

Juriprudence of Forensics: Applications in Criminal Justice Administration

Dr GK Goswami

IPS (50 RR: UP)

Additional Director General of Police, Uttar Pradesh

Fulbright Scholar [Flex Awardee]

Kumarappa-Reckless Awardee-2019

Honorary Professor at:

National Law University, Delhi

National Forensic Sciences University, Gandhinagar

Rastriya Raksha University, Gandhinagar

Jindal Global Law School, Panipat

Status of Investigation and Trial – Rape Incidents

Sourced from Crime in India - NCRB, New Delhi

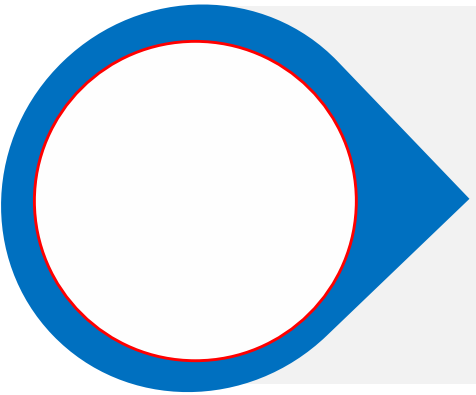
Year	Incidents	Investigation Disposal by Police			Trial Disposal by Courts	
		False cases (%)	Charge-sheet (%)	Pendency (%)	Conviction (%)	Pendency (%)
2021	31,677	-	80.4	39.3	28.6	93.5
2020	28,046	-	82.2	33.2	39.3	94.2
2019	32,033	-	73.7	34.0	27.8	89.5
2018	33,356	7.2	85.3	29.1	27.2	88.7
2017	32,559	7.2	95.8	21.4	34.2	82.1
2016	38,947	7.4	87.6	30.3	25.0	87.7
2015	34,651	7.6	96.1	31.8	29.4	86.2
2014	36,735	7.5	95.6	31.5	28.0	88.4

