



## Case Report

## Case report: Time of death estimation of a buried body by modeling a decomposition matrix for a pig carcass



Senta Niederegger\*, Julia Schermer, Juliane Höfig, Gita Mall

Universitätsklinikum Jena, Institut für Rechtsmedizin, Fürstengraben 23, 07743 Jena, Germany

## ARTICLE INFO

## Article history:

Received 24 February 2014

Received in revised form 6 August 2014

Accepted 30 August 2014

Available online 10 September 2014

## Keywords:

Buried bodies

Pig carcass

PMI estimation

Decomposition matrix

## ABSTRACT

Estimating time of death of buried human bodies is a very difficult task. Casper's rule from 1860 is still widely used which illustrates the lack of suitable methods. In this case study excavations in an arbor revealed the crouching body of a human being, dressed only in boxer shorts and socks. Witnesses were not able to generate a concise answer as to when the person in question was last seen alive; the pieces of information opened a window of 2–6 weeks for the possible time of death. To determine the post mortem interval (PMI) an experiment using a pig carcass was conducted to set up a decomposition matrix. Fitting the autopsy findings of the victim into the decomposition matrix yielded a time of death estimation of 2–3 weeks. This time frame was later confirmed by a new witness.

The authors feel confident that a widespread conduction of decomposition matrices using pig carcasses can lead to a great increase of experience and knowledge in PMI estimation of buried bodies and will eventually lead to applicable new methods.

© 2014 Elsevier Ireland Ltd. All rights reserved.

## 1. Introduction

Estimating time of death of buried human bodies is a very difficult task. Casper's rule from 1860 [1,2] states (p.37): "At a tolerably similar average temperature, the degree of putrefaction present in a body after lying in the open air for one week (month) corresponds to that found in a body after lying in the water for two weeks (month), or after lying in the earth in the usual manner for eight weeks (or month)." It is still widely used [3,4] which illustrates the lack of suitable methods. Characteristics of decomposition can be identified and distinguished [5] but it is nearly impossible to determine an accurate time of death or burial time based on these findings. Many factors such as pre-mortem conditions; cause of death; time between death and burial; and especially site dependent factors such as soil type and soil humidity influence decomposition of buried human remains [6].

To perform studies and calculate valid postmortem intervals in forensic cases a surrogate human body is needed: we propose to use pig carcasses to generate decomposition matrices for buried bodies in specific locations. The use of carcasses of properly anesthetized and euthanized animals without prior treatment is in many countries not considered an animal experiment (e.g. Germany (§7 TierSchG)). A decomposition matrix lists characteristics of decay and shows their appearance as a function of time.

In the present case study investigators failed to narrow down the possible time of death of a victim due to contradicting witness statements and the absence of suitable studies.

## 2. Case

On July 31 the body of a male of about 180 cm and 60 kg was found in an arbor; buried in soil within the back part of the wooden shed.

The owner of the garden had had an argument with her partner; in leaving the joint apartment the partner mentioned that the problem with a specific friend was solved. The woman grew suspicious as she hadn't seen the friend in some time and the pit in her arbor – which was supposed to become a toilet – had been refilled for an unremembered time span without serving the purpose it was meant to have. She decided to contact the police.

The excavation revealed the crouching body of a human being, dressed only in boxer shorts and socks (Fig. 1). CT scans showed several impression fractures of the occipital calotte and a fracture of the nose. Signs of advanced decomposition were found on external examination: diffuse brown and black decomposition discolorations of the head, trunk, arms and legs; gas bloating of the abdomen and face; large gas filled blisters of the hypoderm; glove-like slipped epidermis of the hands and feet; as well as a high decrease in the general consistency of the body. Neither livor mortis nor rigor mortis were perceivable but the scalp hair was removable. Due to the crouching position putrefaction was minor in areas

\* Corresponding author. Tel.: +49 3641 937927; fax: +49 3641 937902.

E-mail address: [senta.niederegger@med.uni-jena.de](mailto:senta.niederegger@med.uni-jena.de) (S. Niederegger).



Fig. 1. Discovery of the victim at the scene.



Fig. 2. Pig carcass at burial 08.08.

protected from direct soil contact, e.g. the right thigh. Autopsy and histology confirmed deep aspiration of soil and sand from the trachea to peripheral bronchial tubes and pulmonary tissue, indicating that the victim was buried alive.

