No Safeguard on Duty: Expert Evidence in Aquatic Death Cases

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ABSTRACT

When a person dies by drowning, expert opinion evidence can assist the trier of fact with understanding key issues such as the time, medical cause, and manner of death. At the same time, there are well-documented risks that triers of fact may not be properly equipped to scrutinize expert methods and qualifications, or they may give expert opinions more weight than they should. For drowning deaths, an inequality of resources between the Crown and the accused may make this specialized area inaccessible for defence counsel prior to a trial, when an accused person is faced with the decision to plead guilty. In this paper we review the scientific literature and compare it to principles that have been recognized in reported decisions on drowning deaths to see if the concepts adopted by the courts reflect established science. While most experts in our sample met standards of practice, in a limited number of cases unsound science was deemed to be admissible in the pre-trial *voir dire,* after which accused persons pleaded guilty. These findings shed light on a different, but just as dangerous, misuse of expert evidence as a tool to extract guilty pleas before they can be properly tested during a trial. We conclude that the current legal test does not eliminate the risks of expert opinion evidence, rather, it shifts it from the triers of fact to those accused of committing crimes, offering them insufficient protection when they are in a particularly vulnerable position.

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In this way, drowning deaths provide an example of the ways expert evidence can be used problematically in other factual contexts.
Keywords: criminal procedure, experts, aquatic death, drowning, guilty pleas, evidence

I. INTRODUCTION

On the night of August 19, 2000, Richard Glover and his wife Kelly were staying at a campground on the Muskoka River. At around 10:00PM they put their two young sons to bed in the tent and went out to the dock to look at the stars.[1] According to Richard, Kelly fell in the river and, because it was late at night and the river was moving, he was unable to find her to help her out before she drowned to death.

Consistent with Richard's account of what happened, two pathologists examined Kelly's body and found no signs of a struggle. However, the Crown had circumstantial evidence that Glover was having an extra-marital affair – a potential motive to kill his wife – so they hired an external expert, Dr. Harpur. Dr. Harpur concluded that it was unlikely that Richard was unable to locate Kelly that night in the river. Dr. Harpur came to this conclusion by conducting experiments where he had a research assistant fall into a pool and remain completely passive. Dr. Harpur then timed how long it was before some part of her body surfaced and measured how far she was from the edge of the pool when that happened.[2] Though Dr. Harpur's experiments were of dubious value in determining how a body would float and move in a river, the defence did not have its own expert to counter Dr. Harpur's evidence. Based on his experiments, Dr. Harpur's opinions about "whether and how bodies surface after falling into water and float after drowning" as well as his observations relating to the pool experiments were ruled as admissible in a pre-trial *voir dire*.[3] Two weeks after Justice Weekes decided to allow Dr. Harpur's evidence – and just four days before jury selection was set to begin on his trial - Richard Glover pleaded guilty to second degree murder and was sentenced to life in prison with no eligibility for parole for 11 years. [4]

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1 *R v Glover*, 2006 CanLII 19450 (ONSC) at para 1 [*Glover 1*].

2 *Ibid* at para 3.

3 *R v Glover*, 2006 CanLII 19437 (ONSC) at para 7 [*Glover 2*].

4 See Jack Tynan, "Judge hands down 11 year term for drowning" (30 June 2006), online: <https: www.muskokaregion.com/news-story/3606457-judge-hands-down-11-year-

Richard Glover's conviction illustrates how experts contribute to an informational imbalance between the Crown and an accused that can be used to coerce a guilty plea before an expert's opinion can be tested during a trial. Compared to the Crown, defence counsel has limited time and resources at their disposal, which restricts an accused's ability to conduct their own investigation or counter the conclusions of a Crown's experts. Moreover, the quality of expert information may be difficult to challenge because aquatic death is a specialized topic. In this paper we take aim at this informational deficit between the Crown and defence counsel in aquatic death cases by providing an overview of some key concepts relating to aquatic deaths. In the first part, we suggest those accused of committing a crime are particularly vulnerable to the risks of expert evidence because they are often pitted against an expert in a credibility contest, bearing the consequences of a loss. Though it exists in other contexts, the informational gap between the Crown and the accused is exacerbated in water-related deaths because of the specialized nature of the topic and the imbalance of resources available to hire an expert.

In the second part we take a deeper dive on the science of aquatic deaths by providing an overview of essential concepts: the determination of medical cause of death as drowning and the post-mortem journey of remains. We conduct a targeted search of all reported decisions involving drowning deaths where experts were called to testify, and then situate these cases within the science of aquatic deaths - providing a definition of drowning; how the medical cause of death determination of drowning is reached by exclusion; and the difference between wet drowning and dry drowning. For the post-mortem journey of remains, we explain how diatoms can be used to determine where a death takes place; factors that affect decomposition in aquatic environments; and buoyancy – the post-mortem body movement across different aquatic environments. While most cases align with scientific standards, in a limited number of cases unsettled areas of science were accepted by courts and unreliable experiments – such as Dr. Harpur's – were deemed admissible.

We conclude that the current legal test does not eliminate the risks of expert opinion evidence in drowning death cases. Rather, it shifts it from the triers of fact to those accused of committing crimes - offering them insufficient protection when they are in a particularly vulnerable position

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term-for-drowning/> **[perma.cc/A4SW-ZDPX]**, Mr. Glover had lost on other pre-trial motions as well: on May 15, 2006 Justice Weekes had also admitted a number of statements into evidence and ruled there was no violation of Mr. Glover's *Charter* protected right to counsel, see *Glover 1*, *supra* note 1 and on May 23, 2006 ruled certain search warrants were valid, see *R v Glover,* 2006 CanLII 19448 (ONSC) [*Glover 3*].

before a trial. Our hope is in providing general information on drowning deaths here; those who work with people charged with aquatic deaths will have familiarity in key concepts that will assist with pre-trial scrutiny of expert conclusions and pre-trial decision making.

II. THE RISKS OF EXPERT EVIDENCE IN AQUATIC DEATHS

Canadian courts are alive to the risks of expert evidence. Some of the risks discussed in case law include that its probative value may be overborne by its prejudicial effect; it may take up a great deal of time during a trial that is not commensurate with its value; and it can be misleading in the sense that its effect on the trier of fact, particularly a jury, is out of proportion to its reliability.[5] There is the risk that, armed with credentials and expertise on a topic outside the scope of a lay person, juries would defer to an expert's opinion rather than carefully weigh it.[6] Surrounded by the "mystique of science" the expert can exert a great deal of influence over juries, who could replace their own fact findings with the expert's conclusions.[7] There is also the danger that experts have drawn conclusions on the basis of insufficient qualifications or unreliable experiments, which would make their evidence prejudicial and not probative.[8]

To address these risks, the rules of evidence and procedure have introduced trial safeguards. The party seeking to admit expert testimony must give notice of their intent to do so thirty days before the start of a trial and must not call more than five experts without first obtaining leave of the court.[9] Expert opinion evidence is presumptively inadmissible and the party seeking to admit it must establish its admissibility on a balance of probabilities in a pre-trial *voir dire*.[10] In this *voir dire,* trial judges act as a gatekeeper and determine whether the expert's evidence is necessary, relevant, not subject to an exclusionary rule, and that the expert is properly qualified – criteria frequently referred to as the "*Mohan* factors" after their

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5 *R v Mohan,* 1994 CanLII 80 (SCC) at para 28 [*Mohan*].

6 *Moustakis v Agbuya,* 2023 CanLII 6012 (ONSC).

7 *R v J-L.,* 2000 SCC 51 at para 28.

8 *Mohan, supra* note 5 at para 23.

