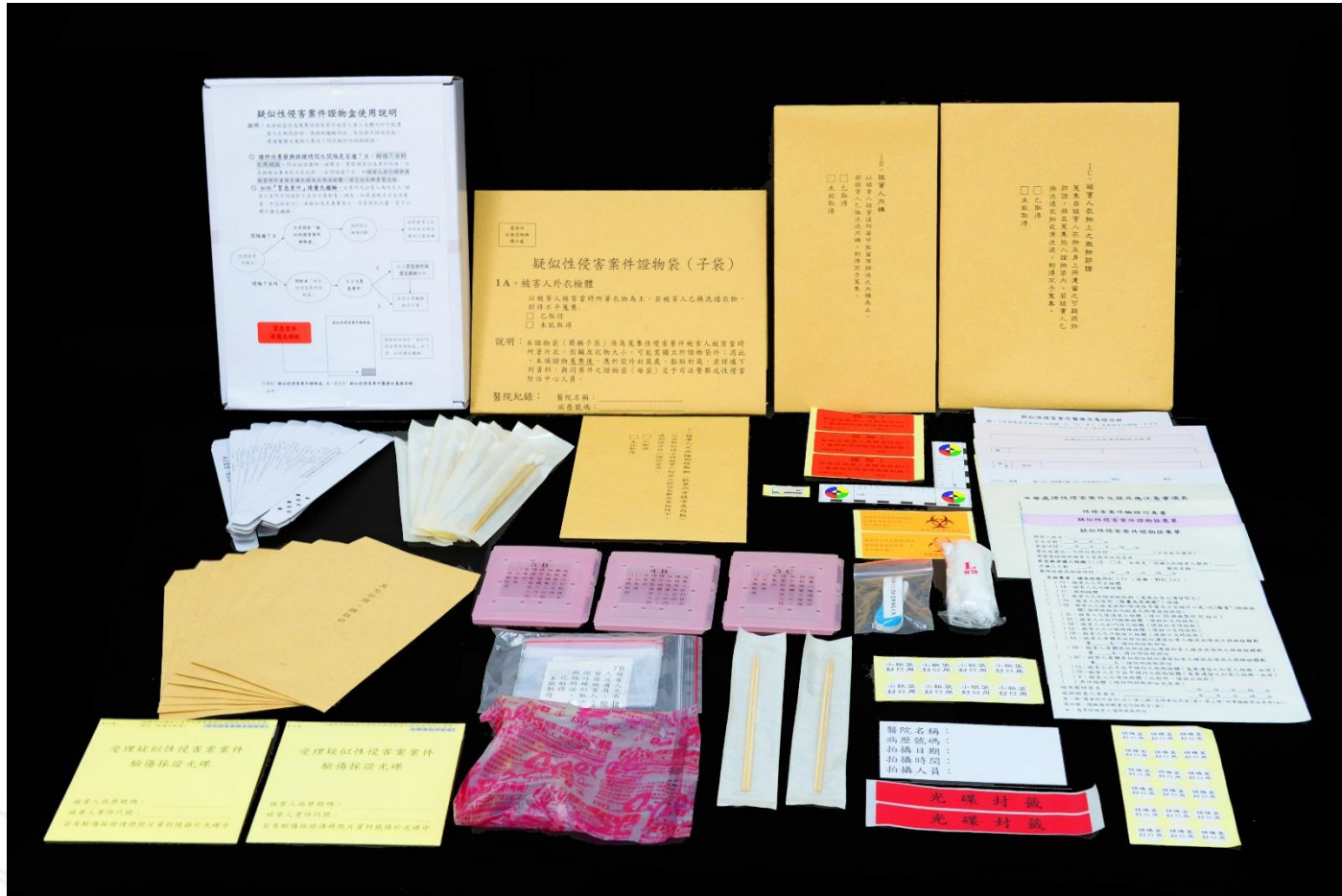


The development of forensic DNA in Taiwan

- The forensic DNA laboratory of CIB was set up in 1992.
- Completed the first DNA analysis in sexual assault case in 1993.
- Almost 2000 rape cases every year.
- Our first rape evidence collection kit was developed until Sexual Assault Crime Prevention Act was passed in 1997.
- Fetus tissue collection kit for misfortune pregnant victim and urea & blood sample collection kit for drug analysis for sexual assault case was set in 2004 and 2011.



Rape kit



The rape evidence collection kit was developed until Sexual Assault Crime Prevention Act was passed in 1997.

What to collect

- Rape kits include the following items:
- Instructions
- Bags and sheets for evidence collection
- Swabs for collecting fluids from the oral cavity, vagina, anus, and other touch area.
- Comb used to collect hair and fiber from the victim's body
- Self-sealing envelopes for preserving the victim's clothes, head hair, pubic hair, and trace evidence.
- Nail pick for scraping debris from beneath the nails
- White sheets to catch physical evidence stripped from the body
- Documentation forms
- Labels



Urea & Blood Collection kit for Drug Analysis 2004



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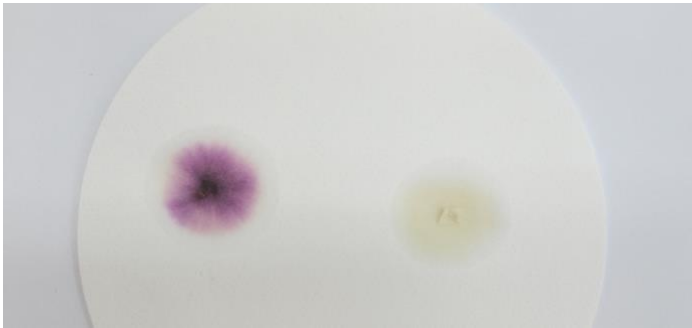
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The analysis strategy for sexual assault evidences

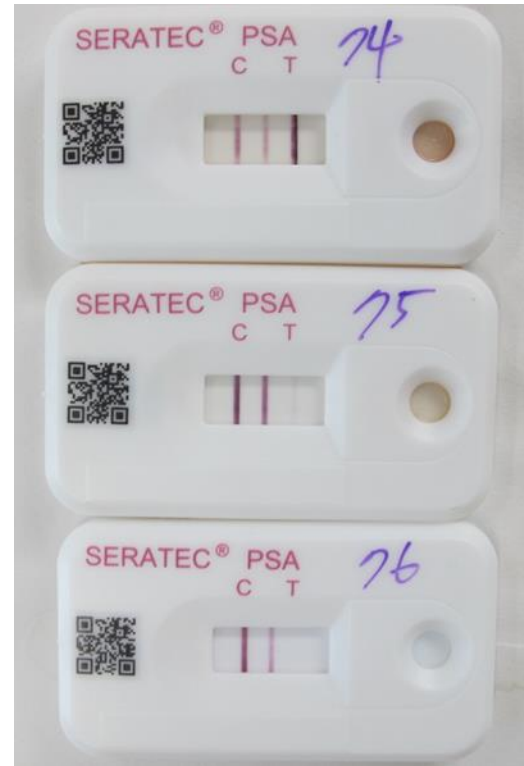
- Acid Phosphatase test for identification of semen stain and then followed by differential extraction method to obtain separate male semen fractions or not.
- Quantifiler™ Trio DNA quantification kit (Quantifiler Trio) to evaluate DNA quality, quantity and male/female ratio of DNA extraction results.
- AmpF1STR™ Identifiler™ Plus PCR Amplification kit is applied for general evidences STR typing.
- For paternity testing, GlobalFiler™ PCR Amplification kit is applied because of its superior discrimination power.
- If the male DNA is less than 10% of female DNA, Y-STR typing is the better choice.
- Y-STRs is now widely used in our laboratories and particularly in sexual assaults cases.



