

AN EXCURSION DOWN AN OUTBACK AUTOMATION HIGHWAY: THE PROGRESSION OF AN AUSTRALIAN FORENSIC BIOLOGY LABORATORY TOWARD AN AUTOMATED, HIGH-THROUGHPUT FACILITY

Brendan Ryan Chapman¹, Desley J. Pitcher², and Lois C. Tack³

¹*PathWest Laboratory Medicine WA. QEII Medical Centre, Nedlands, WA*

²*PerkinElmer Australia, Melbourne, Vic*

³*Application Sciences Group, PerkinElmer LAS, Downers Grove, IL*

In 2005, PathWest Forensic Biology installed its first robotic liquid handling platform, the PerkinElmer MultiPROBE® II HT EX System. Since then, the platform has been used for the routine extraction of blood stained Volume Crime samples. It was also used to successfully process 130 human tissue samples from a light aircraft crash within an approximate 48 hours. With further funding to expand the use of liquid handlers and ancillary integrations, a new project was launched to acquire additional robots for both our casework and reference laboratories. These included multiple, mid-size footprint robots for trace DNA extraction and FTA setup and, additionally, several smaller size platforms for downstream applications such as DNA quantification, amplification and post-PCR human identification setup.

With the purchase of six JANUS® robotic platforms from PerkinElmer, an evaluation of our current automated DNA extraction protocol was conducted. After a review of reported advances and research, a series of modifications were made to the working Promega DNA IQ™ System method used by Forensic Biology. Efficiency of the kit was measured quantitatively. Over a 4-fold gain in DNA yield was achieved after modification of existing physical and chemical aspects of the Promega kit and by trialing alternative hardware to enhance binding. Further recovery gains have been achieved with the incorporation of carrier RNA into the system. Our goal is to completely automate processing of all blood and trace DNA samples received from crimes in Western Australia.