9 *Criminal Code*, RSC 1985, c C-46, s 657.3(1) [*Code*]; *Canada Evidence Act,* RSC 1985, c C-5, s 7 [*CEA*].

10 *Mohan, supra* note 5 at para 25.

originating case, *R v Mohan.* [11] If the *Mohan* factors are satisfied, then the judge further considers whether the benefits of admitting the expert testimony outweighs any potential risks it presents to the trial.[12] If an expert's evidence is deemed admissible at the pre-trial *voir dire,* then the expert can give their evidence at the full trial later on, subject to cross examination.

An important limitation on expert evidence is that an expert should not give an opinion on the accused's guilt.[13] Expert reports will provide information about the expert - their qualifications, employment and educational experience, instructions that were provided to them for a particular case, and any assumptions used to arrive at that opinion. [14] Expert reports may also include a description of any research conducted by that expert to support their opinion.[15] Expert opinions are meant to assist with fact finding, leaving legal questions to the judge or jury.

These rules of evidence and procedure attempt to address the risks that expert evidence presents to juries but are not attuned to the risks experts present to an accused's decision making prior to a trial. Like members of the jury, those accused of a crime are likely to be lay persons who do not have an understanding of the specialized topic an expert has acquired through their education and experience. Those accused of crimes share the risk of reasoning errors related to expert credentials and giving expert's opinions undue weight. However, unlike members of a jury – who are impartial third parties to a dispute - the accused's account of events is pitted against that of the expert. When an expert satisfies the *Mohan* criteria in the pre-trial admissibility hearing, then a judge has effectively indicated to an accused person – whose testimony would contradict that expert's account - that they think that the expert's testimony is credible. Though the judge is exercising their gatekeeping role by ensuring that unreliable and unduly prejudicial expert evidence is not introduced in a trial, the accused

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11 *Ibid.*

12 *White Burgess Langille Inman v Abbott and Haliburton Co.,* 2015 SCC 23 at paras 23-24.

13 *R v Van,* [2009] 1 SCR 716.

14 *Supreme Court Civil Rules,* BC Reg 168/2009, British Columbia, rule 11-6.

15 A good resource to assess standards of practice and what would be qualified as forensic science experimentation can be found in the National Institute of Standards and Technology's Organization of Scientific Area Committees for Forensic Science (OSAC) Registry National Institute of Standards and Technology, "OSAC Registry" (last updated 9 May 2024) online: <https://www.nist.gov> **[perma.cc/J85G-UPYX].**

may be left with the impression that the judge believes the expert and would therefore be unlikely to believe the accused.[16]

If an accused does not think they would win this credibility contest with an expert, it exerts a powerful incentive to plead guilty. The decision to plead guilty is a rational one: in deciding whether or not to plead guilty, an accused person will weigh the likelihood of success at trial against the maximum possible penalty for the offences they are charged with.[17] In a series of experiments testing the influence of expert testimony in this pre-trial decision making, Saul Kassin and colleagues find that individuals are more likely to plead guilty to a crime they did not commit if they believe that there is an expert that will testify that they did it.[18] Kassin's experimental findings are reflected in actual trials, where a large proportion of exonerees who pleaded guilty to crimes they did not commit in the US (25 per cent) and Canada (18 per cent) were facing expert evidence which

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16 Anecdotally, exonerees such as Maria Shepherd and Brenda Waudby have explained how the prospect of facing Dr. Charles Smith – Canada's Chief Paediatric Forensic Pathologist at the time - made them feel like their claims of innocence would not be believed, see Steve Paikin, "The Disgrace of Charles Smith" (17 January 2017) at 00h:04m:00ss – 00h:04m:40s online (video) <https://www.tvo.org/video/the-disgrace-of-charles-smith> [**perma.cc/W7XC-66XD**]; The Current with Matt Galloway (18 April 2023) on *The Current*, CBC Radio, online: <https://www.cbc.ca/listen/live-radio/1-63-the-current> [**perma.cc/QE2V-3PNX**].When interviewed about Dr. Evan Matshes' testimony that she drowned the toddler she was taking care of, Tammy Bouvette said, "No one wanted to hear my side," see The Fifth Estate, "The Autopsy" (12 June 2020) at 00h:24m:47s online (video): <https://youtu.be/-lTldgjb8tw?si=2cgOAsETcBRGGoqX> [**perma.cc/ZV9H-Y2K4**]. Shelby Herchack, who was wrongfully convicted of killing her infant due to Dr. Matshes' testimony (which was later overturned on review) said: "All the stuff that [Matshes] said… the judge and the jury would have believed him over anything I would have said so two days before my trial was set to being I took a plea for manslaughter." (The Fifth Estate at 00h:22m:49s).

17 Stephanos Bibas, "Plea Bargaining Outside the Shadow of the Trial" (2004) 117 Harv L Rev 2463. The rates of false guilty pleas is likely greater than that represented in wrongful conviction registries: Public Prosecution Service of Canada, *Innocence at Stake: The Need for Continued Vigilance to Prevent Wrongful Convictions in Canada* (Ottawa: Public Prosecution Service of Canada, 2018) at 170; Joan Brockman, "An Offer You Can't Refuse: Pleading Guilty When Innocent" (2010) 56 Crim LQ at 3; Christopher Sherrin "Guilty Pleas from the Innocent" (2011) 30 Windsor Rev Legal Soc Issues at 18; Kent Roach, "Wrongful Convictions in Canada" (2012) 80:4 U Cin L Rev 1465 at 1466-1467 and 1475-76; Kent Roach "The Wrongful Conviction of Indigenous People in Australia and Canada" (2015) 17 Flinders Law Journal 203 at 205.

18 Saul Kassin, "False confessions: How can psychology so basic be so counterintuitive? (2017) 79:2 American Psychologist 951; Saul Kassin, "The social psychology of false confessions" (2015) 9:1 Social Issues and Policy Rev 25-51.

later turned out to be faulty.[19] The actual number of guilty pleas that are influenced by experts is likely much higher, since 90 per cent of criminal matters are resolved by guilty plea[20] and these registries only include information on individuals who have been exonerated after their convictions.[21] For drowning deaths, experts likely exert a good deal of influence over the decision to plead guilty because of the specialized nature of medical information relating to drowning deaths and the inability of the court to properly scrutinize an expert's qualifications and methods.

A. The Specialized Nature of Information Relating to Aquatic Deaths

The topic of drowning death and underwater body decomposition are out of reach to most people who do not have specialized training or experience, making expert conclusions difficult to scrutinize. When a person dies in a body of water, a pathologist determines the medical cause of death after conducting a combination of post-mortem computed tomography (PMCT), autopsy, and review of relevant reports from toxicology, forensic anthropology, and/or forensic entomology. This information is then relayed to a medicolegal death investigator, who ultimately determines the manner of death, making it the most significant part of an investigation.

The professional who is qualified to make this drowning diagnosis differs by province. In some jurisdictions, the death investigator is also a trained medical examiner – a medical doctor that often specializes in forensic pathology.[22] In some provinces, there is a coroner's system where

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19 As of February 2024, there were 90 wrongful convictions in Canada. Of those, 16 involved false guilty pleas and of those who pled guilty, nine involved faulty forensic expert evidence: O'Neil Blackett, Tammy Bouvette, Richard Brandt, C.F., C.M., Dinesh Kuma, Maria Shepherd, Sherry Sherret-Robinson, and Brenda Waudby (see Canadian Registry of Wrongful Convictions, "Wrongful Convictions Data Visualized" (2024) online: https://innocenceproject.org/exonerations-data/ [**perma.cc/VAP9-UY5A**]).

