

## Drowning in the Night-soil Reservoir (II)

Junji FURUNO, Takeshi KAN and  
Yoshimi YOSHITAKE

*Department of Legal Medicine*  
(Director: Prof. J. Furuno),  
*Yamaguchi University School of Medicine, Ube*  
(Received January 30, 1969)

### INTRODUCTION

The various methods<sup>1)2)3)</sup> have been as yet used in practice to certify whether infant cadavers found in the night-soil reservoir died by drowning or not. In the previous paper,<sup>4)</sup> the authors had emphasized that detecting diatoms and palisade cells in the lung and digestive tracts was very suitable for the verification of drowning death. The present paper have reported 6 cases that were newly discovered in the reservoir, subjected to the autopsy and investigated on their dead causes. The disorganization was proceeded the same procedure as that in the previous paper.<sup>4)</sup>

### AUTOPSY CASES

#### Case 1

A cadaver was a male infant, the body was remarkable putrefied. The body's each part was measured, but not accuracy because of the advance of putrefaction. On the basis of these measuring values, a infant seemed to be born at 32-34 weeks of age. The brain, lung, liver, and kidney were decomposed and vanished away by the putrefaction and worm-eating. The umbilical cord had been cut off at the position of about 15 cm in length apart from the navel and appearance of cut end was not clear. Postmortem time was assumed to be about one month, judging from postmortem phenomena and others.

So, the disorganization was carried out with ribs and femur, but not with the lung, liver and kidney. The kinds of diatoms, *Melosira*, *Navicula*, and *Fragilaria* were detected in these bones and the results were shown in Table 1.

#### Case 2

A male infant seemed to be born at 40 weeks of age. There were discolorations and abrasions of reddish brown or dark reddish brown color on the under lip, right cervical region, chest, abdomen, lumbar region, and anterior of left arm; contusion of sparrow's egg in size in the liver; lacerated wound of approximately 1.0 cm

Table 1. Detection of Diatoms from the Bones in first case.

Bone	Ribs (1)	Ribs (2)	1-femur
Weight (g)	1.2	1.0	6.5
<i>Mel. diatans</i>	8	3	15
<i>Fragilaria</i>	7	2	6
<i>Mel. varians</i>	2	1	8
<i>Navicula</i>	1	1	2
<i>Coscinodiscus</i>			2
<i>Mel. granulata</i>		1	
Total	18	8	33
per 1g	15	8	5.1

in length in the right suprarenal; and about 80 ml of non-coagulated blood in the abdominal cavity. This cadaver showed asphyxial phenomena such as petechial hemorrhages at the subconjunctiva, subpericard, and subpleura, and hemorrhage in the muscular of cervical region, and then dark red non-coagulated blood in the heart.

The hydrostatic lung test was positive. The expanded alveoli were microscopically observed. The umbilical cord had been cut off at the position of 0.5 cm in length apart from the navel. Postmortem time was assumed to be about 30 hours.

To search whether or no diatoms and palisade cells exist in, the disorganization was carried out with lung, and stomach and intestine contents, but these did not be detected at all.

### Case 3

A male infant seemed to be born at about 40 weeks of age. There were not any noticeable injuries except the putrefied change. Postmortem time was recognized about 4 days. The signs of asphyxial cadaver were observed when the autopsy was performed. The hydrostatic test of lung was positive. The cut margin of umbilical cord was irregular, having two linear edges like string (approximately 2 and 3 cm in length). In the microscopic examination, the alveoli were well expanded and palisade cells and a kind of diatom, *Merosira* were observed in bronchi as shown in Fig. 1 and 2. As shown in Table 2, a great number of diatoms were in the disorganized lung, and the kinds and number of diatoms were almost same in each lobe (Fig. 3, 4 and 5). In the stomach and intestine contents, liver and kidney, the same kinds of diatoms as those in the lung were detected (Table 3).

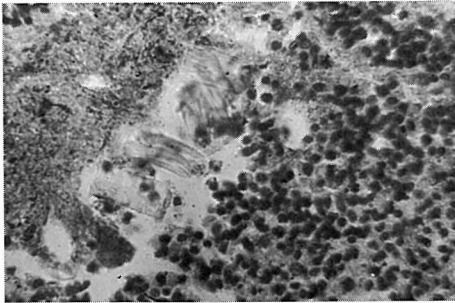


Fig. 1. Palisade cells found in bronchus in 3rd case.