Bridging gap: Charge-sheet and Conviction ROLE OF CRIMINALISTICS

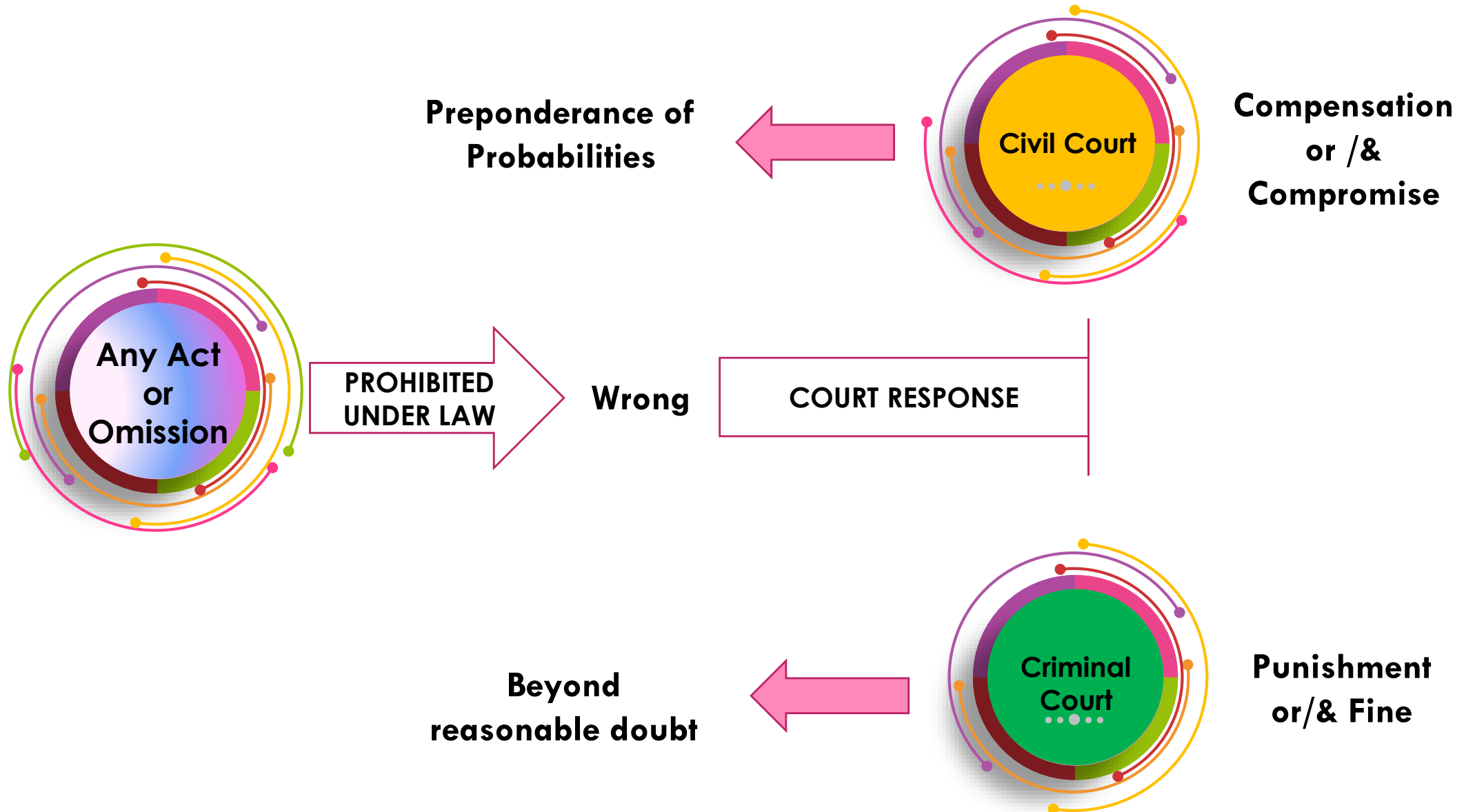
Cases under the POCSO Act, 2012

Source: Crime in India - NCRB, New Delhi

Year	Incidents	Police		Trial Courts	
		Charge-sheet (%)	Pendency (%)	Conviction (%)	Pendency (%)
2021	52,836	94.9	26.2	32.3	92.5
2020	46,123	94.7	28.7	39.6	94.6
2019	47,335	93.3	29.6	34.8	88.7
2018	39,827	94.3	31.3	34.2	90.3
2017	32,608	94.1	33.6	33.2	90.1
2016	36,022	94.2	31.8	29.6	89.0



INVESTIGATION: PROCEDURAL FAIRNESS



Human Identification

1

Morphological features

2

Photography & sketch

3

Fingerprints

4

Serology : blood groups

5

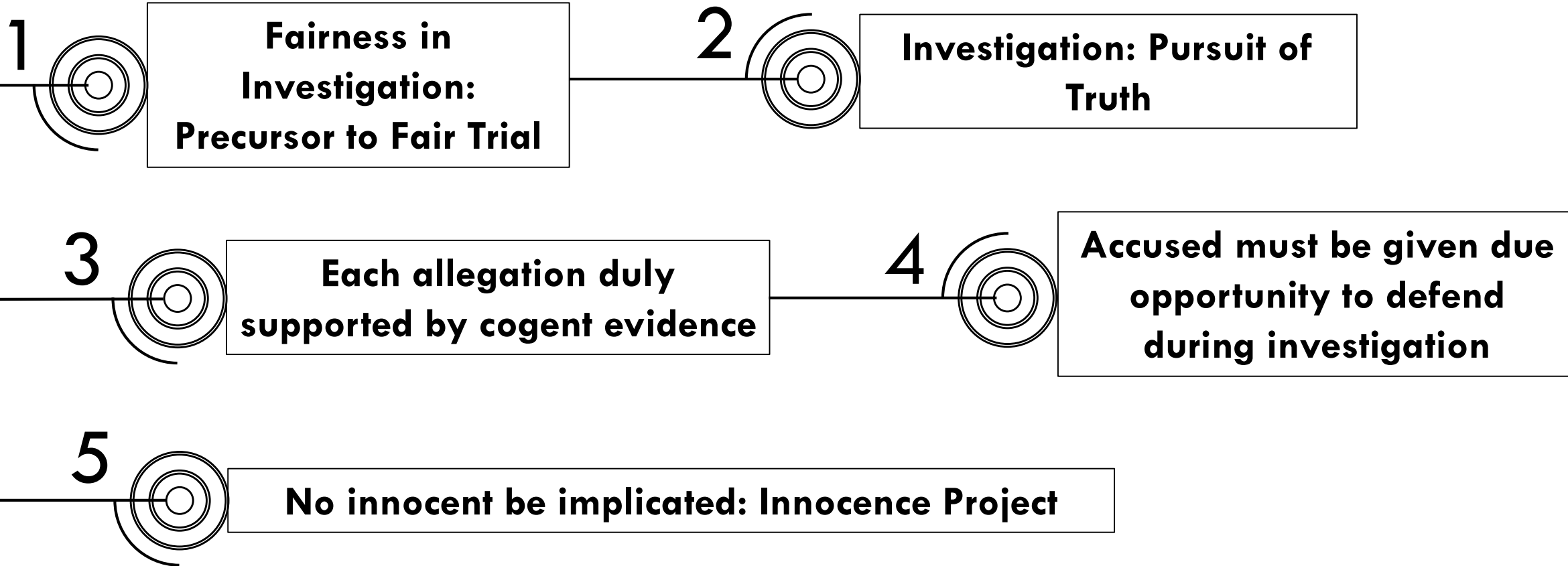
Voice sample

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DNA Profiling

King Solomon's Justice

[Amitbhai Anilchandra Shah v. Central Bureau of Investigation (2013) 6 SCC 348]



Investigation – Need for Scientific Temper

Oral Testimony

No. of Witness

To prove/ disprove a fact
How many? – s. 134 of the IE
Act, 1872

Eye Witness

‘Sterling’ witness

May not always available e.g. Rape
- Planted or interested
- Memory and other issues