20 Of course, a major reason for preferring plea bargaining is expediency and preserving court resources, although this in itself can still be problematic. See eg David Ireland, "Bargaining for Expedience? The Overuse of Joint Recommendations on Sentence" (2014) 38:1 Man LJ 268.

21 Simon Verdun-Jones & Adamira Tijerino, *Victim Participation in the Plea Negotiation Process in Canada: A Review of the Literature and Four Models for Law Reform* (Ottawa: Department of Justice Policy Centre for Victim Issues, 2004).

22 Medical examiner systems (like Alberta) do not give their death investigators the same quasi-judicial powers that the *Coroner's Act* allows (such as being able to impose "recommendations" that are identified through judicial inquests) see *Coroner's Act*, SBC

death investigators are individuals qualified in a number of ways (for example, forensic nurses, lawyers, forensic anthropologists, and geographers) to conduct death investigations. These coroners hold quasi-judicial powers to conduct a death investigation and make recommendations.[23] Whether a death occurs within a coronial or a medical examiner system, at a minimum, autopsies must be performed by an individual with a Doctor of Medicine with a specialty in pathology, as well as board certification and accreditation from the Royal College of Physicians and Surgeons of Canada.[24]

Distinct from the medical cause of death, the study of the ways bodies decompose in water is an area of science known as forensic aquatic taphonomy.[25] Aquatic taphonomy can help investigators understand how long a body has been in water; the location where an aquatic death may have occurred; and whether a body has moved since its point of entry. Taphonomists are typically researchers that work closely with health and law enforcement agencies in either forensic, medical, health, biology, chemistry, toxicology, or physical anthropology departments at universities. Taphonomists are best equipped to provide analyses of the post-mortem journey of human remains because they will also typically track changes to the local depositional environment (for example: river systems, ecology, hydrology, seasonal effects) in the course of their research. There is no board certification for taphonomists, but taphonomists will likely be members of organizations such as the Canadian Society of Forensic Sciences, American Academy of Forensic Sciences, and if outside of North America, the International Academy of Forensic Sciences.[26]

2007, c 15, ss 16, 29, 51, 53; Government of Alberta, "Death investigation process" (2024) online: <https://www.alberta.ca/death-investigation-process> [**perma.cc/GSM5-SWGV**].

[23] The BC Coroners Service also includes medical doctors, lawyers, and forensic anthropologists on staff to assist with the determination of time and manner of death see Government of British Columbia, "Coroners Service" (2024) online: < https://www2.gov.bc.ca/gov/content/life-events/death/coroners-service> [**perma.cc/79U4-S4EW**].

[24] Royal College of Physicians and Surgeons of Canada, "About" (2024) online: <https://www.royalcollege.ca/en.html> [**perma.cc/7UES-9NNU**].

[25] Angi Christensen, Nicholas Passalacqua, & Eric Bartelink, *Forensic Anthropology: Current Methods and Practice* (San Diego: Academic Press, 2014) at ch 5.

[26] Gail Anderson, & Lynne Bell, "Impact of Marine Submergence and Season on Faunal Colonization and Decomposition of Pig Carcasses in the Salish Sea" (2016) 11:3 PloS One; Vienna Lam, *Experimental lacustrine taphonomy: Decompositional changes in freshwater lake submerged Ovis aries skeletal remains within the Pacific Coastal Western Hemlock Zone*. (MA Thesis, Simon Fraser University, 2018).

Though it is a critical tool for investigators, in academic circles aquatic deaths are particularly challenging to study because of the inherent complexities of hydrodynamic environments and the costly nature of water-based research. As a growing scientific discipline, much of what is known about drowning pathology that is presented in courts is not found elsewhere in the academic literature, so the ability to scrutinize experts in aquatic deaths may be particularly difficult.

B. Imbalance of Resources to Access Experts

To properly scrutinize an expert in a drowning death, another expert in the same field is needed. For example, in *R v Glover,* defence counsel's arguments that Dr. Harpur's experiments failed to consider the laws of fluid dynamics, that Kelly could have had a different body mass index then the research assistant, or that his methodology was impossible to replicate were dismissed because defence counsel did not have an expert to testify to these matters.[27] Similarly, in *R v Pomeroy,* the court refused to engage with certain science-based theories advanced by defence counsel because there was no evidence on the record to support them.[28] The failure to call an expert limits defence counsel's ability to scrutinize the Crown's experts or raise their own science-based theories in a trial.

The Crown has greater access to experts than the accused. Most forensic pathologists and coroners are employed by the provincial government. Taphonomists are likely affiliated with forensic centres, and typically work within multidisciplinary departments at universities. Any of these professionals would either be salaried by the government, or the Crown would have the financial resources to hire them as experts.[29]

In contrast, the accused must locate and pay their own experts. What an expert costs depends on the type of experts and types of services required (a report, or a report plus pre-trial or trial appearances which involve travel and other additional expenses above the hourly rate).[30] Though there is a lack of recent systematically collected information of what experts in a criminal trial might cost in Canada,[31] research on the use and costs of

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27 *Glover 2*, *supra* note 3 at paras 10-12.

28 *R v Pomeroy,* 2008 ONCA 521 at para 98 [*Pomeroy*].

29 *Glover 2*, *supra* note 3 at paras 7-15.

30 See Zachary Crockett, "The Lucrative Economics of the Expert Witness" (2022) online: <https://thehustle.co/the-lucrative-economics-of-expert-witnesses/> [**perma.cc/33JN-BZ7Z**].

31 One account reports of a middle-class family that sold their house and cashed in their retirement savings to pay experts required to mount a defence for their 12-year-old

experts in the United States suggests experts are used frequently and they are expensive.[32] Data compiled by an American private expert referral service based on 35,000 cases suggests that the average rate for initial case reviews for all expert witnesses is $356/hour, the average rate for deposition appearances is $448/hour, and the average rate for trial testimony is $478/hour (USD).[33] Another private American firm conducted a 2021 survey of 1,100 of their experts and concluded that the average rate $422/hour for case preparation, $524/hour for depositions, and $550/hour to testify at trial.[34] Though these rates will no doubt vary on the topic of expertise and may not translate directly to the Canadian experience, there is consensus that experts are expensive to involve in a trial on this side of the border.[35]

The Crown is likely to be in a better position to pay those experts than an accused who is either funding a defence out of their own pocket or through legal aid.[36] For an accused person, the cost of an expert is added to the already expensive costs of paying a lawyer to mount a defence to

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daughter who was charged with manslaughter based on a diagnosis by Dr. Charles Smith, see Jane O'Hara, "The Babysitter Didn't Do it" (2001) 114:20 *Maclean's Magazine* 62.

32 Shari Seidman Diamond, "How Jurors Deal with Expert Testimony and How Judges Can Help" (2007) 16:1 JL & P'y 47; Samuel R. Gross, "Expert Evidence" (1991) Wis L Rev 1113.

33 See Expert Institute, "Expert Witness Fee Calculator" (2024) online: <https://www.expertinstitute.com/resources/expert-witness-fees/> [**perma.cc/4SNS-MUPP**].

34 James Mangraviti, Kelly Wilbur, & Nadine Nasser Donovan, *Survey of Expert Witness Fees* (Falmouth, England: SEAK, 2021).

35 For example, in a self help guide for litigants, the Justice Education Society of BC emphasizes twice that "it can be expensive to hire an expert" see Justice Education Society, "Expert Witnesses Basics" (2023) at 2 online: <https://supremecourtbc.ca/civil-law/trial/expert-basics> [**perma.cc/89S4-HT2N**]. Caselaw where expert fees are discussed support this proposition, for instance, in *Bokova v Gertsoyg & Company*, 2016 BCSC 2297 the Court held that the $21,984.48 cost of an expert report prepared by a psychiatrist was reasonable. In another case, *Laflamme v Groupe TDL Itée*, 2014 QCCS 312, [2014] QJ No 683 (QL) a woman was suing Tim Hortons for $2 million for burns sustained while drinking hot soup. Her 10-day trial involved the oral testimony of nine expert witnesses. At the end, the plaintiff was awarded $69,000 – nearly half of which ($33,000) was to reimburse the cost of expert witnesses.