Estimation of the post mortem interval was strongly impaired by putrefaction and the unusual circumstances of recovery. Witnesses were not able to generate a concise answer as to when the person in question was last seen alive; the pieces of information opened a window of 2–6 weeks for the possible time of death.

To determine the post mortem interval (PMI) an experiment was conducted to set up a decomposition matrix using a pig carcass. *Sus scrofa domestica* – the domestic pig – was found to be an ideal model for a human cadaver when investigating forensic relevant insects colonizing the body [7]. In order to simulate the dimensions of the victims' body a big carcass had to be used. With a weight of about 40 kg however, pigs start to develop the typical fatty rind below the outer skin. As this rind is not comparable to the human skin a sub adult animal with a weight of 35 kg was selected. The pig carcass was provided by the Institute for Laboratory Animal Science in Jena. All temperature measurements were conducted using a measuring instrument with sensors from Almemo (Ahlborn, Germany).

### 3. Setup

#### 3.1. 08.08.2012: burial of the pig carcass

The pig was anesthetized using ketamine and midazolam and euthanized with pentobarbital shortly before it was buried within the pit the victim had been found in (Fig. 2). Rectal temperature was 39.01 °C (Table 1), which is consistent with normal core body temperature of pigs.

To analyze decomposition in a skin-skin contact zone similar to the one found on the left leg of the victim the hind legs of the pig's carcass were tied together with a rope.

Ambient as well as soil temperature was measured from the ground of the pit to the top before placing the pig within, bottoms

facing to the ground. The head of the pig was bent downward for the neck to be the highest point. The carcass was covered to level with matter previously retrieved by digging the hole.

Corresponding to the finding situation of the victim the ground was elutriated with water and subsequently covered with a plastic tarp, Styrofoam boards and bricks. Access points (two doors) of the hut were closed and boarded up. On each following excavation day the hut was found closed and boarded up as it was left after the previous excavation.

### 4. Results

#### 4.1. 15.08.2012: 1. Excavation

Seven days after the burial the pig carcass was excavated for the first time. During this and all following excavations soil temperature was measured gradually from level to ground of the cavern. The carcass was removed from the pit and deposited onto a plastic tarp for further examination. As expected core temperature adapted to soil temperature and reached 15.78 °C (Table 1).

The soil was very moist, clayey and heavy on the surface as well as in the depth of the hole. No soil organisms or insects could be detected during excavation.

The following findings could be reported from the carcass (Fig. 3): aside from some decomposition fluid leaking from the nose and cloudy eyes almost no decay could be detected on the head. Slight blistering of the skin as well as small skin ablations were found at the throat and legs. Belly and abdomen showed slight bloating as well as green and blue decomposition discolorations. Hind legs exhibited dimpled skin but the skin-skin contact area between hind legs was undamaged and of light color.

#### 4.2. 21.08.2012: 2. Excavation

Thirteen days after the burial and 6 days after the first excavation the pig carcass was excavated for the second time. Air temperatures were above 24 °C and thus higher than on the day of

Table 1

Air, soil and carcass temperatures in °C.

	08.08. burial	15.08.	21.08.	28.08.	04.09.	11.09.	17.09.
Outside	22.3	19.0	24.8	18.0	15.6	17.4	12.3
Entrance of hut	20.6	19.0	24.5	16.6	15.1	16.8	12.3
Inside of hut	20.9	18.5	23.4	16.0	14.8	15.5	11.9
Above carcass	21.2	16.5	18.1	15.3	14.8	16.3	11.1
Height of carcass	17.2	16.5	18.0	17.2	16.2	15.9	15.1
110 cm	16.0	16.3	18.3	17.5	16.6	16.8	15.0
100 cm	15.8	16.2	17.5	17.4	16.9	16.8	15.1
90 cm	15.9	16.1	16.9	17.4	16.4	15.9	15.2
80 cm	16.0	16.1	16.7	17.3	16.7	15.9	15.1
60 cm	16.1	15.8	16.4	16.3	16.2	15.9	15.1
30 cm	16.0	15.6	16.8	16.0	16.0	15.6	15.1
Cavern ground 0 cm	15.9	15.3	15.4	15.6	15.3	15.1	14.9
Core temperature	39.0	15.8	16.4	16.3	16.6	16.1	15.9

Download English Version:

<https://daneshyari.com/en/article/103511>

Download Persian Version:

<https://daneshyari.com/article/103511>

[Daneshyari.com](https://daneshyari.com)