Oral Witness

Oral Witness: susceptible for
vendetta, hostility, duress,
intimidation other constraints

CORROBORATION

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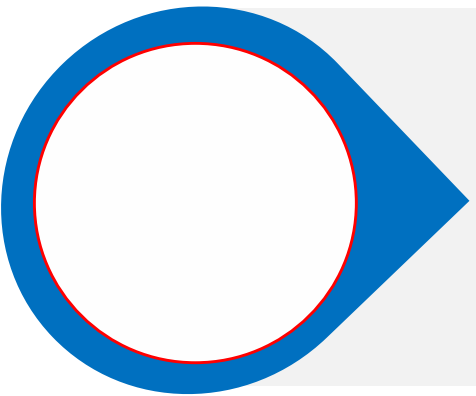
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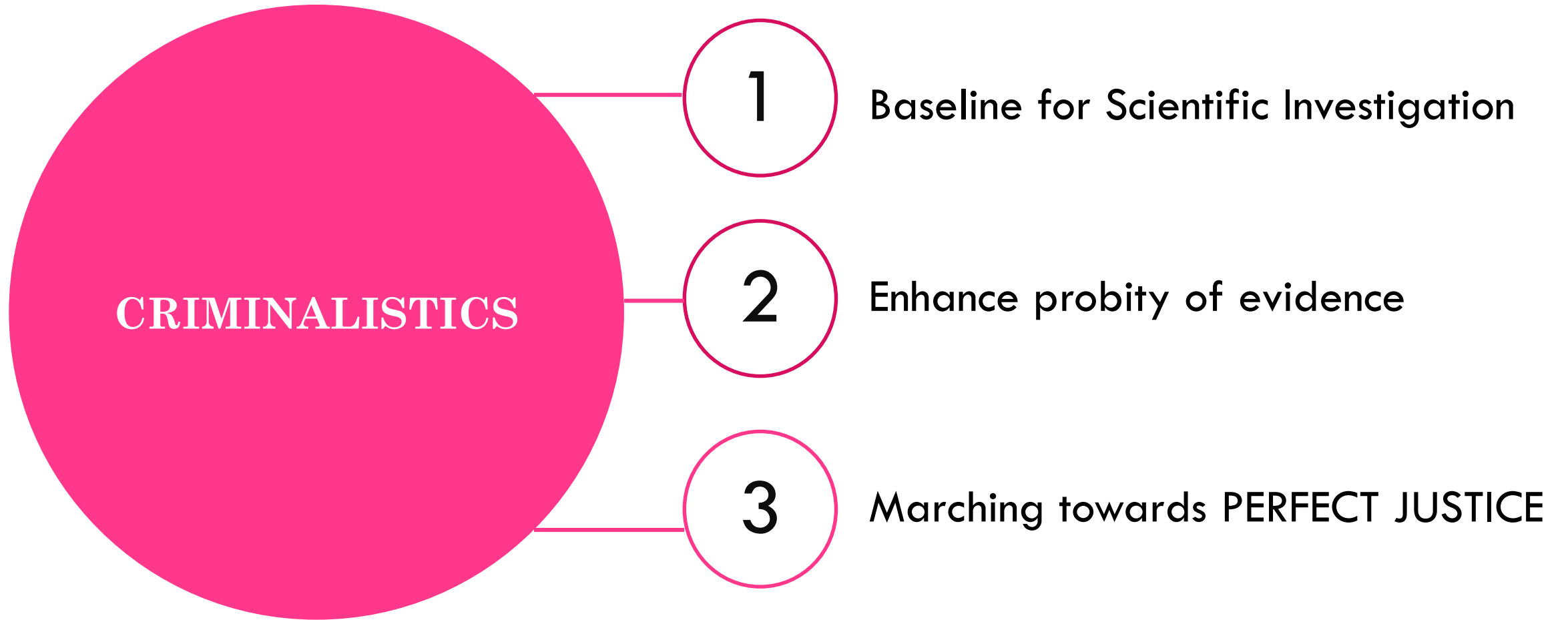
CORROBORATION



Forensic Jurisprudence

ISSUES AND CHALLENGES

Forensic Science: Science blend with Law



Forensic Science – Jurisprudence



Art. 20 of Indian Constitution

*20(1) Post facto law –
Prospective effect*

20(2) Double jeopardy

20(3) Self-incrimination

Testimonial compulsion

Third degree by LEA

Case Laws

Kathi Kallu Oghad v. State of Maharashtra (1961 SC)

Nandini Satpathi v. Union of India (1978 SC)

Selvi v. State of Karnataka (2010 SC)

Ritesh Sinha v. State of UP (2019) SCC OnLine SC 956

Legal Issues: Complexities

Issue of Admissibility & Scientific Certainty

RELIABILITY

- Factual Accuracy (??)
- Retest Reliability: Reproducibility (intra examiner) or Replicability (Inter examiner)
- Consistency
- Trustworthy - truthful

VALIDITY

- ❖ Reliability: precursor to validity
- Foundational Validity: Conceptual or theoretical generalisation
- ❖ Difficult to calibrate and estimate

DDTs:

- ☐ Psycho-physiological analysis
- ☐ No theory could tied physiological changes with deception
- ☐ A scientific test may be scientific but not valid
- ☐ Not admissible as evidence *per se*.