36 The lack of funds to pay experts was identified as an area of unmet need on a report of the delivery of legal aid in the Yukon see Department of Justice Canada, "Legal aid, Court worker, and Public Legal Education and Information Needs in the Yukon Territory: Final Report" (Department of Justice Canada, 2004) at 21.

criminal charges.[37] Legal aid is available if a person faces serious charges that could result in imprisonment, but an accused's person's monthly income must not exceed a prescribed rate (eg $3,320 in BC, $2,208 per person monthly in Manitoba). [38] If an application is made for a judge to appoint a lawyer for an individual who fails to meet that threshold, that lawyer will need to agree to be paid legal aid rates, and any expert will need to be first approved by legal aid and then agree to be paid legal aid rates – which is an additional challenge if the Crown is able to pay experts more. In this way, the cost of obtaining an expert may be prohibitive or may play a key role in the quality of expert that a person is able to hire for a person funding their own defence or obtaining legal aid. This may in turn unequally limit defence counsel's ability to scrutinize expert testimony tendered by the Crown in a way that the Crown would not be similarly affected, making the use of experts an important but understudied access to justice issue.[39]

The imbalance in resources and limited pool of qualified experts together may make it difficult for expert evidence in aquatic deaths to be properly scrutinized. To demystify some of the science behind aquatic deaths, we will review existing case law involving drowning deaths in Canada and examine how the facts on drowning accepted by courts reflect the science.

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[37] While the cost to a person defending themselves in a criminal trial varies on the type and complexity of the charges against them, as well as regional differences in rates, a 2021 survey conducted by Canadian Lawyer finds that a three to five day trial for an indictable offence costs an average of $167,080 in legal fees, or a significantly higher amount of $280,650 when lawyers have over five years of experience (Canadian Lawyer, "2021 Legal Fees Survey: Results" (2021) online: <https://www.canadianlawyermag.com/news/features/2021-legal-fees-survey-results/362970> **[perma.cc/Q2VM-C9BX]).**

[38] Legal Aid Manitoba, "Do I qualify for legal aid?" (2024) online: <https://www.legalaid.mb.ca/financial-rules/do-i-qualify-financially/> [perma.cc/DGT6-XBRY]; Legal Aid BC, "Do I qualify for legal representation?" (2024) online: <https://legalaid.bc.ca/legal_aid/doIQualifyRepresentation> [perma.cc/SV9T-47VG]. If legal aid is obtained, then a person can render themselves ineligible if they obtain outside financial help to pay an expert. So, for instance, if a family member agrees to pitch in the thousands of dollars it costs to pay an expert, a person may be disqualified from continuing to receive legal aid for their representation see

[39] It is also important to note that costs will not be recovered by a defendant who pleads guilty.

III. AQUATIC DEATH EVIDENCE IN CANADIAN TRIALS

In this part we review essential concepts that concern aquatic deaths to give a general understanding of these scientific concepts for legal practitioners. To see what kinds of principles would be important to the practice of law, we looked at case law where experts were called to provide their opinions when a person died by drowning.[40] In total, our sample included 76 decisions where experts testified in cases of drowning death, 17 of which involved guilty pleas or admissions of fault (in civil cases).

The purpose of the case law review is to explore which scientific principles are being discussed by experts in cases involving aquatic deaths, but relying on judgments as a source of data has notable limitations. Written decisions are usually rendered at the end of a trial, so our sample under-represents cases that were resolved with a guilty plea before a trial took place. With judgments as a source of data, we would not have captured decisions made from the bench, without a written decision. That said, the case law review helped us to identify two key topics generally discussed by experts: drowning as the medical cause of death and the post-mortem journey of human remains.

We first discuss the how these principles of underwater death and decomposition have been recognized in trials. We then focus on the courts' adoption of scientific principles in two key areas: the drowning diagnosis by exclusion and the post-mortem journey of remains. Having a closer look at the science of aquatic death that has been adopted in courtrooms, we find overall alignment between the facts accepted by judges and well-established science, but in a limited number of cases discredited concepts and unreliable experiments were deemed to be admissible.

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[40] Our cases were collected through a search of Canadian Legal Information Institute (CanLII) and Lexis Advance QuickLaw using the search terms drown*, expert* and admiss* from January 1, 2000, to February 29, 2024. To capture cases where a person pleaded guilty and may not have had a trial, we conducted a supplementary search using the terms sentence* & drown* & plea* & expert* with the same time limits. The inclusion criteria involved all trial, voir dire, and preliminary hearing court documents that mentioned drowning or aspects of aquatic taphonomy. From the initial 341 documents found, two rounds of the initial review were used to exclude 265 cases where the aquatic death was either not an important or relevant factor, the aquatic death referenced was from a different case, or the terms used to identify the case was being used colloquially (eg, drowning under paperwork). What remained were 76 cases from all levels of court, including *voir dire* hearings and appeals.

A. Admissibility of Evidence of Aquatic Death

Though the focus of this paper is where principles of aquatic death were admitted into trials through expert testimony, in our sample we found other routes of admissibility for scientific principles. In *Pomeroy*, the trial judge took judicial notice of the fact that it was "obvious that a person unable to move will drown when placed face down in water."[41] Taking judicial notice of this idea meant that the proposition that an incapacitated person would drown when placed face down in water was so obvious and capable of immediate verification, it could be adopted by a judge without further proof.[42]

Another way information relating to aquatic deaths was admissible was when medical professionals or investigators provided testimony as to what they had observed when an individual was admitted to the hospital or at the scene of a crime.[43] As regular witnesses, medical professionals were entitled to provide evidence about events they observed – things that do not require special expertise to make, interpret or describe.[44] These kinds of observations and the conclusions drawn from them can have a significant impact on the conduct of the subsequent investigation and findings of fact later at trial, but in practice it can be hard to separate the observations from opinions that may be made about those observations. [45] Looking at the routes of admissibility and the types of information accepted by courts, we found scientific principles occurred in two main topics: the drowning process and the post-mortem journey of human remains.

1. The Drowning Process

Drowning is defined by the World Health Organization as "the process of experiencing respiratory impairment from submersion/immersion in liquid."[46] When a person drowns, what is functionally happening is the

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41 *Pomeroy, supra* note 28 at para 134.

42 *R v Find*, 2001 SCC 32. Another possible way science may be adopted in a trial could be through adopting propositions of drowning science cited in earlier cases through precedent, though we did not find any examples where principles of aquatic taphonomy were accepted with reference to earlier cases.

43 For example, where evidence is admitted through a medical professional is when an attending nurse or doctor at the hospital make observations about the appearance of a victim when they are admitted to the hospital, see *R v Shepherd*, 2001 ONCA 54 [*Shepherd*], *R v Laberge*, 2021 ABPC 245 [*Laberge 1*] (appeal allowed), and *R v Laberge*, 2022 ABCA 385 [*Laberge 2*].

44 David Paciocco, Palma Paciocco, & Lee Stuesser, *The Law of Evidence,* 8th ed (Toronto: Irwin Law Inc, 2020) at 248 [Paciocco et al].

45 *Code, supra* note 9 s 655.