Serology Test for Semen

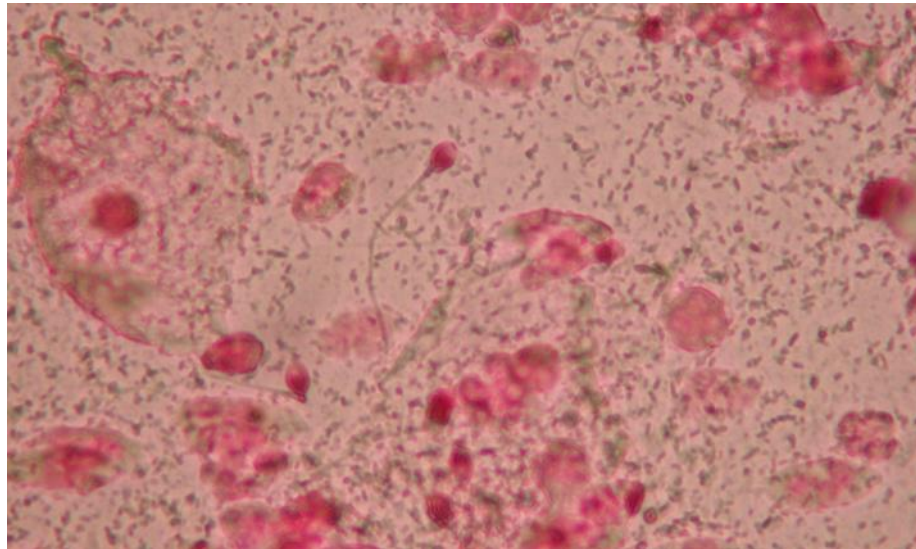


Acid Phosphatase Test



Immune-Chromatographic Test for prostate specific antigen, PSA or P30

Semem Conform test



Find sperm cell by Microscope method
or
Immune-Chromatographic Test for semenogelin



Y STR Typing or Not

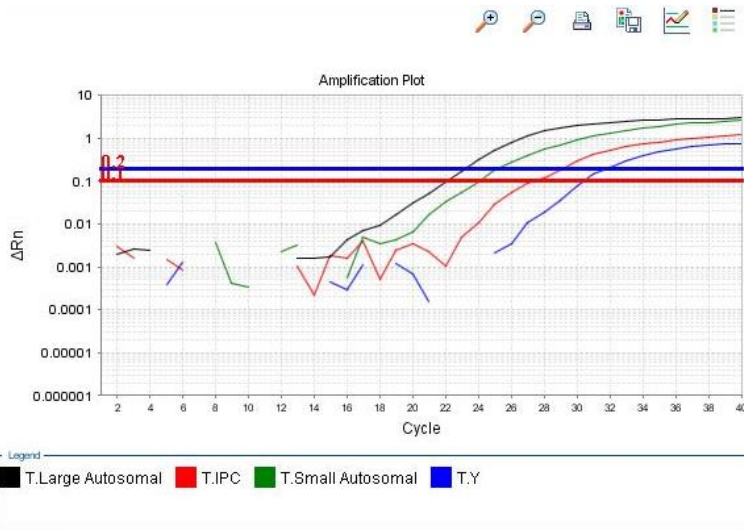
- Y DNA concentration and male/female DNA ratio was evaluated
- The amount of trace male DNA can be more accurately estimated by using Quantifiler Trio than Quantifiler Y Human Male DNA quantification kit (Quantifiler Y).
- The Y quantification is more concordance with Yfiler™ Plus kit or PPY23 typing results.



Y DNA Evaluation

One blood stain found on the seat of suspect's car was evaluated by using the Quantifiler Trio DNA Quantification Kit with the Applied Biosystems 7500 Real-Time PCR System.

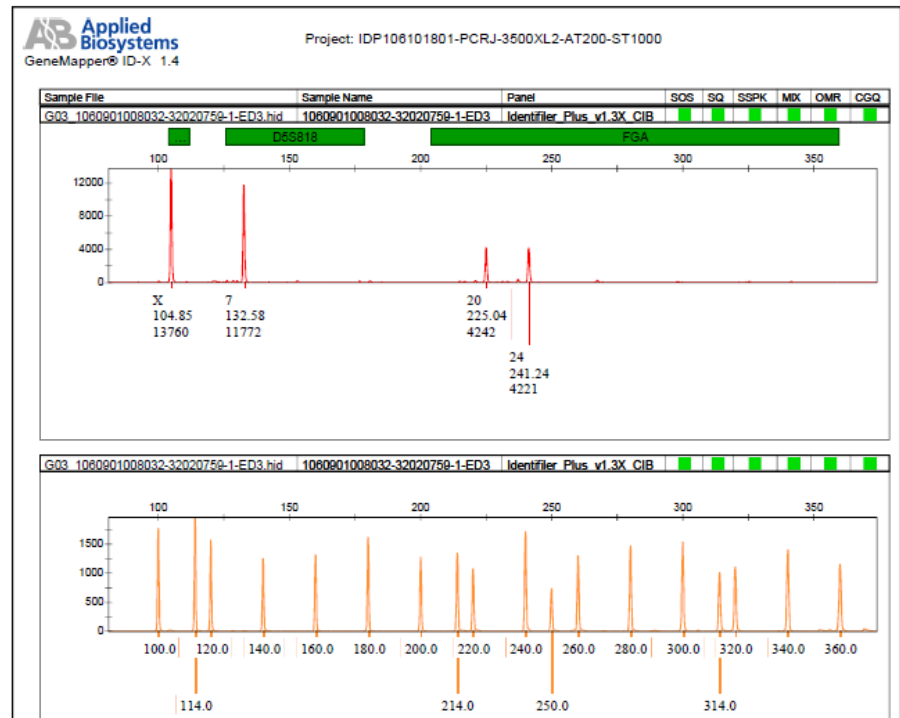
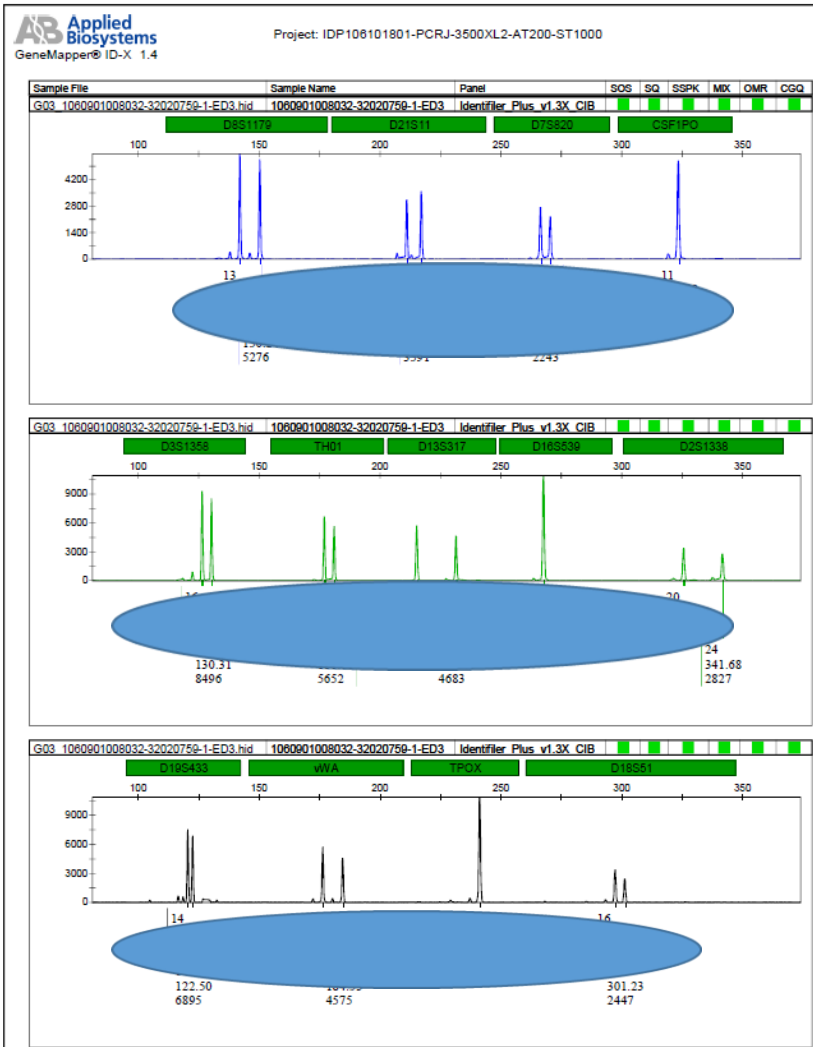
T.LA=2.56, T.SA=3.65, T.Y=0.08 (ng/ul), S/L=1.43 no degradation
 The ratio of male to female is 1:30



