VICTORIAN INSTITUTE OF FORENSIC MEDICINE

THIS DOCUMENT DETAILS THE NATURE AND RESULTS OF THE MEDICAL INVESTIGATION INTO THE DEATH OF

MR WARREN AND MR MATTAINI
CASE REFERENCE NO. A00097/23

My name is Linda Elizabeth ILES and my professional address is the Victorian Institute of Forensic Medicine, 65 Kavanagh Street, Southbank, Victoria 3006.

I am a registered medical practitioner practising as a specialist in forensic pathology.

My qualifications are Bachelor of Medicine (MB), Bachelor of Medical Science (B Med Sci) and Bachelor of Surgery (BS) with Honours, from the University of Tasmania. I am a Fellow of the Royal College of Pathologists of Australasia by examination in anatomical pathology. I hold the Diploma in Medical Jurisprudence in Pathology from the Society of Apothecaries of London (DMJ (Path)), and am a founding fellow of the Faculty of Post Mortem Imaging of the Royal College of Pathologists of Australasia.

I am employed as a Forensic Pathologist at the Victorian Institute of Forensic Medicine and am an Adjunct Associate Professor in the Department of Forensic Medicine at Monash University.

My practical experience in Forensic Pathology commenced in 2000. I commenced full time professional forensic pathology practice in Victoria in 2005. I was subsequently employed as a Consultant Forensic Pathologist in the Section of Forensic Medicine and Science at the University of Glasgow from March 2007 until January 2009 and received specialised training in Forensic Neuropathology at the University of Edinburgh. I resumed practicing forensic pathology in Victoria in July 2009.

I am head of Forensic Pathology Services at the Victorian Institute of Forensic Medicine and co-ordinate the Institute's neuropathology service.

65 Kavanagh Street
Southbank VIC 3006
Australia
ABN 15 887 032 583

T +61 3 9684 4444
F +61 3 9682 7353
vifm.org

OPINION REPORT

Case No. A00053/23
Re : WARREN AND MATTAINI

I have been requested by Ms Elizabeth Blomfield, senior solicitor for the Special Commission of Inquiry into LGBTIQ hate crimes, to review materials related to MR ROSS WARREN AND MR GILLES MATTAINI.

MATERIALS PROVIDED

- P79A Report of Death to Coroner (Ross Warren)
- Statement of Kenneth James Bowditch (original OIC)
- Letter from Dr Allan Cala (forensic pathologist)
- Statement Dr Robert Brander (coastal scientist)
- Report of Dr Robert Brander
- Second statement of Dr Robert Brander
- Oral evidence Dr Robert Brander
- Third statement Dr Robert Brander
- First statement Jacques Musy (re: Mr Mattaini)

QUESTIONS AND REPONSES

Q1. *Your view on the following matters:*

a. The rate of decomposition of a human body in seawater;

b. The average period of time between the initial submergence of a human body in seawater and its resurfacing (absent attack by a predator); and

c. The length of time before gasses are released.

2. Please provide any other comment, within your expertise, which you consider to be relevant to the decomposition of a human body in seawater.

1a. The rate of decomposition of a human body in seawater;

Given the complex interaction of numerous intrinsic and extrinsic variables, it is not possible to reliably estimate the rate of decomposition of human remains in seawater.

After a deceased person is immersed in seawater, the general course of events is as follows:

- If sufficiently buoyant, the body will float for a period of time until buoyancy decreases to a point where the body sinks.

- The body becomes vertically displaced downwards in the water, and may be moved about under the water, until such time that the production of gases of

decomposition ("bloating") increases the buoyancy of the remains to the point where the body resurfaces again. This is largely a function of time and temperature.

- As decomposition proceeds, putrefactive gases are released from the body, reducing its buoyancy, resulting in the remains sinking again.