46 World Health Organization, *Global Report on Drowning: Preventing a Leading Killer*

process of prolonged submersion causes oxygen levels in blood, tissues, and organs to decrease. Hypoxemia (low oxygen levels in the blood) and hypoxia (low levels of oxygen in tissue) can then lead to cardiopulmonary arrest and, if untreated, death.[47] That said, drowning is not necessarily fatal, and a person may be successfully resuscitated without injury or sustaining lung damage or other medical complications.

When there is too much pressure on blood vessels or the proteins necessary to contain cells within plasma are compromised, edema may occur. Edema generally refers to swelling, and in the case of pulmonary edema, the swelling takes place in the lungs as a result of the alveoli (tiny air sacs in the lungs) taking on fluid. In *R v Shepherd*, the court accepted that pulmonary edema could result from brain injuries or drowning.[48] Similarly two pathologists in *R v Reeve* explained that pulmonary edema could have been the result of the blunt force trauma to the head or by drowning if the victim had been alive when submerged in the river.[49]

The time it takes for a person to drown may be particularly significant in murder trials where there is a question of whether a person intended death to occur (which would establish culpability for murder) or was unintentional (which would lead to a manslaughter conviction instead).[50] Depending on a person's age, weight, and underlying health conditions, a drowning fatality can occur in seconds.[51] These principles relating to the time it takes someone to drown were explained in the case *R v Peng,* where a mother was charged murdering her four-year-old daughter by holding her face down in the bath.[52] The Crown called on the expertise of Dr. Taylor, a paediatric pathologist who testified "when someone is submerged under water, loss of consciousness will generally occur within one to three minutes but can take as little as 30 seconds."[53]

(Geneva: World Health Organization, 2014) at x.

47 Kevin Erskine & Erica Armstrong, *Water-related death investigation: practical methods and forensic applications,* 2nd ed (Boca Raton: CRC Press, 2021) at ch 9 [Erskine & Armstrong]; Robert Boutilier & Julie St-Pierre, "Surviving hypoxia without really dying" (2000) 126:4 Comparative Biochemistry and Physiology 481.

48 *Shepherd, supra* note 43.

49 *R v Reeve*, 2008 ONCA 340 at para 61 [*Reeve*].

50 *R v Peng*, 2009 ONCA 921; R v Bouvette, 2023 BCCA 152.

51 Erica Armstrong & Kevin Erskine, "Investigation of Drowning Deaths: A Practical Review" (2018) 8:1 Acad Forensic Pathology 8.

52 *Peng, supra* note 50 at para 5.

53 Defence counsel challenged Dr. Taylor's qualifications, arguing that forensic pathology exceeded Dr. Taylor's expertise in paediatric pathology, and that Dr. Taylor should

It is also possible that drowning may occur passively, for example in cases where someone who is impaired by drugs or alcohol falls asleep in a shallow body of water and is incapable of saving themselves.[54] In *Nelson v Industrial-Alliance Pacific Life Insurance Company*, passive drowning occurred when the deceased had a heart attack prompted by the shock of cold water. The pathologist found insufficient evidence that the deceased had drowned, despite the existence of fluid in the lungs. The pathologist consulted with a cardiologist to assess the likelihood that the deceased had suffered from arrythmia, which led them to conclude that despite the fluid found in the deceased's lungs, the death was caused by an underlying heart condition that was triggered by immersion and exertion related to swimming in the lake.[55]

i. Drowning is a Diagnosis of Exclusion

There is no definitive test for when a drowning has taken place, and not all bodies recovered from water can be presumed to have drowned. Drowning is a diagnosis of exclusion, which means that pathologists will reach this conclusion after excluding all other likely possibilities.[56] An example of the process of diagnosis by exclusion is *R v Henry*, where the Crown alleged the accused tied the deceased to a chair and then wrapped his face in duct tape before dumping his body over a bridge into a river. Initially, the pathologist formed the opinion that the victim had died by asphyxiation that could have been caused by the duct tape, or alternatively, by drowning.[57] After more evidence was tendered, including an eyewitness who saw the victim's lifeless body taped to a chair at the accused's home, the trial judge found that the victim likely had asphyxiated on land prior to being submerged in the water.[58]

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never have been allowed to testify about the origin and timing of bruises that had been found on the deceased's neck. On appeal, Moldaver JA (as he then was) dismissed this ground of appeal finding that just because there were more qualified experts did not disqualify Dr. Taylor from testifying. Though a new trial was ordered on appeal, Peng pleaded guilty to manslaughter before it could take place see *Peng*, *supra* note 50 at para 30.

54 For example, *Pomeroy, supra* note 28.

55 *Nelson v Industrial-Alliance Pacific Life Insurance Company.* 2010 ABQB 746 [*Nelson* 2010].

56 Erskine & Armstrong, *supra* note 47 at ch 9.

57 *R v Henry*, 2003 BCCA 476 at para 18 [*Henry*].

58 *Ibid*. See also *Nelson, supra* note 55 where there was the question of whether it was a heart attack or drowning; *Reeve, supra* note 49 where there was the question of whether drowning or a fall could have caused the pulmonary edema; *R v Biddersingh*, 2015 ONSC 6063 [*Biddersingh* 1] where there was a question of drowning or starvation as

The pathology of drowning can change depending on the presence of co-morbidities or the environmental context of the submersion (external factors that impact how one comes to be submerged or immersed). An example of complications introduced by co-morbidities is in *Nelson* ,[59] where the key legal issue was whether a man had drowned in a lake, or if a pre-existing heart condition caused a heart attack while he was swimming which then caused him to drown.[60] Whether or not the death was accidental or natural turned on the medical examiner's interpretation of the co-morbidity, and the ultimate finding of a natural death meant $400,000 in benefits denied to the deceased's widow.[61]

ii. Wet drowning vs. Dry drowning

For most cases of drowning, water enters a person's airways and floods the lungs – a condition that the attending pathologist would refer to as "wet drowning". The absence of fluid in the airways and lungs is generally interpreted as indicating a person asphyxiated before they were placed in water.[62] Though the absence of water in the lungs can be evidence that no drowning has taken place, in up to 20 percent of drowning cases a phenomenon known as "dry drowning" occurs when an involuntary laryngospasm creates a plug of mucus, foam and froth which prevents fluid

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cause of death; and *Shepherd*, *supra* note 43 where the accused was charged with first-degree murder for the death of his five-month-old stepdaughter, Mariah. The accused claimed he had stepped away momentarily while washing her in the sink and found her unconscious then he tried to shake her awake. The attending pathologist, Dr. Rao, found Mariah's injuries were not consistent with the possibility that Mariah became unconscious because of near drowning and then was shaken in an attempt to resuscitate. Dr. Rao believed the fluid in Mariah's lungs was the result of the injury to her brain. In this case the determination of drowning only mattered to the extent that it undermined Sheppard's story that it was a near drowning incident that caused him to shake Mariah.

59 *Nelson 2010*, *supra* note 55 at para 26; *Nelson v Industrial-Alliance Pacific Life Insurance Company*, 2012 ABCA 1 [*Nelson* 2012] appeal dismissed.

60 *Nelson 2010*, *supra* note 55 at para 17.

61 See *Reeve*, *supra* note 49 at para 41 for another example of co-morbidities where two pathologists testified for the defence, Dr. Markesteyn and Dr. King, believed that the injuries were consistent with a fall and would have been fatal. They argued that there was no evidence corroborative of drowning and no evidence that would permit the exclusion of drowning as a cause of death. On appeal, both Crown and defence pathologists disagreed with the trauma specialists, indicating that "neurogenic pulmonary edema may develop within minutes of a fatal head injury."