Target	Amplicon length	Ploidy	Copy Number
Human Target, small autosomal	80 bases	Diploid	multicopy
Human Target, large autosomal	214 bases	Diploid	multicopy
Human Male Target†	75 bases	Haploid	multicopy
Internal PCR Control	130 bases	NA	Synthetic IPC template is included in the primer mix

† Contained in the Quantifiler™ Trio DNA Quantification Kit only

The DNA-STR Result of the Blood Stain



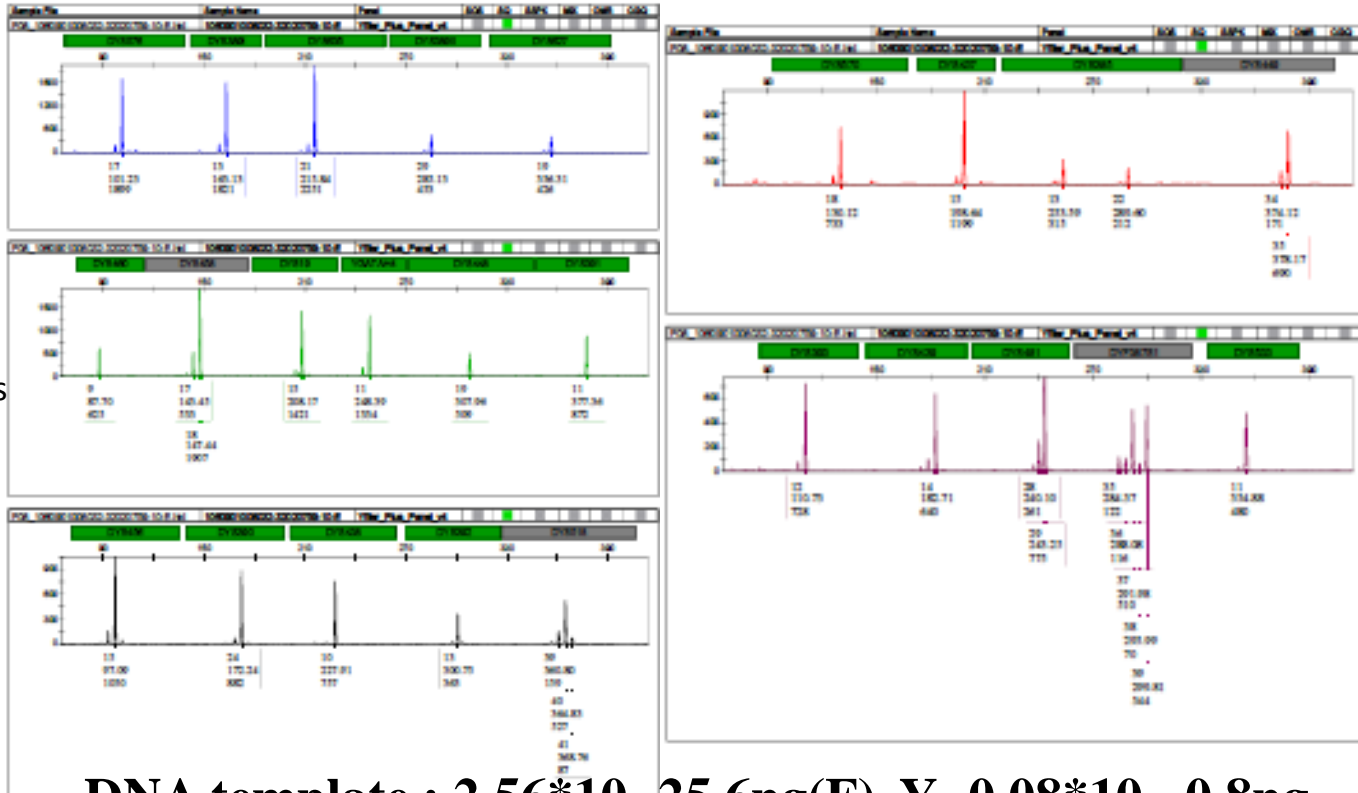
The ratio of male to female is 1:30.
The typing result match with the victim.

AmpFLSTR Identifiler Plus PCR Amplification Kit
Equipment: GeneAmp™ 9700, 3500xL Genetic Analyzer



The Y-STR Result of the Blood Stain

Yfiler Plus



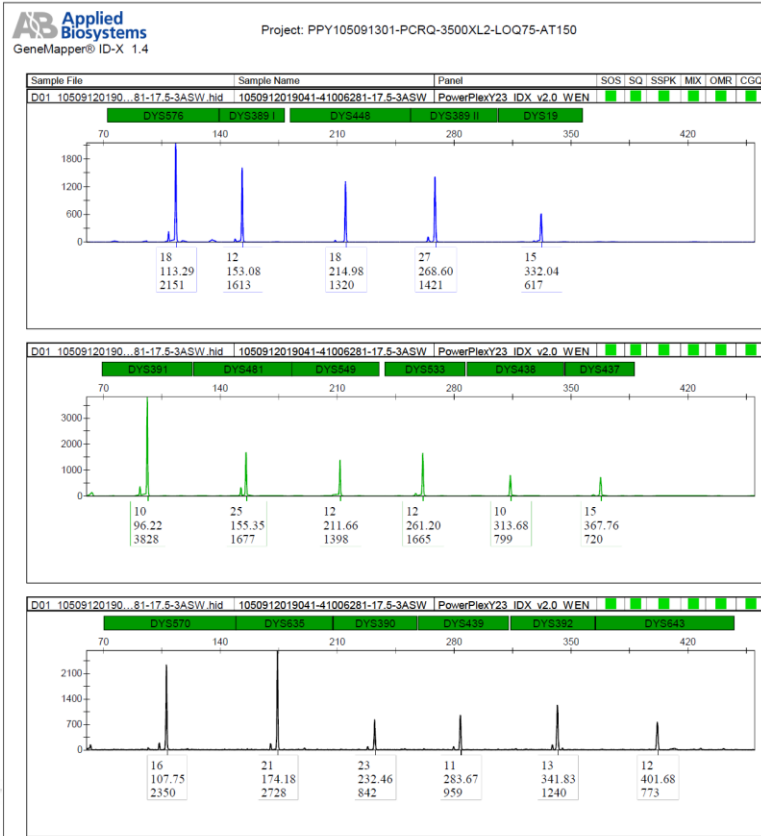
DNA template : $2.56 \times 10 = 25.6\text{ng}(F)$, $Y = 0.08 \times 10 = 0.8\text{ng}$
The Y-STR typing result match with the suspect.