This stereotypical course of events does not always occur. Whilst if not retrieved, many bodies will become submerged twice - once prior to bloating and once again after decomposition gases have been released - some bodies never float, and some may never sink prior to recovery[1]. There are multiple intrinsic and extrinsic variables acting on the different stages of this cycle, including (but not limited to):

i. Factors impacting initial buoyancy: body composition of individual; relative aeration of the lungs; completeness of body/pre-immersion trauma; clothing (ability to trap air; buoyancy aids Vs weighted clothing); salinity of water; tethering/entrapment.

ii. Factors impacting rate of decomposition and gas production during the bloating stage: clothing; pre- and post-immersion trauma; tethering/entrapment; water temperature and salinity, depth of water (pressure at increased depths may prevent refloating), scavenging.

iii. Factors impacting ongoing decomposition: clothing (protecting parts of the body from elements of decomposition); pre-and post-immersion trauma; biodiversity of scavenging ecosystem, including crustacean macroscavengers (large shrimps, lobsters, crabs) and microscavengers (small amphipod and isopods such as sea lice and beachfleas), fish, sharks etc; wave and tidal activity; water temperature, salinity and oxygen content.

Knowledge around marine taphonomy (i.e., the decomposition process in marine environments), including estimates of time for resurfacing following submersion, comes from two types of datasets: controlled animal studies (often with pig carcasses as analogues for humans), and reports following mass drowning events or case series from multiple immersion events. Performing research to inform forensic interpretation of isolated steps in this cycle is extremely difficult, given the number of uncontrolled variables related to both the individual and the environment, as outlined above.

1b. The average period of time between the initial submergence of a human body in seawater and its resurfacing (absent attack by a predator)

Data from case studies from immersion events where decedents are found floating focuses on a measure described as the post-mortem submersion interval (PMSI). PMSI is an estimate of how long a body has been in the water - from when it first entered until when it was discovered. In this sense, PMSI is a misnomer – it actually represents the body immersion interval. PMSI encompasses the time that it takes for a body to resurface, but also incorporates time to submerge, and the time from resurfacing to discovery. Unless both the moments of submerging and resurfacing are actually witnessed, it is the only data point that is available for study, and thus is what is described in human immersion case series.

An association between water temperature, PMSI and the extent of decompositional change was recognised in the late 1960s[2]. Water temperature charts were used to estimate minimum immersion intervals for bodies retrieved from the River Rhine and its surrounds. This demonstrated immersion times from two days in the warmer months, to 28 days and beyond in the colder months. Case series from marine drowning events include cases with PMSIs of one day or less. However, it is not possible to know if these cases were ever fully submerged and went through a complete immersion/refloating sequence in the first instance.

Water temperature has a central role in the rate of decomposition in water, and thus measures of water temperature have been linked to PMSI, described as accumulated degree days (ADD). ADD is measured as the sum average daily water temperature in degrees Celsius for the period in which the body was immersed[3]. A Portuguese study based on a small case series suggested that an ADD range of 100-140 hours correlates with resurfacing. The authors even went as far as to suggest an ADD of 130 hours as a hypothetical reference for resurfacing[4]. Aside from the inappropriateness of drawing such stark conclusions from such a small case series, many of the variables acting on this process are a function of the local geographic area where immersion occurred. This significantly limits the ability to extrapolate for observations made in geographically different areas to others. Also, the literature contains extensive case examples with short PMSIs that contradict this hypothetical reference.

Whilst global models utilising calculated variables such as ADD, and body decomposition score have been advocated as tools to estimate PMSI, they do not incorporate enough biogeoclimatic variation to adequately capture decomposition rates

in different regions[5]. Environmental factors such as tidal action and the presence of scavengers can disrupt decomposition and cannot be factored into these models. To this end, the development of research-informed regionally specific formulae, using region-specific criteria that capture the nuances of decomposition in local environments has been advocated[5].

To the best of my knowledge, there is no contemporary data from the Bondi/Tamarara region that might inform such modelling. Thus there is no data to inform an approximation of the average time between the initial submergence of a human body in seawater and its resurfacing in this coastal region, let alone take into account the uncontrollable intrinsic and extrinsic variables described above.

1c. The length of time before gasses are released.

With regards to the length of time for gases to be released, resulting in the remains becoming submerged a second time, there is no viable dataset to inform this assessment. A significant number of decedents whose remains are submerged in the marine environment for a second time are never recovered, therefore there is no data for this cohort. For those whose remains are discovered submerged in this environment, there is no way to know when they sank for a second time, or if they ever resurfaced in the first instance.