62 *R v Khan*, 2001 SCC 86 at para 42 citing *R v Khan*, 1999 CanLII 4114 (MBCA) at para 9 [*Khan*].

from entering into the lungs.[63] At the same time, these muscle spasms block a person's airway so pathological changes such as fluid the lungs and upper airways or edema are not observed in dry drowning cases.[64] Whether dry drowning exists is contentious,[65] and the World Health Organization's World Congress on Drowning has recommended abandoning the term because it can mislead people into thinking that it is a drowning that does not involve submersion into liquid.[66]

Despite this controversy, dry drowning was discussed as a possible cause of death in *R v Samuels*, where the accused was charged with the first-degree murder of his common law wife. [67] Samuels claimed that while driving home with his wife, he swerved to avoid a collision with an oncoming vehicle. The truck was turned upside down in waist-high water and although he could free himself, he was unable to rescue his wife. The emergency department physician advised the coroner that water had been found in the deceased's windpipe and concluded the cause of death was drowning. However, a pathologist who conducted a later autopsy concluded that there was no evidence of "wet drowning," but it was a case of "dry drowning" because of the shock of falling into very cold water. At trial, another pathologist testified that he could not say that this was a case of drowning because other injuries made another form of asphyxial death possible.[68] These divergent accounts illustrate how the drowning is a

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63 Joost Bierens, Philippe Lunetta, Mike Tipton, & David Warner, "Physiology of Drowning: A Review" (2016) 31:2 Physiology 147; Philippe Lunetta, Anne Penttilä & Antti Sajantila, "Drowning in Finland: "external cause" and "injury" codes" (2002) 8:4 Journal of the International Society for Child and Adolescent Injury Prevention 342.

64 Erskine & Armstrong, *supra* note 47 at 13.

65 For example, Philippe Lunetta, Jerome Modell & Antti Sajatila, "What is the incidence and significance of 'dry-lungs' in bodies found in water?" (2004) 25:4 American Journal of Forensic Medicine and Pathology 291 conducted a retrospective analysis of autopsy and police records in Helsinki Finland from 1976-2000 and found that less than 2 per cent of persons found in water with normal lungs did not have any water liquid penetration.

66 Philippe Lunetta, "Autopsy findings; Drowning and submersion deaths" (2016) 1 Encyclopedia of Forensic and Legal Medicine 227. Dry drowning is also not in the ICD-11, that dictates how investigators classify diseases and injuries for determining the medical cause of death

67 *R v Samuels*, 2005 CanLII 15700 (ONCA) at para 13.

68 *Ibid* at paras 14 -16, Samuels did not plead guilty, but he was convicted at trial. Samuels successfully appealed his conviction, not on the basis of the expert testimony but rather to the instructions given to the jury on reasonable doubt, after the fact conduct, and the Crown's jury address. It is in cases like these that additional consideration for immersion effects, like cold shock, should be considered.

diagnosis of exclusion, as well as how the idea of dry drowning can complicate medicolegal investigations.

With the exception of the unsettled science relating to dry drowning, in the cases we reviewed the pathologists and medical examiners' drowning diagnoses aligned with well known principles of aquatic death. When it comes to the science of body movement and decomposition, which we discuss in the next part, the cases revealed more troubling misalignment between the science in the courtroom and what is accepted in academic circles.

2. Water Characteristics and the Post-mortem Journey of Remains

Almost as important as the initial diagnosis of drowning is the ways pathologists interpret the location and condition of a body once it is recovered. Pathologists are best equipped to review the body, but they should consult aquatic taphonomists for questions relating to underwater decomposition and the post-mortem journey of the remains.[69] Taphonomic changes can offer an estimate of time elapsed since death or the initial immersion, and what locations the body may have moved through. Combined with pathology, taphonomy can also help explain and describe what happened, and what observations could be attributed to a person's life course (perimortem) or after death (postmortem).[70] Some important taphonomic concepts canvassed in the cases we reviewed include diatoms, how water characteristics affect body decomposition, and buoyancy.

i. Diatoms

Diatoms are microorganisms contained in fluids that are used by investigators to understand prolonged immersion in a particular water body. Diatoms are unique to specific bodies of water, so they can help investigators determine where a death occurred (for example, in fresh water, lake water, or sea water). Diatoms have specific tolerances for

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[69] It is unusual for pathologists to specialize in aquatic taphonomy, as they are expected to learn about this subject throughout the course of their medical education. Although there are a few forensic anthropologists that also examine soft tissue decomposition, taphonomists are better able to discern the effects of scavenging versus perimortem trauma when a body is recovered from water. Unfortunately, there are no set standard or annual training required of pathologists and medical examiners on advancements in aquatic decomposition research. A lot has been done within the last five years and there are select experts that have circulated codices based on interesting case studies among practising pathologists, but much of this communication is informal and requires voluntary opt-in.

[70] Richard Saferstein, *Criminalistics: An Introduction to Forensic Science* (New York: Pearson Education, 2018).

temperature, light, salt content, environmental pollution and pH levels, so different bodies of water will contain different types and concentrations of diatoms based on these environmental factors. [71]

The challenge for pathologists comes from identifying whether the quantity of diatoms and microorganisms can reliably indicate whether someone had drowned, as opposed to swallowing these during activities prior to death or post-mortem entry.[72] Diatoms were used to help establish the cause of death in *R v Biddersingh*, where 15-year-old Melonie Biddersingh's body was discovered in a burned suitcase and her parents were charged with her murder. [73] The attending pathologist, Dr. David Chiasson, initially ruled the medical cause of death to be undetermined but that "asphyxia modes of death could not be completely ruled out."[74] The cause of death was changed to drowning when Ontario's Chief Forensic Pathologist, Dr. Michael Pollanen, found diatoms in the right maxillary sinus and bone marrow of both femurs, which led him to conclude that drowning was a cause or significant contributing factor of Melonie's death.[75] The presence of diatoms supported the conclusion that, even though Melonie was not found in a body of water, drowning was a factor in her death.[76] Both Dr. Chiasson and Dr. Pollanen acknowledged that "diatoms as a diagnostic of drowning are not without controversy in the scientific community,"[77] a caveat that is warranted because diatoms are widely distributed in soil, food, and air and so can be found in tissues of people who died of causes other than drowning.[78]

ii. Decomposition in Aquatic Environments

The extent to which a body decomposes in water depends on a number of factors including water temperature, depth, and acidity. In general,

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71 Erskine & Armstrong, *supra* note 47 at ch 9.

72 Ian Efford, "Temporal and Spatial Differences in Phytoplankton Productivity in Marion Lake, British Columbia" (1967) 24:11 Journal of the Fisheries Board of Canada 2283 at 2292; Ruma Pal & Avik Kumar Choudhury, *An introduction to phytoplanktons: diversity and ecology* (New Delhi: Springer, 2014) at 1.

73 *R v Biddersingh*, 2015 ONSC 6498 at para 10 [*Biddersingh* 2].

74 *Biddersingh* 1, *supra* note 58 at para 3.

75 *Ibid* at para 4.

76 *Ibid*.

77 *Ibid* at paras 6, 69.