Tests for Admissibility of Expert Opinion

Comparison

Frye Test

Frye v. United States - Lie detector
[293F. 1013 (D.C. Cir. 1923)]
- 'General Acceptance principle' :
Narrow range
- Burden on Scientific Community
States in USA use: 14% Frye, 80%
Daubert and 6% others. Visit:
<https://www.expertinstitute.com/resources/insights/daubert-v-frye-a-state-by-state-comparison/>

Daubert Test

Daubert v. Merrell Dow Pharma. Inc.
[509 U.S. 597 (1993)]
Federal court exclusively use this
standard [Rule 702 of the Federal
Rules of Evidence]
Only 9 US States exclusively use it
Criterion for Test: Wider range
• Test for reliability
• Peer review and publication
• Known or potential rate of errors
• Maintenance of standard
• General acceptance by scientific
community
Burden on Court: 'Gate keeper'

Legal Framework

ISSUES AND CHALLENGES

Indian Evidence Act, 1872:

Opinion of third person, when relevant

S. 45

Opinion of Experts

Foreign law, or

Science, or

Art

**handwriting (or finger
impression)**

S. 46

**Facts bearing upon opinions of
experts**

**Facts not otherwise relevant,
becomes relevant based on
opinion of experts**

Indian Evidence Act, 1872:

Opinion of third person, when relevant [s. 45 to 51]

S. 47

Opinion as to handwriting (written or signed)

Opinion of any person acquainted with handwriting/ signature

Art

Handwriting (or finger impression)

Electronic Evidence

s. 45A (2009) – Opinion of examiner of electronic evidence

s. 47A (2000) – Expert opinion on electronic signature

Indian Evidence Act, 1872

Opinion of third person, when relevant [s. 45 to 51]

s. 48: Custom, when relevant

s. 49: Usage when relevant

s. 50: Relationship when relevant

s. 51: Grounds of opinion when relevant

Forensic Evidence under procedure code

s. 292 CrPC: Evidence of Witness of Mint: Officer of

Mint

Note printing press

Security printing press

Any forensic Department or FSL

State Examiner of Questioned documents

**s. 291 CrPC: Deposition of
Medical Witness**

**Doctor called deponent
– not witness**

Forensic Evidence under procedure code

293(4): Govt. Scientific Experts

(4)(a) Chemical Examiner

(b) Chief Controller of Explosive

(c) Director of Fingerprint Bureau

(d) Director Hoffkine Institute, Bombay

(e) Director (DD/AD) of CFSL or SFSL

(f) Serologist of Government

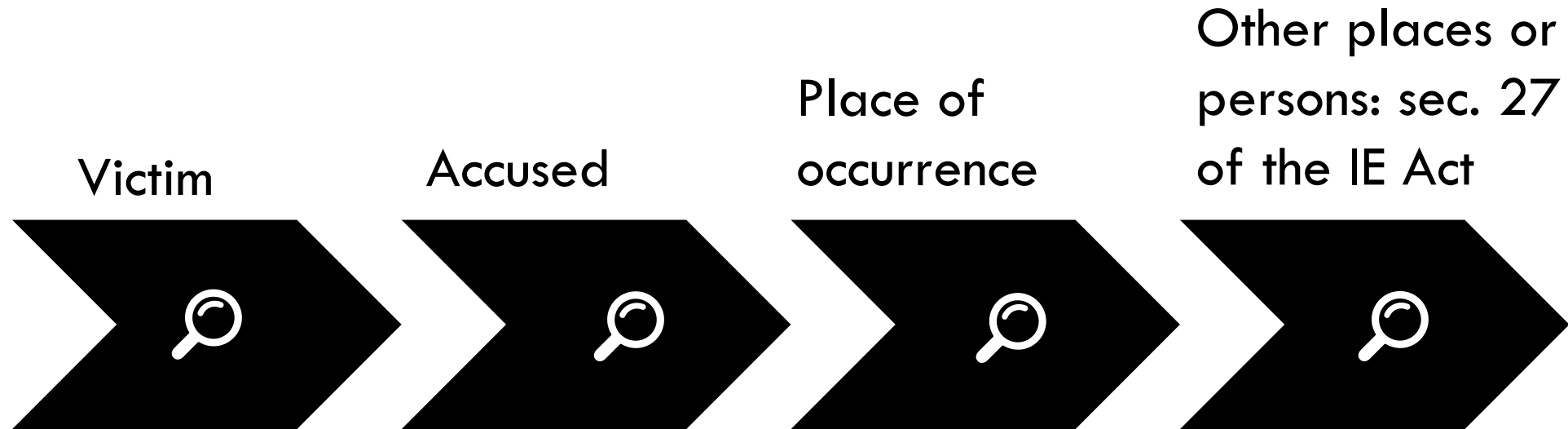
(g) Any other Government Scientific Expert specified by notification by government

S. 293 CrPC: Report of Govt. Scientific Expert

293(1): Report – evidentiary value

Forensic Evidence Collection

Where to get forensic evidence?