Yfiler Plus PCR Amplification Kit

Equipment: GeneAmp 9700, 3500xL Genetic Analyzer



The Y-STR Result of VS



T.LA=6.55, T.SA=4.94, **T.Y=0.0023** (ng/ul), S/L=0.75

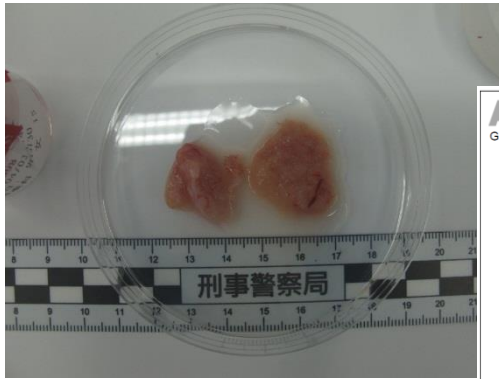
DNA template : 6.55*17.5=114.63ng(F), **Y=0.0023*17.5= 0.04ng**

PowerPlex® Y23 System

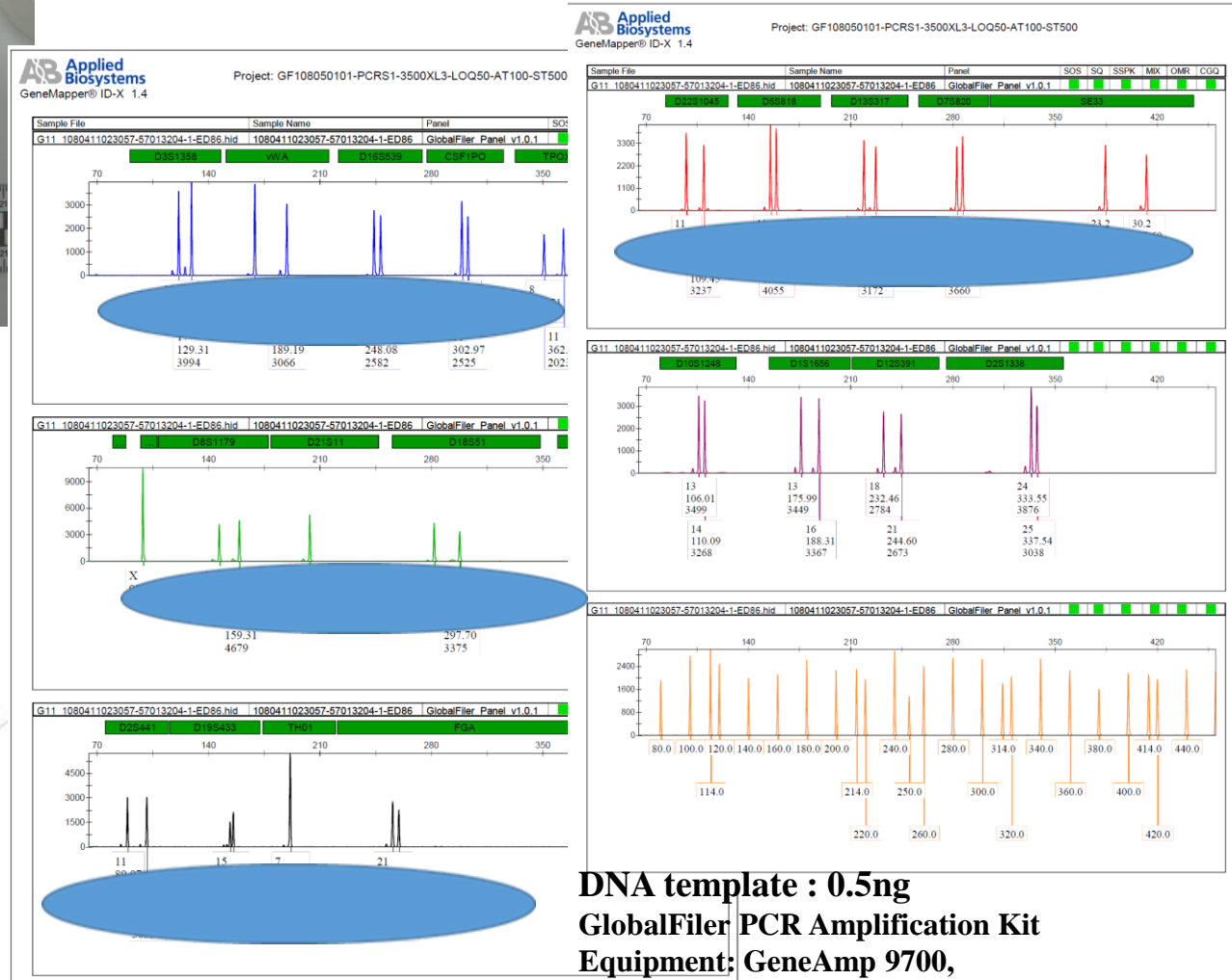
Equipment: GeneAmp 9700, 3500xL Genetic Analyzer



Paternity Test



Compare the DNA-STR result of Victim (mother), Suspects (father), and the Fetus, $CPI= 5.30 \times 10^{10}$



DNA template : 0.5ng
GlobalFiler PCR Amplification Kit
Equipment: GeneAmp 9700,
3500xL Genetic Analyzer

The DNA Sampling Act

(since 1999, revised in 2011)

Article 5. The accused or suspects committing any of the following offenses of Criminal Code shall be subject to the mandatory DNA sampling :