78 Arturo Lucci et al., "A promising microbiological test for the diagnosis of drowning" (2008) 182: 1-3 Forensic Science International 20.

warmer temperatures speed up the rate of decomposition, which is calculated as the sum of time involving high temperatures or accumulated degree days (ADD). Although ADD is less reliable in aquatic contexts than on dry land, it is still generally accepted that cold water may inhibit decomposition due to the diminished amount of bacterial and biotic factors in the lower temperature water.[79] In *R v Khan*,[80] the cold water from the bathtub was thought to slow down decompositional changes in a body, but the pathologist deemed that the asphyxiation was not from drowning because of the absence of other drowning related pathology like washerwoman's hands.[81] Washerwoman's hands, also known as "waushaut", is a form of decomposition change that is unique to water-based deaths where skin folds and wrinkles due to prolonged submersion in liquid.[82] The longer a person is immersed in water, the more likely the outermost layer of skin will lead to skin slippage and eventually, complete degloving through this process. In *Khan*, the absence of this feature helped establish an alternative cause of death that did not involve submergence.[83]

Water acidity can help to determine the time since a person drowned because the rates of decomposition differ in fresh water compared to saltwater bodies. Acidic environments result in higher rates of decomposition (pH 1 – 4), whereas more basic environments (such as salt water, which has an average pH of around 8) preserve immersed bodies better.[84] Some recent studies suggest that fresh and saltwater drownings can be distinguished based on differences in body fluid and tissue density

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79 Absent scavengers and other more influential environmental factors, see: Jarvis Hayman & Marc Oxenham, *Human Body Decomposition* (London: Elsevier, 2016).

80 *Khan, supra* note 62.

81 *Ibid* at para 44.

82 Erskine & Armstrong, *supra* note 47 at ch 9.

83 *Khan, supra* note 62.

84 See Angi Christensen & Sarah Myers, "Macroscopic Observations of the Effects of Varying Fresh Water pH on Bone" (2011) 56:2 J Forensic Sci 475, submerged bones into beakers with different pH levels. Only macroscopic observations were conducted, and the beaker solution was monitored to maintain its acidity of either pH 1, 4, 7, 10 or 14. The solution was comprised of tap water, nitric acid, and sodium hydroxide solutions. Results showed that high acidity (ph1) resulted in immediate bone degradation that continued for the first two weeks until only trace amounts were found after two weeks. Moderate acidity (pH 4) was slow to change and aside from discolouration, the sample remained in relatively good condition. With the pH of 7 the skeletal sample was in excellent condition, with most of the soft tissue dissolving or detaching from the remains. Surface topography – like saw marks – were still observable as there was little change to outer surfaces. The basic solution (pH1 10) was found to preserve the materials the best, and soft tissue attachments were retained.

as a direct result of "dilution of the blood or sequestering of blood with organs."[85] An example of how water acidity influences decomposition is found in the case *Henry*, where the pathologist referenced changes to the body as being attributed to the deceased's submersion in a riverine environment.[86] The tidal action was also cited as part of the reason why the tape covering the deceased's face had moved and how lividity set clues about what the original placement of the body was, observations that were important to reconstruct the timeline of events. Based on these observations, the pathologist concluded the victim died by asphyxiation by taping the victim's mouth on dry land, followed by the secondary removal and disposal of the body in a river.

iii. Buoyancy

Buoyancy is the term used to describe how bodies float and move in water. In *Glover* – the case that initiated this exploration of water deaths - buoyancy was important for the Crown's theory that Richard Glover had intended to kill his wife.[87] To discredit Glover's assertion that he was unable to save his wife after she fell into the river, the Crown introduced Dr. Harpur as an expert who testified about the manner in which drowned persons float, the effect of clothing being worn by drowning victims on floating and the significance of surfactant in drowning victims.[88] To establish that Glover could have been able to save his wife, Dr. Harpur set up experiments where he instructed a research assistant to remain completely passive while he pushed her into a pool and measured how far away she was from the pool's edge when she resurfaced.[89]

There are potential issues with Dr. Harpur's qualifications,[90] but we focus here on the ways the experiments reflect a misapprehension of the

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85 Erskine & Armstrong, *supra* note 47 at 271.

86 *Henry*, supra note 57 at paras 18-19.

87 *Glover 2*, *supra* note 3.

88 *Ibid* at para 1.

89 *Ibid* at paras 3-4.

90 In terms of being qualified to be an expert on buoyancy, Dr. Harpur was a family physician with training in emergency medicine, and no training in forensic aquatic taphonomy. Dr. Harpur was a coroner and had been present a several autopsies and body recoveries - but there is a question of whether he had performed these body recoveries and autopsies or merely observed them. It is unclear from the voir dire ruling where Dr. Harpur's expertise in movement of bodies through water came from, a potential error of law since experts may only give evidence on those areas within their expertise and training (see *Johnson v Milton (Town)*, 2008 ONCA 440 at para 50; Paciocco et al., supra note 44 at 260).

science of buoyancy. First, the experiments fail to reflect the difference in the ways bodies move in still water compared to moving water. The Muskoka River carried Kelly Glover 157 metres away from her initial point of entry. An expert should have examined tidal maps or live readers to assess the speed of a river, which will undoubtedly be higher than that of a still water pool.[91] Dr. Harpur's experiment also failed to recognize that Richard's ability to see in an area with no natural light could have been limited. A brightly lit pool in the middle of the day is lighter than a river at night, which would have made it harder for Glover to actually see his wife in the water. Third, there could also have been the presence of algae blooms and vegetation that would limit Richard's swimming ability and ability to save Kelly that would not similarly hinder movements in a pool. In the same vein, the court failed to consider Richard Glover's swimming ability or lack thereof. Even the most skilled swimmers can get swept up by a river because it is very different to swim with low to no visibility at night, especially when there's unintended water entry.[92] Based on the toxicology report, alcohol was not a factor in the drowning but it is possible Kelly and Richard were both fatigued given that it was late at night when Kelly drowned.[93] As the pool was completely still, Dr. Harpur's experiments would have failed to take into account these critical factors about how the body moves and surfaces under water. With the pool experiments, Dr. Harpur was trying to generate a study to say that Kelly could not have moved so far that Richard could not save her even though record showed she moved 157 meters in less than an hour.

The effect of allowing these experiments to meet threshold admissibility as observations in the pre-trial *voir dire* meant that Dr. Harpur

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91 With this information, an aquatic taphonomist would calculate the body's movement taking into account a) the current's strength (as measured by the velocity of the river, where higher speeds are from faster currents), b) body position (same considerations that divers and swimmers make when assessing drag), and c) buoyancy of the body (the physiology of the body, clothing, and any variables that would impact the buoyancy), see Erskine & Armstrong, supra note 47.

92 Chase the Water, "How can good swimmers drown? (Here's what to know)" online: <https://chasethewater.com/how-can-good-swimmers-drown-heres-what-to-know> [**perma.cc/38WU-MHGH**].

93 Kelly's body was recovered within an hour of submergence, so in terms of stages of decomposition, her body would still be considered fresh. As such, the effects of putrefaction and other degenerative changes would likely not obfuscate the condition of the body in so far as to render the attending pathologist Dr. Munkittrick's assessment. One of the other key issues of this case is that when both pathologists that saw the body say there's no reason to doubt the accused, inviting a third pathologist that didn't assess the body to provide speculative "expertise" is problematic.

escaped this kind of proper scrutiny which would have taken place with cross-examination in the full trial. Dr. Harpur's experiment is particularly insidious because the judge also qualified him as an expert. In recreating the crime scene in the pool and then in explaining his experiments, Dr. Harpur would effectively be telling the finder of fact how to interpret the facts of the case from his position of an expert – making it likely jurors would accept his interpretation as their own.