2. Human decomposition in sea water.

A number of aquatic decompositional scoring systems incorporating post-mortem observations of decomposition have been developed[6,7]. These scales of increasing decompositional change range from no visible changes, skin slippage and degloving, bloating in different body regions, adipocere formation, and partial skeletonization to complete skeletonization. These observations are given facial aquatic decomposition scores (FADS), body aquatic decomposition scores (BADS), and limbs aquatic decomposition scores (LADS), culminating in total aquatic decomposition scores (TADS). These have been used to inform estimates of PMSI and are subject to the same uncontrolled variable as discussed above. As the remains of Mr Warren and Mr Mattaini have not ever been located, this will not be discussed in any further detail.

Observations of the sequence of disarticulation of decomposing human remains in water have been made in the literature, following the general sequence[8]:

- Hands and wrists, bones of feet and ankles, mandible, cranium.
- Lower legs, forearms, upper arms.
- Portions of the trunk and pelvic girdle with femora articulated are the last portions of the body to disarticulate.

The presence of clothing, pre-and post-immersion trauma, post-mortem predation and tidal/surf activity can interpose on this sequence. Footwear in particular may protect the bones of the feet and distal lower legs from disarticulation. If footwear is particularly buoyant, this may result in feet and lower leg segments being recovered in coastal zones.

Whilst trends have been identified relating to the decomposition of bodies in aquatic environments, given the dynamic and varied nature of aquatic environments and the multitude of variables that may act on immersed human remains, it is extremely difficult to describe with any certainty the post-mortem taphonomic history of a body recovered from an aquatic/marine environment, let alone that of a body or bodies that have never been recovered.

Acknowledgement

Thanks to Dr Gemma Carter, PhD, Scientist, Molecular Biology, VIFM, for review and feedback.

I, Dr Linda Iles, acknowledge for the purpose of Rule 31.23 of the Uniform Civil Procedure Rules 2005 that I have read the Expert Witness Code of Conduct in Schedule 7 to the said rules and agree to be bound by it.

I hereby acknowledge that this statement is true and correct and I make it in the belief that a person making a false statement in the circumstances is liable to penalties of perjury.

Assoc. Prof. Linda E. Iles
B Med Sci, MB BS (Hons), FRCPA, DMJ (Path), FFPMI (RCPA)
Forensic Pathologist
Head of Forensic Pathology
Victorian Institute of Forensic Medicine

References

1. Sorg MH, Dearborn JH, Monahan EI, Ryan HF, Sweeney KG, David E., CH. 37. Forensic taphonomy in marine contexts. In: Haglund WD, Sorg MH eds. Forensic Taphonomy The postmortem fate of human remains. Boca Raton: CLC Press; 1997 pp567-604.

2. Madea B. Commentary on: Heaton V, Lagden A, Moffatt C, Simmons T. Predicting the Postmortem Submersion Interval for Human Remains Recovered from U.K. Waterways. J Forensic Sci 2010; 55(2):302–7. doi: 10.1111/j.1556-4029.2010.01517.x

3. Palazzo C, Pelletti G, Fais P et al. Application of aquatic decomposition scores for the determination of the Post Mortem Submersion Interval on human bodies recovered from the Northern Adriatic Sea. Forensic Science International 318 (2021) 110599. http://dx.doi.org/10.1016/j.forsciint.2020.110599

4. Mateus M, Vieira V. Study on the postmortem submersion interval and accumulated degree days for a multiple drowning accident. Forensic Sci Int 2014 May;238:e15-9. doi: 10.1016/j.forsciint.2014.02.026. Epub 2014 Mar 5.

5. Forbes MNS, Finaught DA, Miles KL, Gibbon VE. Inaccuracy of accumulated degree day models for estimating terrestrial post-mortem intervals in Cape Town, South Africa. Forensic Science International 296 (2019) 67–73 https://doi.org/10.1016/j.forsciint.2019.01.008

6. van Daalen MA, de Kat DS; Oude Grotebevelsborg BFL. An Aquatic Decomposition Scoring Method to Potentially Predict the Postmortem Submersion Interval of Bodies Recovered from the North Sea. J Forensic Sci, March 2017, Vol. 62, No. 2 doi: 10.1111/1556-4029.13258

7. Heaton V, Lagden A, Moffatt C, Simmons T. Predicting the Postmortem Submersion Interval for Human Remains Recovered from U.K. Waterways. J Forensic Sci, March 2010, Vol. 55, No. 2 doi: 10.1111/j.1556-4029.2009.01291.x

8. Haglund WD. Disappearance of soft tissue and the disarticulation of human remains from aqueous environments. J For Sci 1993, 38 (4): 806-815.