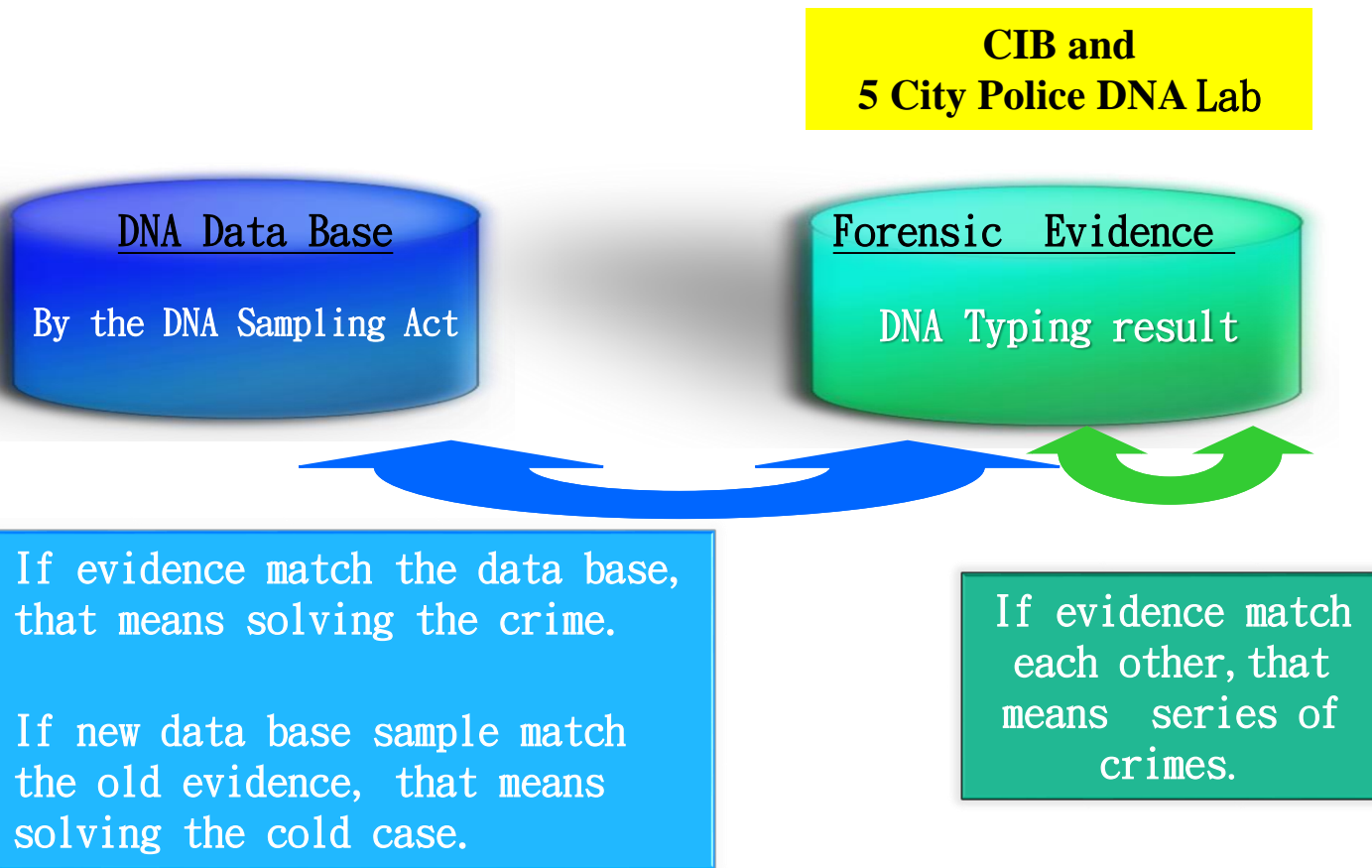
- **Offenses Against Public Safety (serious)**
- **Sexual Offenses**
- **Offenses of homicide**
- **Offenses of causing serious injury**
- **Offenses of Abrupt Taking, Robbery and Piracy**
- **Offenses of Extortion and Kidnapping for Ransom**

The accused or suspects who are convicted of any of the following offenses and recommit any offenses provided in this paragraph shall be subject to mandatory DNA sampling : (revised in 2011)

- **Offenses Against Public Safety....**
- **Offenses Against Abandonment**
- **Offenses of Larceny...**
- **Offenses of Abrupt Taking, Robbery and Piracy (general)**
- **Offenses of Against the Firearms, Ammunition and Knives Control Act (Article 7, 8, 12, 13)**
- **Offenses of Against the Narcotics Control Act (Article 4, 8, 10, 12)**

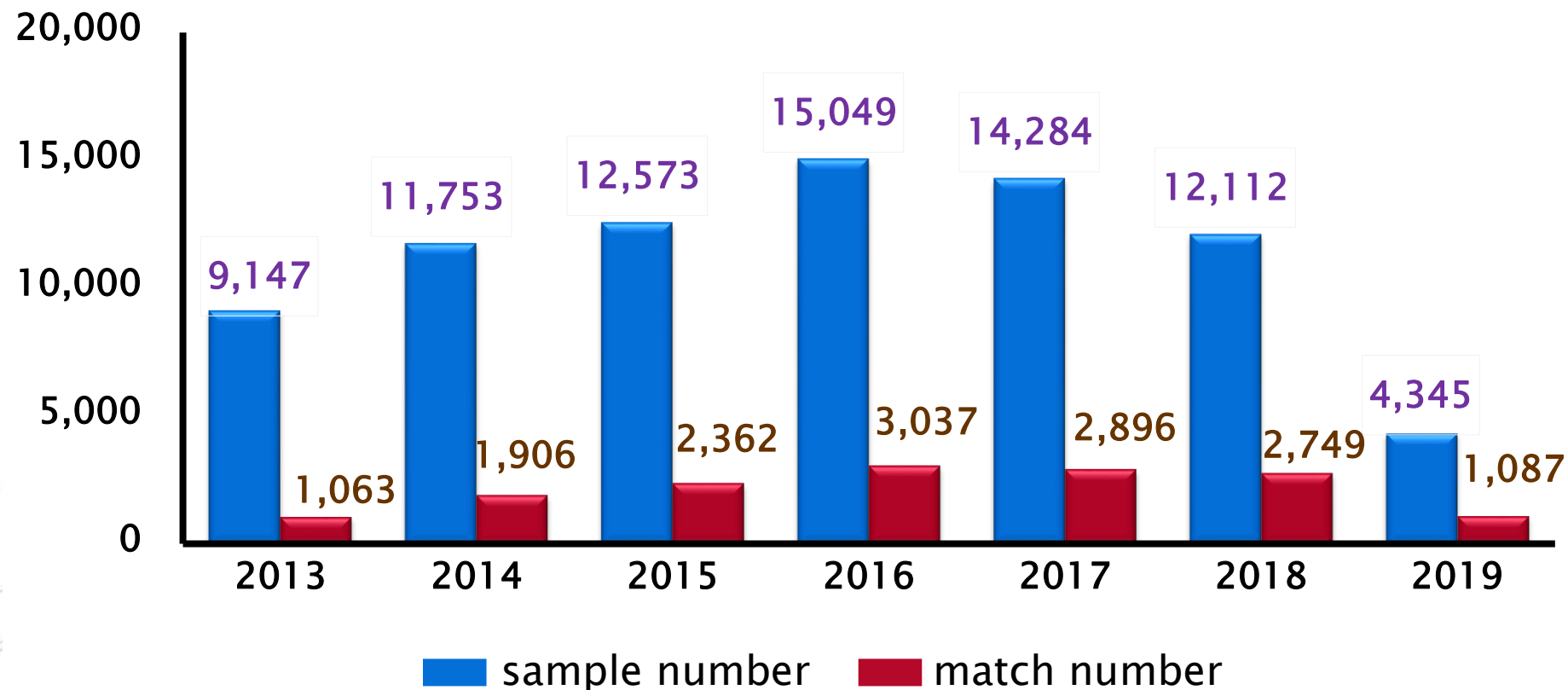


The Matching policy of evidence and DNA data base



The DNA Data Base 2019.June

Total DNA Samples: 146,078



Special Case Report

In September 2016, a teenager girl finished her tuition class, at around 8 p.m., the girl was walking home and a man approached her.

