

PRESENTERS

Dr John Buckleton, Principal Scientist, Environment and Scientific Research, Auckland

Dr Buckleton has an outstanding international reputation in the analysis and interpretation of forensic evidence. He has led the way in the application of DNA-based methods for matching of forensic samples to archived records in databases; and refined analytical methods for DNA profiling used in New Zealand. The author of over 100 significant publications and patents, John is regularly called upon to appear as an expert witness in New Zealand courts and has appeared as an expert witness in several high profile cases in overseas courts.

Craig Ruane, Barrister, Christchurch

Craig was admitted in 1980 and is a barrister practising in Christchurch, after several years as a senior prosecutor with the Crown Solicitor's Office in Christchurch. A steady diet of Sherlock Holmes and "Notable British Trials" nurtured an interest in things forensic as an adolescent. Regular practice in the criminal courts has confirmed his view that a thorough understanding of scientific evidence is essential for the criminal advocate. He has co-ordinated the NZLS CLE Duty Solicitor training programme in Christchurch and Sentencing and Pleas in Mitigation workshops nationally, and is a faculty member of the Litigation Skills programme.

Acknowledgement

Figures 2 to 10 are reproduced from the subscription service Expert Evidence, published by Lawbook Co., an imprint of Thomson Reuters (Professional) Australia Limited with the permission of Thomson Reuters:

<http://www.thomsonreuters.com.au>.

The statements and conclusions contained in this booklet are those of the author(s) only and not those of the New Zealand Law Society. This booklet has been prepared for the purpose of a Continuing Legal Education course. It is not intended to be a comprehensive statement of the law or practice, and should not be relied upon as such. If advice on the law is required, it should be sought on a formal, professional basis.

CONTENTS

INTRODUCTION	1
THEORY OF THE CASE	1
BASIC PRINCIPLES	4
QUALIFICATION OF EXPERT WITNESSES	6
AVAILABILITY OF EXPERT WITNESSES.....	8
THE CRIME SCENE INVESTIGATION (“CSI”) EFFECT.....	8
ACCESS TO PROSECUTION EXPERTS.....	9
<i>Code of Conduct for Expert Witnesses</i>	9
BLOOD - IDENTIFICATION AND CHARACTERISATION	11
HISTORY AND BACKGROUND	11
BLOOD TYPING PRINCIPLES	11
WHAT IS BLOOD?	13
FORENSIC ANALYSIS	14
<i>Is it blood?</i>	14
<i>Is it human blood?</i>	14
<i>Individualisation</i>	15
DNA.....	17
HISTORICAL BACKGROUND	17
BIOLOGICAL BACKGROUND	18
INTERPRETATION	24
ASSESSING THE FREQUENCY OF THE PROFILE.....	24
<i>Population genetic models</i>	24
<i>Product rule</i>	24
<i>NRC II Recommendation 4.1</i>	25
<i>The subpopulation formulae</i>	25
<i>Certainty</i>	25
<i>Mixtures</i>	28
<i>RMNE</i>	28
<i>LR</i>	28
<i>The issues</i>	29
<i>Posterior odds = likelihood ratio x prior odds</i>	29
<i>Low level DNA</i>	32
<i>Database hit</i>	33
BLOOD SPATTER AND BLOODSTAIN PATTERN ANALYSIS	35
USE OF BLOODSTAIN PATTERN ANALYSIS.....	35
CAUSE OF BLOOD SPATTER – ENERGY TRANSFER	35
CLASSIFICATION OF BLOODSTAIN PATTERNS.....	35
EFFECT OF THE RECEIVING SURFACES SHAPE AND TEXTURE	36
STAIN SHAPE	36
ANGLE OF IMPACT CALCULATION	38
REGION OF ORIGIN	39
BLOODSTAINS ON CLOTHING.....	40
<i>Importance</i>	40
<i>Analysis</i>	40
<i>Other considerations</i>	41
RECONSTRUCTION OF BLOOD SPATTER EVENTS	41
<i>Importance in casework</i>	41
<i>Methods</i>	41
FIREARMS.....	43
INTRODUCTION	43
INDIVIDUALISATION.....	43

EXPERTS	44
DEFINITIONS - ARMS ACT	44
FIREARMS IDENTIFICATION	46
<i>Impressed and striated marks</i>	46
<i>Class and individual characteristics</i>	46
<i>Calibre and gauge</i>	47
<i>Ammunition</i>	49
<i>Head stamps</i>	51
RELATED TOPICS	51
<i>Unintentional discharge</i>	51
<i>Firing distance determination</i>	52
<i>Propellant residue patterns</i>	52
<i>Firearm discharge residues</i>	52
WOUND EXAMINATIONS.....	54
SUCK-BACK EFFECT	54
ACTION TYPES.....	54
GLOSSARY	55
FINGERPRINTS	69
HISTORY	69
FINGERPRINT IDENTIFICATION IN NEW ZEALAND.....	71
PHYSIOLOGY OF FINGERPRINTS	71
FINGERPRINT CLASSIFICATION AND IDENTIFICATION	72
<i>Class characteristics</i>	73
<i>Fingerprint pattern classification</i>	73
<i>Fingerprint identification</i>	74
<i>Latent fingerprints</i>	77
<i>Fingerprint detection and enhancement</i>	78
<i>Human skin</i>	79
<i>Recording of fingerprint evidence</i>	79
<i>Age estimation</i>	79
FORGED AND FABRICATED FINGERPRINTS	80
<i>Forged fingerprints</i>	81
<i>Fabricated fingerprint evidence</i>	81
INTERPRETATION OF SCIENTIFIC EVIDENCE	83
<i>Same language, different meaning</i>	83
<i>Likelihood ratios and probability</i>	84
<i>The prosecutor's fallacy</i>	86
<i>Defence counsel's fallacy</i>	87
SOURCES	89