Locard's Exchange Principle

Probable Scientific Evidence

Forensic Footprints



Medico-legal report: Bite marks etc.



Documents – writing, signature – GEQD opinion

Fingerprints, footprints, tyre marks etc.
Cyber evidence, Ballistics, acoustics etc.

Deception Detection Techniques (DDTs)



Biological content – serology,
chemistry, Dental Analysis
DNA analysis



Narco-analysis
Polygraph
Brain Mapping (P-300)

Chain of Custody (CoC)

1

CoD procedure for ensuring probity of samples

2

From source to laboratory

3

Unique identifier (RFID)

4

Item description

5

Identity of the person who collected the item

6

Time and date of collection

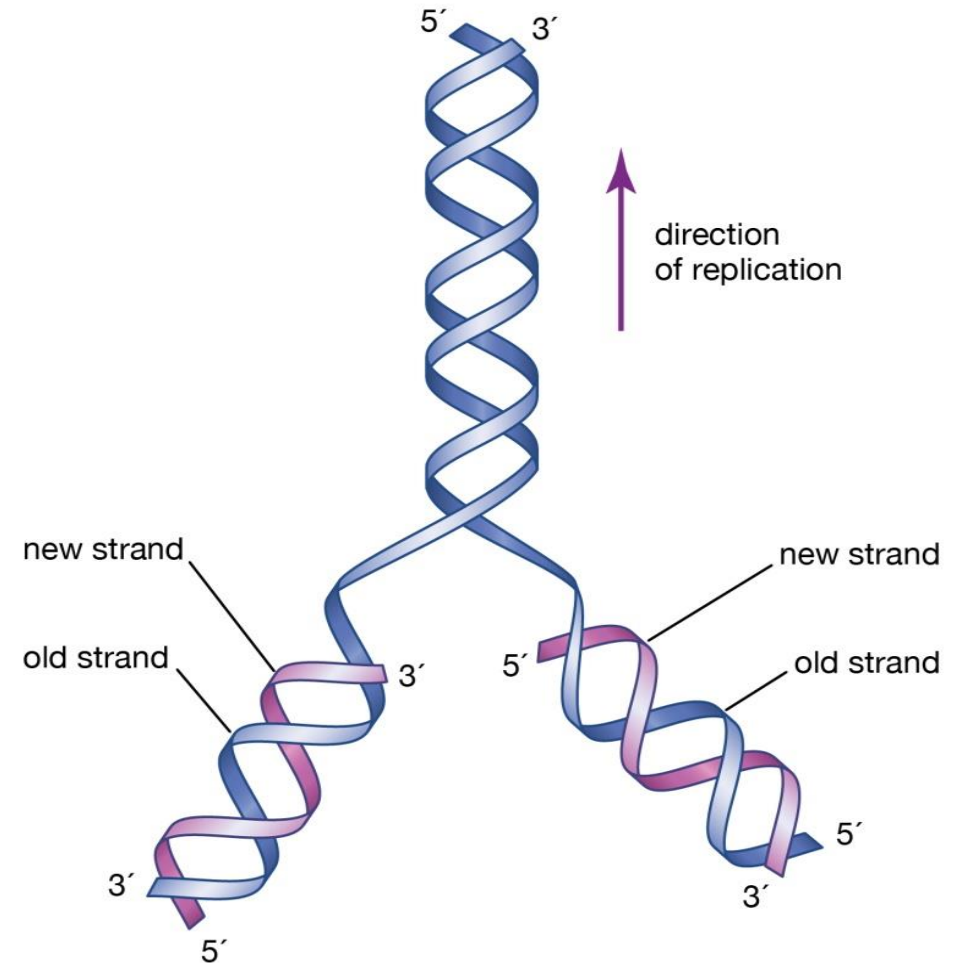
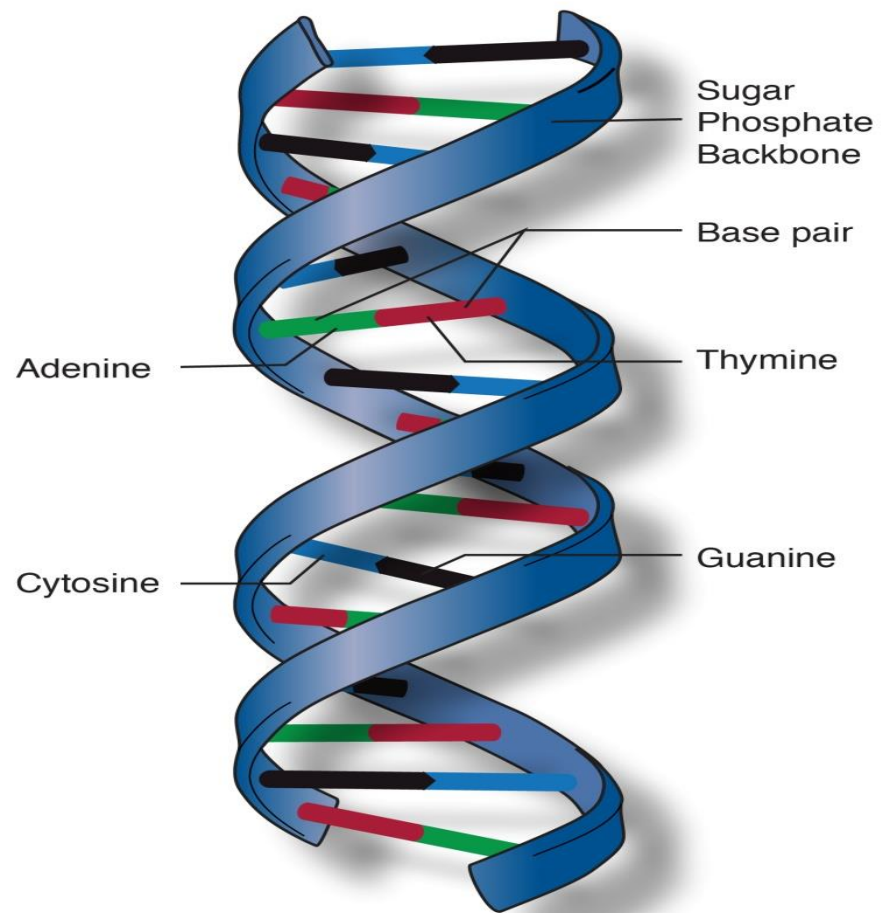
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Acknowledgement with identity receiver of docket