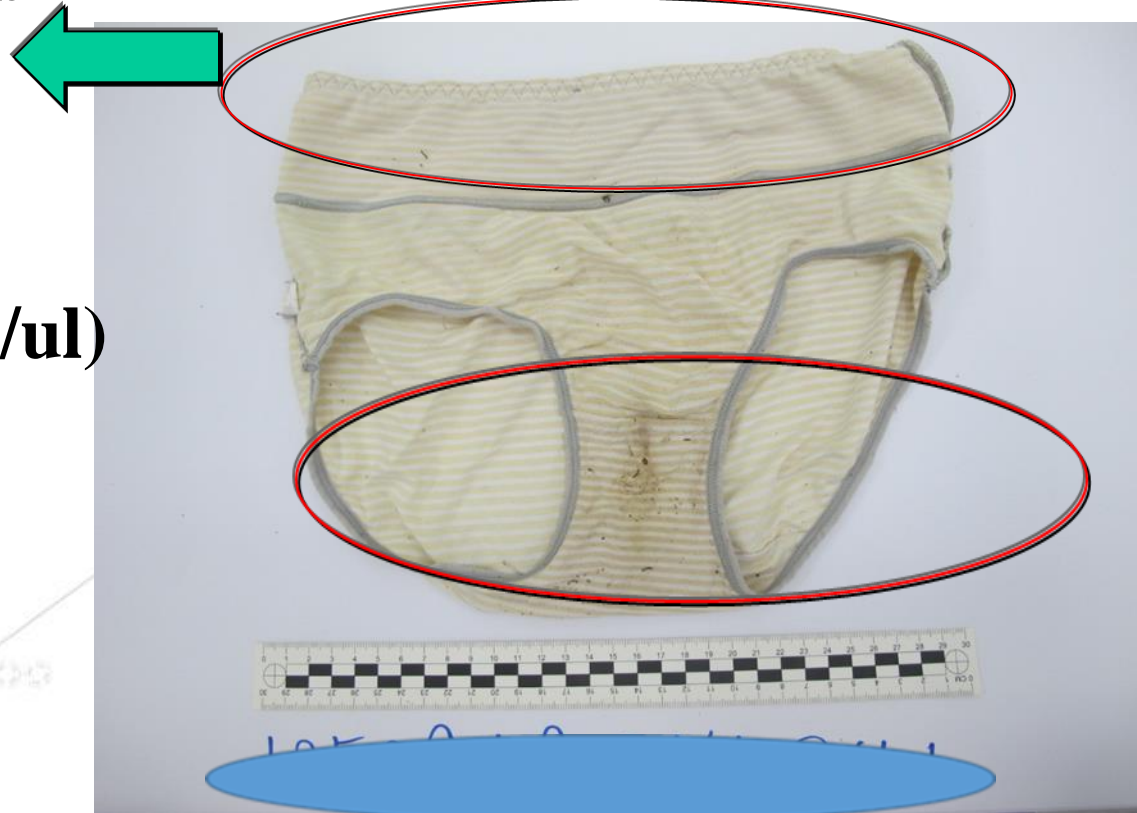
After the man get close to her, he sprayed her with chilli water, grabbed her into the grass on the side of the road, choked her neck, took off her pants, touched and licked the victim's sexual organs.

The man ran away and the victim was taken home by a passer-by, then accompanied by her family to the police and taken to the hospital for evidence collection.



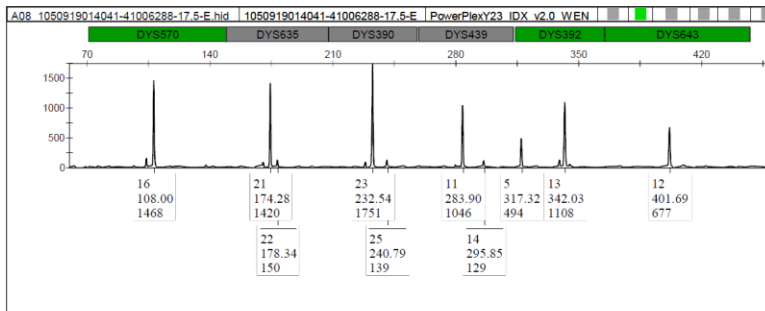
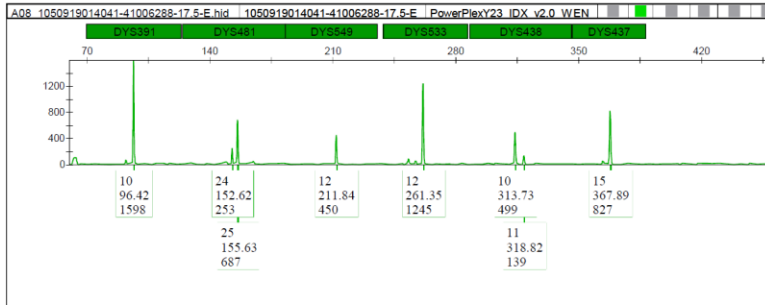
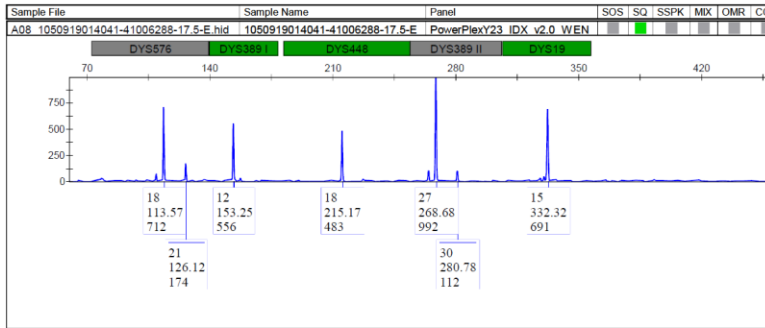
The underwear Evidence

Trace DNA was
sampling
T.LA=0.0973,
T.SA=0.0819,
T.Y=0.0057(ng/ul)



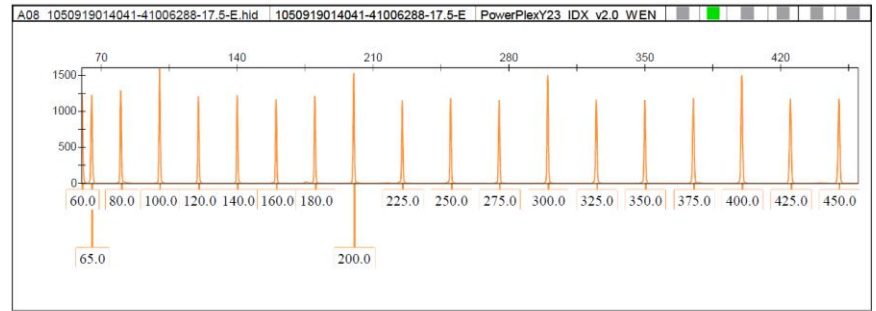
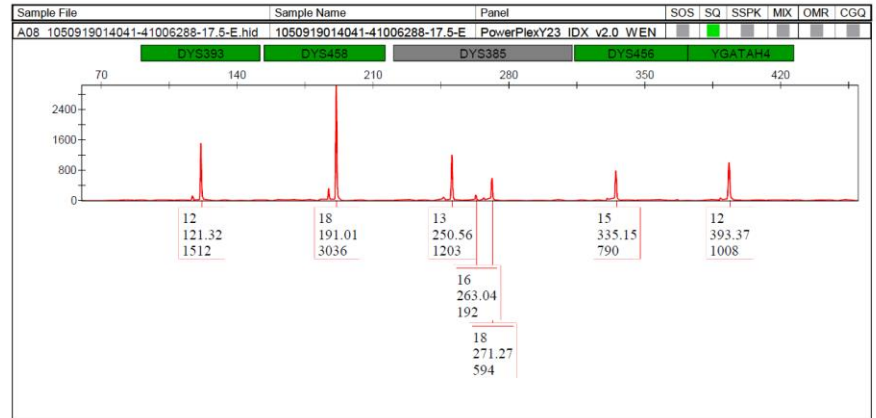
ACP: -
P30: -
T.LA=1.8933
T.SA=2.0495
T.Y= UD

Applied Biosystems
 GeneMapper® ID-X 1.4
 Project: PPY105101101-PCR-3500XL2-LOQ75-AT150



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Applied Biosystems
 GeneMapper® ID-X 1.4
 Project: PPY105101101-PCR-3500XL2-LOQ75-AT150