In the large, our case law review of drowning deaths finds the principles adopted by courts are based on established science. The effects of water temperature and pH have been used in cases in ways that are consistent with existing science.[94] Appropriate caveats were noted by experts in relation to less reliable indicia of place of death such as diatoms.[95] However, when it comes to buoyancy, that Dr. Harpur's experiments were deemed to be admissible in the pre-trial *voir dire* in *Glover* illustrate that faulty expert evidence remains an issue for drowning deaths.[96]

IV. CONCLUSION

Though courts are alive to the risks expert evidence present to juries, it is time to think about how those risks manifest in relation to those accused of committing crimes and their decision to plead guilty. With this paper, we take steps to address the informational disadvantage experienced by the defence by providing an overview of key scientific principles that relate to drowning deaths as reported in case law. When we reviewed how the drowning diagnosis was made, with the exception of dry drowning, we did not find any issues in terms of the qualifications of experts and the concepts they discussed. When we shifted our review from the drowning diagnosis to decomposition and the post-mortem journey of the remains, we found that principles relating to diatoms and decomposition aligned with accepted practice. However, faulty scientific evidence was accepted in relation to buoyancy, which may have contributed to at least one man's decision to plead guilty before the expert evidence could be properly tested in a trial through cross examination.[97]

Though there are safeguards in place during the trial to prevent unreliable science, there is an absence of protection in the pre-trial stages

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94 *Khan, supra* note 62.

95 *Biddersingh 1, supra* note 58 at para 4.

96 *Glover 1, supra* note 1.

97 Ibid.

to prevent the distorting effect that expert credentials, unreliability, technicality, or paid-witness partiality can have on the accused. In this paper we suggested that those accused of crimes are vulnerable because of a lack of specialized knowledge relating to drowning deaths; an inequality of resources to access experts; and the case-specific pre-trial admissibility hearing is taken by the accused as the judge's acceptance of the expert's account of events over their own. Though we focus on drowning deaths, these risks are present when experts are used in other factual contexts as well.

One way to address these issues may be to eliminate the need for the case-specific *voir dire* to qualify experts and instead have experts pre-approved by the judiciary.[98] With this model - currently used in California state courts - experts apply to the court to become 'approved professionals' to give evidence on specific topics within their expertise. [99] A committee comprised of sitting judges meets regularly to review applicants' materials, interview them, and if they pass, they qualify as experts and are then placed on a registry that is available to both the State and defence counsel. Experts on the roster are paid a rate that is fixed by the State. Having a roster of pre-approved experts eliminates the pre-trial, case-by-case determination expert admissibility – which can leave the accused with the impression that a judge believes what an expert says (and would therefore not believe their account over the expert in the trial). Access to experts is enhanced by having the public roster of pre-approved experts, so neither party has the benefit of greater connections within specialized professions. Having fees fixed by the State addresses some of the resource issues that may be experienced by defence counsel because with this system, experts would be paid the same rate regardless of who was hiring them so would not be incentivized to testify for the party who could pay them more. Beyond these benefits there would be institutional efficiencies to be gained by eliminating the need to set aside courtroom space and judges' time to hold *voir dires* for individual

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98 Other recommendations have been made by legal scholars, such as the use of different experts at various stages of an investigation and the trial itself. See Brandon Trask & Evan Podaima, "Blurred Lines: A Critical Examination of the Use of Police Officers and Police Employees as Expert Witnesses in Criminal Trials" (2021) 44:6 Man LJ 48 [Trask & Podaima]; Bruce MacFarlane, "Convicting the Innocent: A Triple Failure of the Justice System" (2006) 31:3 Man LJ 403.

99 Robert D. Weide & Justice Jerome Haig, "How to Expert Witness: Using your Research and Expertise in the Courtroom" (paper delivered at the Western Society of Criminology Annual Meeting, Long Beach, California 10 February 2024) [unpublished]; Superior Court of California, County Placer, "Court-Appointed Professionals" (2022) online: < https://www.placer.courts.ca.gov/general-information/court-appointed-professionals>.

experts once they are on the roster. That said, there are the risks that preapproved experts may not have specialized expertise in topics and be allowed to testify in areas they may not have domain knowledge. For instance, an expert in saltwater decomposition may not necessarily have the same knowledge of body decomposition in fresh water and it might be difficult for the committee of judges to anticipate these kinds of finer distinctions at the pre-approval stage.

Another potential way to reduce the risk of experts pre-trial would be to restructuring the ways experts are used, and then augment public funding for defence experts. In terms of restructuring, Brandon Trask and Evan Podaima propose a way to reduce the risks of expert testimony is to create two different streams of experts: (1) in-house police experts - sworn officers as well as civilian employees of police agencies; and then (2) experts engaged to testify in court. In house police experts would focus solely on assisting with investigations and performing analyses and would not testify in court. Experts that testify in court would work within organizations with a separate management structure and budgets that are independent from police agencies. They would not be involved with the investigation and would only perform reviews and provide objective opinions for court purposes.[100] Defence counsel already has access to in-house police experts through the Crown's disclosure obligations, but still needs to hire their own experts to help understand and think critically about these reports, in addition to external experts who could testify in court. While currently legal aid does provide some funding for experts, we suggest raising these limits so that an imbalance of resources does not prevent defence counsel from accessing the experts they need to meet the Crown's evidence. Such funding could be triggered if the Crown relies on expert reports, then there would be an obligation for the Crown to then fund the defence's choice of expert in that area. This kind of a funding would help address how a lack of resources creates a situation where the defence is unable to hire an expert to help them understand and test the Crown's experts.

The lack of funds to pay for experts is part of a bigger problem of underfunding defence counsel more generally that may cause them to encourage their clients to make a guilty plea to avoid a trial.[101] Experts contribute to the coercive environment within which plea bargaining takes place before a trial, but there are other ways those accused of crimes are coerced into pleading guilty. In our case law review, we saw examples of

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100 Trask & Podaima, *supra* note 99 at 72-73.

101 Kent Roach, Wrongfully Convicted: Guilty pleas, imagined crimes, and what Canada must do to safeguard justice (Toronto: Simon & Schuster, 2023) at 4.

other factors that would make pleading guilty a rational choice for an accused person – for example, where the guilty plea would assure quick release from custody;[102] or the threat of harsh penalties in the absence of a guilty plea.[103] We also saw cases where those accused of a crime had personal characteristics that are documented as making a person more vulnerable to pleading guilty such as youth, race, parenthood, gender, and mental health issues.[104] The rules currently in place help address the risks of experts in a trial, but most criminal cases do not make it to trial. Going forward, policies need to consider not only the influence of experts, but all these other factors that contribute to the coercive nature of plea bargaining before a trial takes place.

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[102] John H. Blume & Rebecca Helm, "The Unexonerated: Factually Innocent Defendants Who Plead Guilty" (2014) 100:1 Cornell L Rev 157 at 157 and 16 [Blume & Helm]. Examples from our sample include: *Peng, supra* note 50; *R v Murphy*, 2014 YKCA 7.

[103] *R v Bouvette*, 2023 BCCA 152 [*Bouvette*] accused pleaded guilty to manslaughter to avoid murder charges, Indigenous mother with four young kids of her own; *R v Steppan*, 2010 MBPC 9 pleaded guilty to sexual assault but not murder; R v Cuff, 2003 NLSCTD 31; Reeve, supra note 49, pleaded guilty to manslaughter to avoid murder charge; *R v McConnell* 2012 ABQB 369 [*McConnell*] mother, guilty plea rejected, acquitted of second-degree murder charges at trial – but later committed suicide; *R v LM*, 2018 NWTTC 12 [*LM*] where the accused pleaded guilty to sexual assault but not guilty to manslaughter.

[104] Blume & Helm, *supra* note 102, cases from the sample include: *Albon v Ontario (Attorney General)*, 2019 ONSC 3372 (youth); *R v EW*, 2019 ONCJ 788 (mother); *R v Lavoie*, [1987] AJ No 536 (youth, 18 years old) with mixed personality disorders), *McConnell*, *supra* note 103 (mother, depressive disorder); [*LM*], *supra* note 103 (youth, 17 years old); *Bouvette, supra* note 103 (youth, parent, woman, Indigenous, intellectual disability, mental health and addiction).