8

Description of docket movement

DNA Structure & Replication



Dr. Alec Jefferey of the University of Leicester called
Father of DNA Profiling.

First introduced into criminal justice system in 1986
when assisted UK Police in investigation of potentially
linked sexual assault coupled with murder of two young
girls.

DNA Technology - a tool in the hands of police - a
prudent “genetic eyewitness”

Milestones in DNA Profiling

1984

1

9 September
[9.05AM – EUREKA]

1985

2

Immigration
dispute
[Civil Litigation]

1986

3

- Rape/Murder (Criminal Court)
- Detective –David Becker
- Richard Buckland (Innocent – Nov 21, 1986)
- Ian Kelly
- Collin pitchfork (accused)
- Convicted 30 y - Jan 23, 1988
- Released in September 2021
- Again recalled for breach of license conditions (stalking women - recidivism) in Nov 2021.

DNA Sampling

s. 53A CrPC

Accused : No consent

s. 164A CrPC

Victim: With consent [Lilu @ Rajesh v. State of Haryana (2013 SC)]

Forensic Misconduct & Frauds

The United States:

❖ **OJ Simpson** (football player): Double Murder in Los Angeles (1993) - including Ms. Nicole Brown Simpson, his ex-wife, First DNA based Exoneration (1994), Contamination, police misconduct by planting evidence, and DNA fraud.

❖ **Amanda Knox (2007)** – Two room female mates were arrested for rape and murder of Ms. Kercher in the US. Cross contamination in sample lifting.

❖ Forensic lab scientist **Annie Dookhan of Massachusetts** admitted in 2012 to falsifying drug tests in 24,000 cases.

India:

Rajiv Singh v. State of Bihar (2015 SCC OnLine 1336).

State (NCT of Delhi) v. Khursheed (2018 SCC OnLine Del 10347)

Ankush Maruti Shinde v State of Maharashtra (2019) 15 SCC 470.

Major Challenges:

- Forensic Frauds - Dry-labbing
- Resources
- Fundamental Issues

Challenges in Forensic Technology

Except DNA Profiling none was invented in lab – stakeholders creation
Lack of research – to establish the uniqueness
Self-proclaimed error free results

A FEW EXAMPLES

1. Fingerprints

- Used in crime since 1907 - considered foolproof – without research data
- Brandon Mayfield case (2004) – Madrid Tran bombing – fingerprint obtained – FBI matched with databank and claimed 100% match with Brandon. Later Spain Police held other accused with cogent evidence.
- Kenny Water case:

2. Bite marks

3. Hair Match

Precautionary Alerts

Sampling Level

- Contamination
- Loss
- Degradation
- Manipulation
- Tampering



Diagnostic Centres

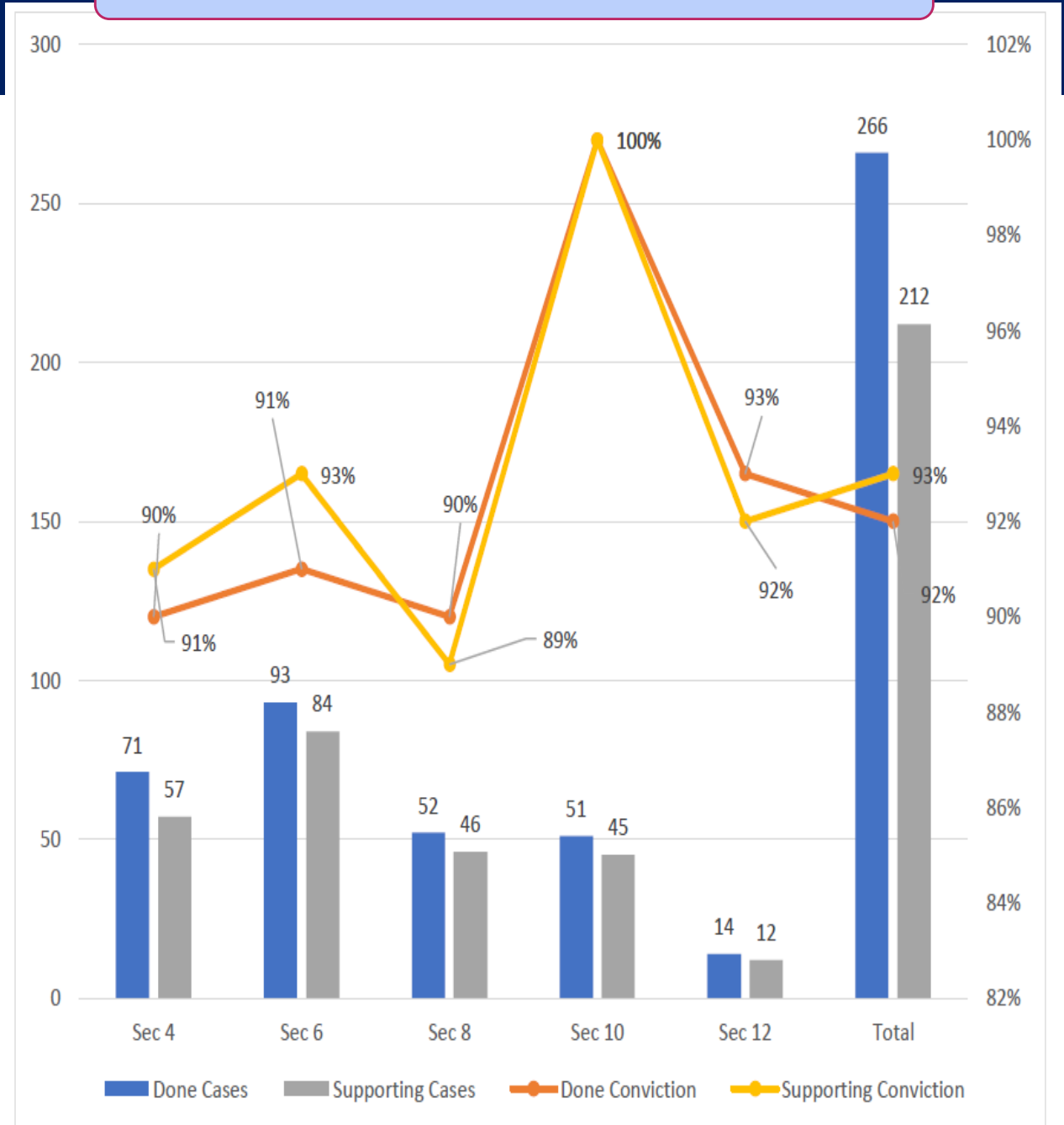
- Accreditation of labs and procedures
- Expert's expertise: Education & Experience
- Metadata
- Integrity of Reporting: **Forensic Frauds***