DNA template : $0.0973 * 17.5 = 1.70\text{ng}(F)$,
 $Y = 0.0057 * 17.5 = 0.1\text{ng}$
 PowerPlex® Y23 System
 Equipment: GeneAmp 9700, 3500xL Genetic Analyzer



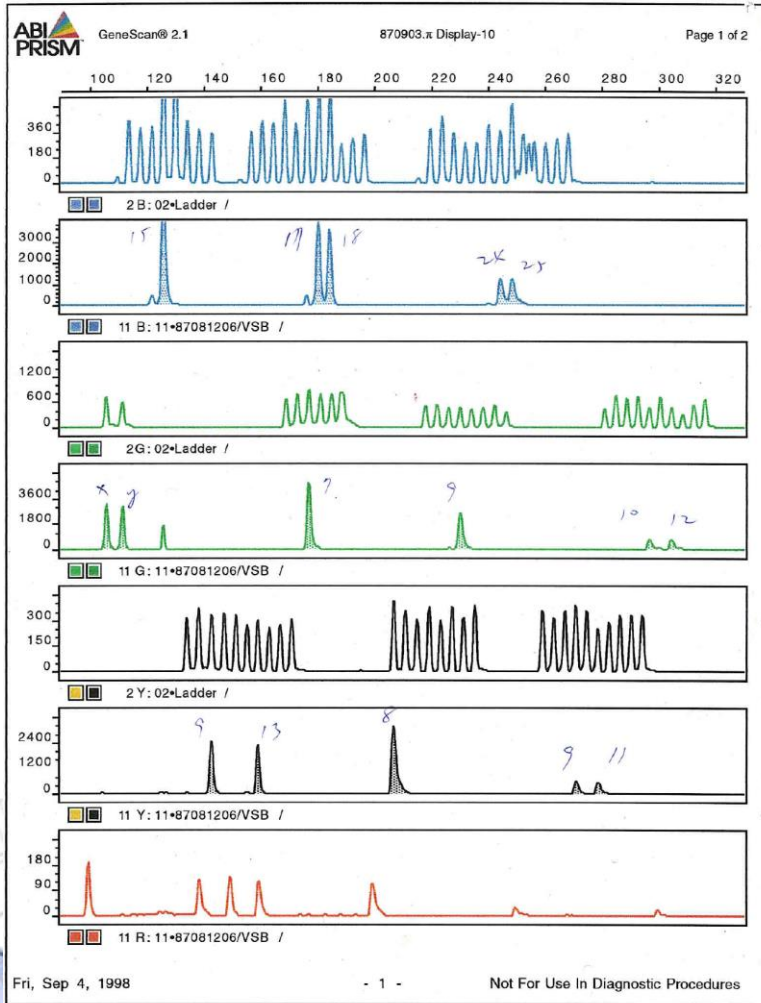
Cold Case

- **The suspect was caught and his Y-STR typing result was match with the Y-STR DNA result of the underwear.**
- **The suspect's DNA sample was analysis by IDP then compared with the whole forensic DNA database.**
- **The suspect's DNA-STR typing match with two old cases from 18 years ago.**
- **The victims of these two cases were teenager girls and almost the same criminal method that happened in 1998 and 1999.**

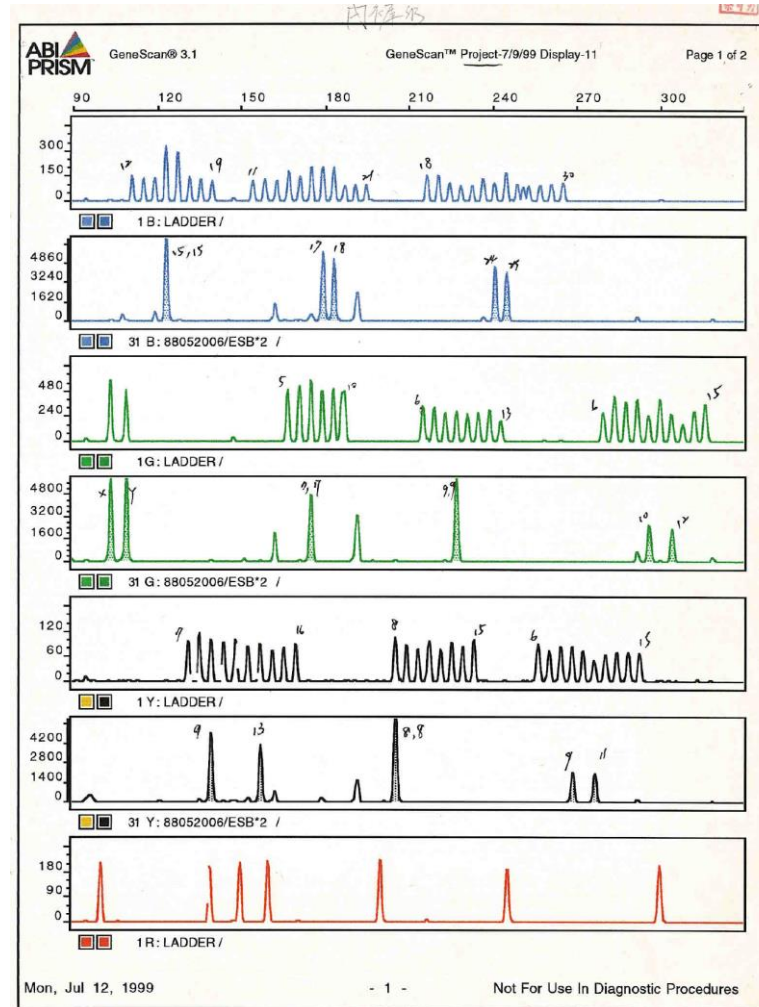


The old DNA-STR result in file

Sperm cell fraction of VS of victim, 1998



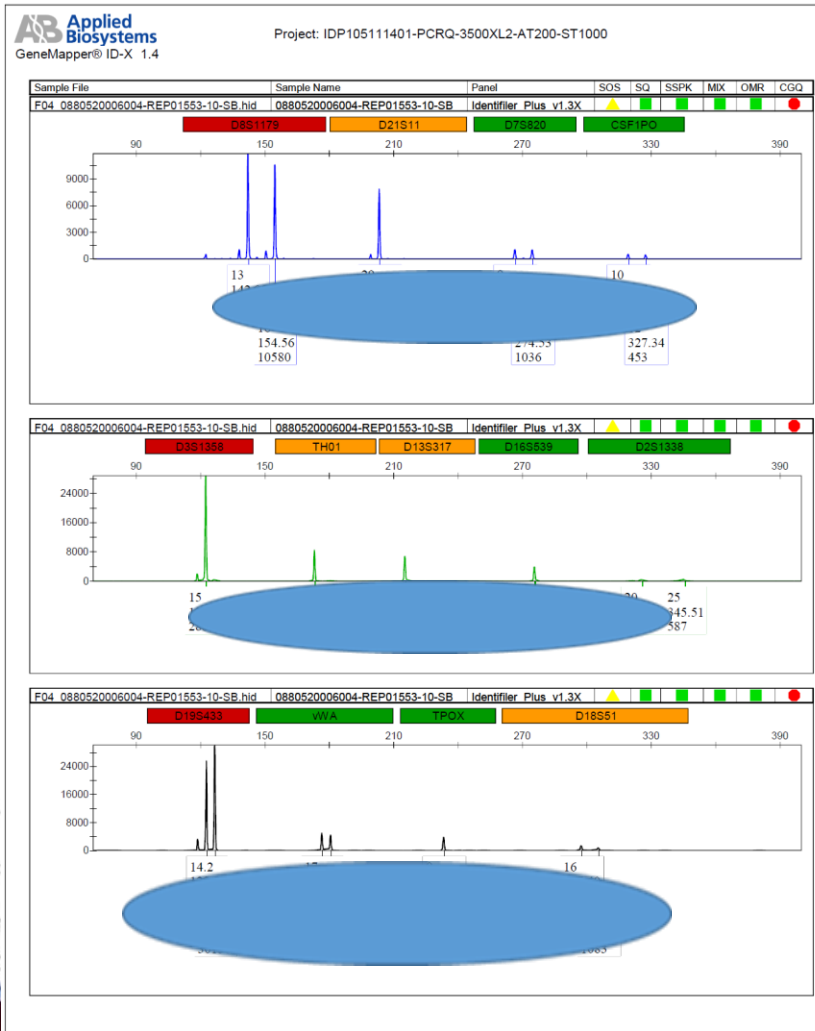
Sperm cell fraction of victim underwear, 1999



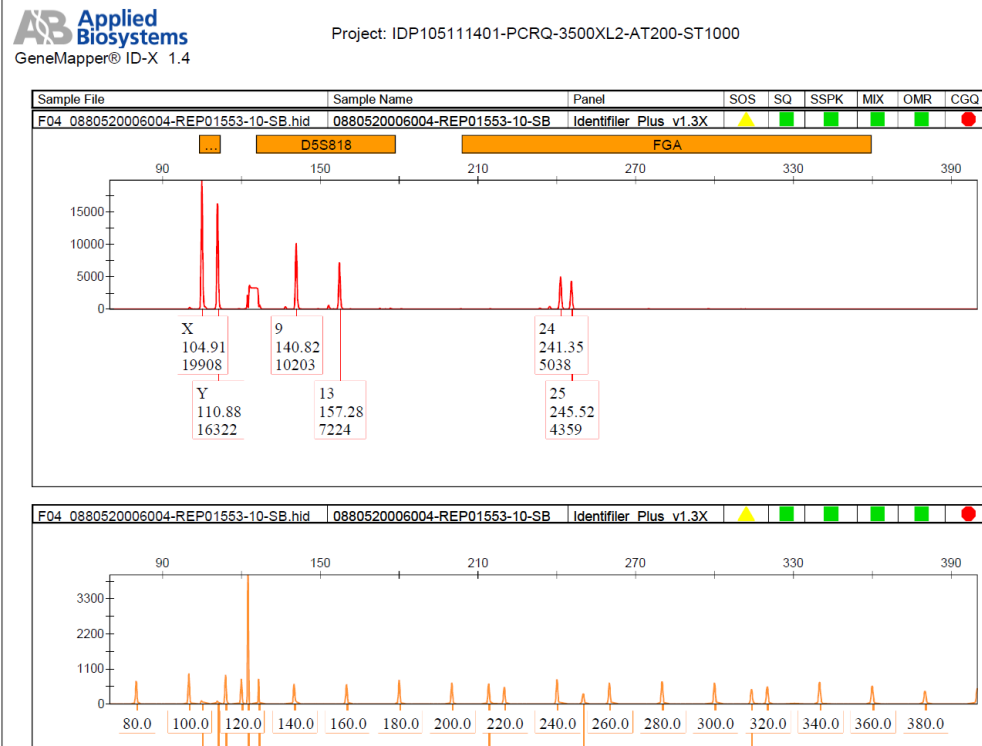
Profiler™ kit: D3S1358, vWA, FGA, TH01, TPOX, CSF1PO, D5S818, D13S317, D7S820 and Amelogenin.

The new DNA-STR typing result

After 17 years of frozen storage



Sperm fraction of victim underwear, 1999



AmpFLSTR Identifier Plus PCR Amplification Kit
Equipment: GeneAmp 9700, 3500xL Genetic Analyzer

The sexual assault offenders got 7 years and 10 month sentence in April 2018.

Two cold cases that happened in 18 years ago will continue to be prosecuted by other trial.

自由時報

Liberty Times Net

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防狼噴霧襲國一女性侵「野狼125之狼」判7年10月定讞



2018-04-17 16:34



〔記者張文川／台北報導〕桃園市49歲男子鄭諺鐘於2016年9月晚間，在桃園大溪騎機車尾隨12歲國一少女，用防狼噴霧劑攻擊，再拖進草叢性侵，恐嚇「再就叫掐死妳」，警方根據機車行跡，循線破案；一、二審都依加重強制性交罪將他判刑7年10月，最高法院今天駁回上訴，全案定讞。



男子鄭諺鐘前年9月在大溪尾隨國一少女，以防狼噴霧劑攻擊，再拖進草叢性侵，被揪出他就是1998、1999年在大溪2起性侵案的「野狼125之狼」，判刑7年10月定讞。（示意圖）

此案也讓警方意外偵破2件高懸17年、18年的性侵案。鄭男落網被起訴後，警方將他的DNA送刑事局鑑識中心，比對歷年未破性侵案檢體，赫然發現他就是1998、1999年在大溪2起性侵案的「野狼125之狼」，慣騎野狼125機車尾隨女子拖入草叢性侵，檢警趕在20年追訴期滿之前意外偵破，桃園地檢署去年已另案起訴，桃園地院審理中。

桃園地區於1998年間出現一名騎著「野狼125」機車的惡狼，在八德、龍潭地區犯下多起性侵案，警方當時追緝未果，惡狼也銷聲匿跡，成為懸案；直到前年9月初惡狼再次犯案，才出現破案契機。

前年9月1日，大溪一名國一女生晚間補習結束走路返家途中，遭到機車男尾隨，在偏僻處將她攔下，以防狼噴霧攻擊她眼睛，架住她脖子拖進草叢，恐嚇「再就叫掐死妳」，以手指、舌頭性侵。

少女哭著奔逃回家，家人發現她外褲反穿，沒穿內褲，身上還有多處擦、挫傷，帶她去報警、驗傷，警方重返現場搜到嫌犯留下的內褲和鞋子，監視器拍到鄭男騎重型機車在現場來回折

性侵害案件服務團隊

Team work
Let criminal
can not be
escaped.
Let our
society be
more safe.



實驗室 DNA物證鑑定



醫院 採集疑似性侵害案件採證盒



社工 訪視



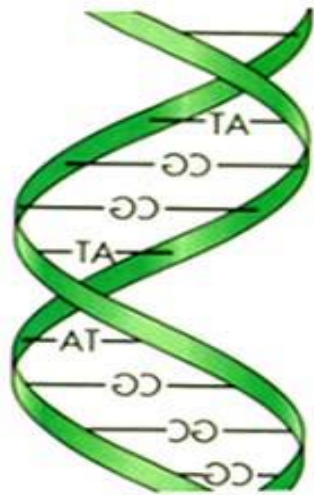
警察 偵辦案件



檢察官 起訴

物證DNA鑑定 提升司法效能 讓連續案件無所遁形



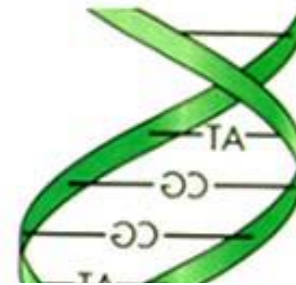
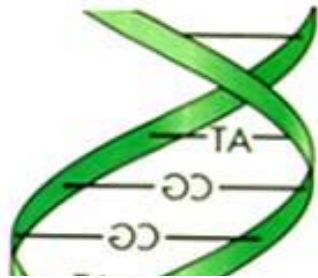


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團隊合作愉快



Thank you for your attention



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