**[Rajiv Singh v. State of Bihar (2015 SCC OnLine 1336); State (NCT of Delhi) v. Khursheed (2018 SCC OnLine Del 10347)]*

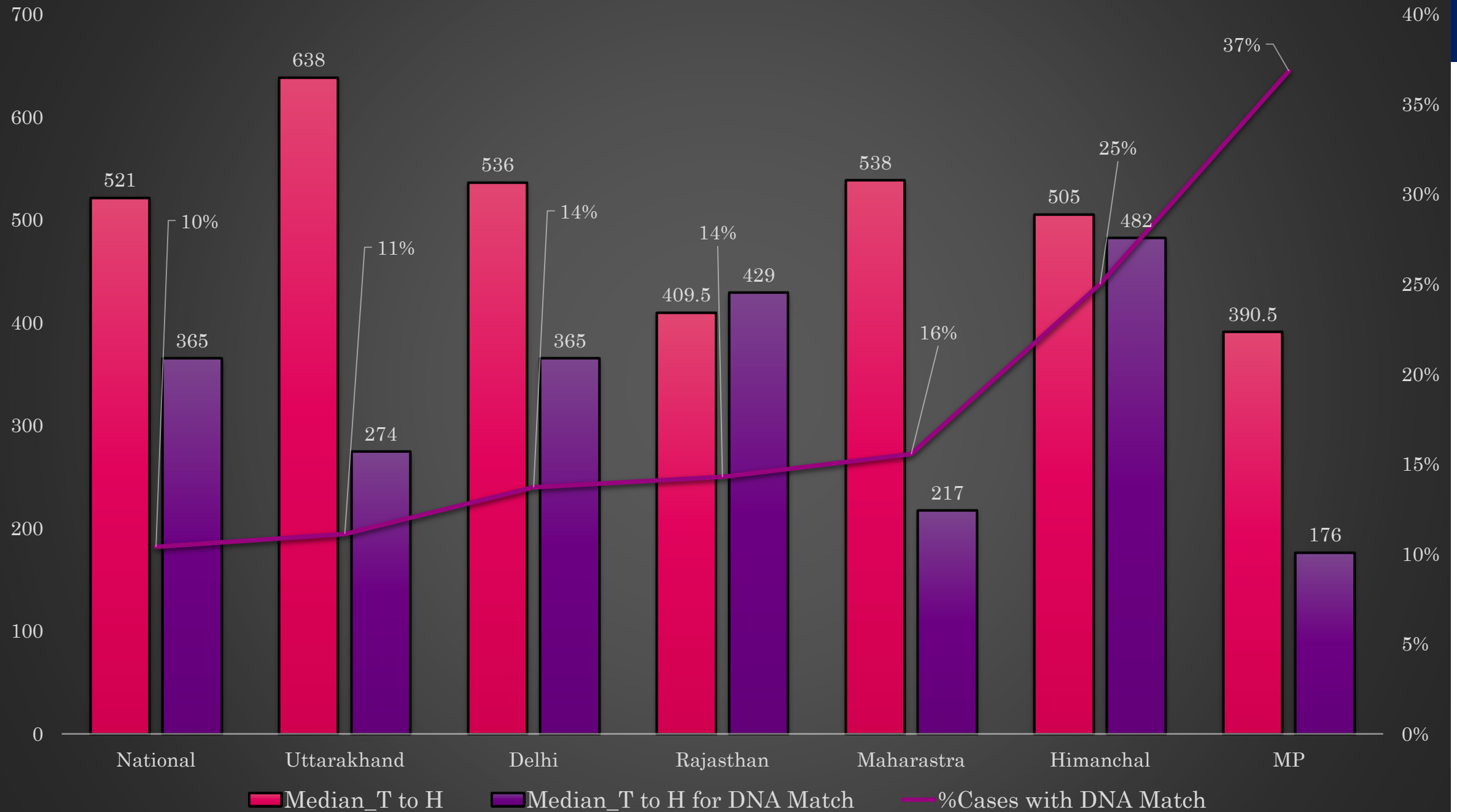
Impact of DNA, Medical and S. 164 CrPC Statement

Indian States	% Conviction if DNA Matched
Delhi	88%
Maharashtra	71%
Himanchal	71%
MP	100%
Uttarakhand	100%
Tripura	100%
National	81%

❖ If Medico-legal exam and DNA both are positive – Conviction rate 94%



DNA Test Conduction vis-a-vis Time for Judicial Process



**Action Plan for Uttar
Pradesh Police**

Investigation

- **Scientific approach**
- **Emphasis on corroboration**
- **Professionalism**
 - **Specialized Teams**
 - **Procedural ISO Certification**
- **Transparency in evidence collection**
- **Sharing inculpatory evidence**

Forensic Inputs

- **Crime lab vs. Forensic Laboratories**
- **Recruitment of Experts**
- **Periodical training**
- **Annual Certification of Forensic Practitioners by Independent Agency**
- **Blind Peer Review of Forensic Reports - Third party Evaluation**
- **Unified Format of Expert Reports**
- **Accreditation of Lab - ISO Certification 17020 (confidentiality), 17025 (Procedural validation)**
- **Administrative control: Independent Forensic Science Commission**
- **Coding of samples – to conceal identity**

Prosecution

- **Specialization**
- **Calendar of Evidence**
- **Prosecution Integrity Unit**
- **Learning from the Past**

Virtopsy

Non-invasive technique for post-mortem – scalpel free procedure

Based on 3D Scanning and Imaging – [Multi-slice Spiral Computed Tomography (MSCT) and Magnetic Resonance Spectroscopy]

Advantages:

- Non-invasive – bloodless procedure - preserves human dignity of a dead person**
- High Precision, Contamination free sampling for poison, tissues etc.**
- Observer Independent – minimize human errors**
- Illustrative and Reproducible – preserve every details forever**
- Medico-legal reconstruction**

Limitations:

- High cost**
- Color of internal organs**
- Decomposed bodies**
- Validation challenge - National Council**

USA has approve it 'Best Practice'.

Note: This technique supplements the conventional autopsy.

Q&A SESSION





Thank You