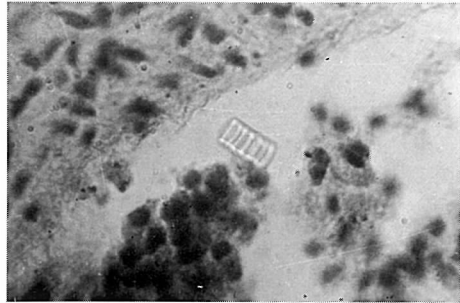


Fig. 2. *Melosira distans* found in bronchus in 3rd case.

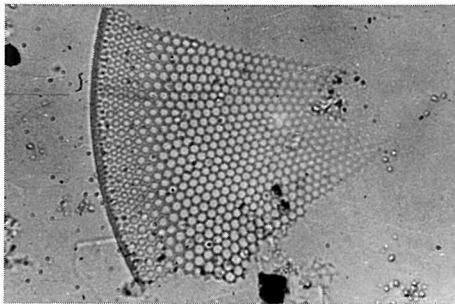


Fig. 3. *Coscinodiscus* detected from the lung in 3rd case.

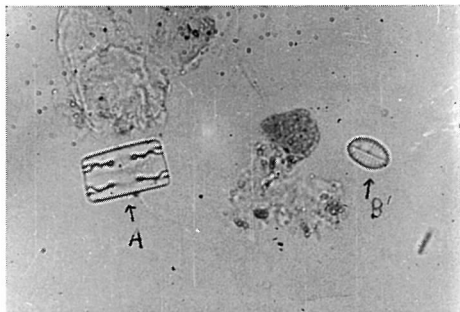


Fig. 4. *Grammatophora* (A) and *Cocconeis* (B) detected from the lung in 3rd case.

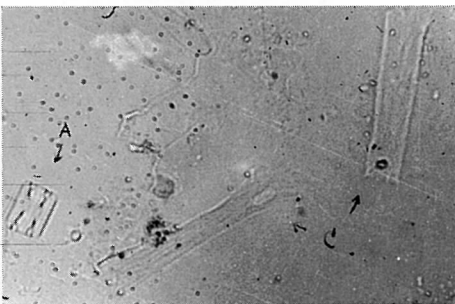


Fig. 5. *Grammatophora* (A) and Palisade cell (C) detected from the lung in 3rd case.

Table 2. Detection of Diatoms from the Lung in 3 rd case.

Organ	left		right		
	upper	lower	upper	middle	lower
Weight (g)	10.0	5.5	6.5	5.0	5.3
<i>Fragilaria</i>	2330	1450	1390	1050	1020
<i>Cocconeis</i>	620	370	390	250	300
<i>Chaetoceros</i>	510	360	330	280	280
<i>Mel. varians</i>	500	250	290	280	230
<i>Navicula</i>	380	180	200	210	180
<i>Asterionella</i>	410	200	190	120	180
<i>Coscinodiscus</i>	190	80	120	180	120
<i>Mel. distans</i>	180	130	110	60	140
<i>Grammatophora</i>	120	40	120	50	40
<i>Rhizosolenia</i>	80	50	40	10	
<i>Skeletonema</i>		40	80		20
<i>Dictyocha</i>			40	20	
<i>Biddulphia</i>		10			40
Total	5320	3160	3300	2510	2550
per lg	532	575	508	502	481
palisade cell	1090	720	1150	680	530

Table 3. Detection of Diatoms from the Various Organs in 3 rd case.

Organ	Stomach	Intestine					Liver	l- kidney	r- kidney
		1	2	3	4	5			
Weight (g)	8.5	2.0		2.4		1.2	10	8.0	7.5
<i>Fragilaria</i>	114	22		8			9	7	8
<i>Cocconeis</i>	22	8		4			2	2	1
<i>Chaetoceros</i>	12	4					2		
<i>Mel. varians</i>	8						3		2
<i>Navicula</i>	6	4					1	1	1
<i>Coscinodiscus</i>	6			2				2	1
<i>Mel. distans</i>	4	2					2	1	2
Total	172	40		14		0	19	13	15
per lg	20.2	18.2		5.8			1.9	1.6	2.0
Palisade cell	22	24		0		0	0	0	0

## Case 4

A female infant seemed to be born at 40 weeks of age. The slight subcutaneous hemorrhage was found on the right part of parietal region and upper chest, and anterior part of right arm. According to the inner findings, the cause of death was presumed to be asphyxia. The hydrostatic lung test was positive. The cut margin of umbilical cord was sharp, but had a linear edge like string and one's length was approximately 4 cm. Postmortem time was considered to be 2 days.

As shown in Table 4, a lot of diatoms and palisade cells were found in each lobe of lungs. In the stomach and intestine contents, liver, and kidney, the same kind of diatoms as those in the lung were detected and these results were summarized in Table 5.

Table 4. Detection of Diatoms from the Lung in 4th case.

Organ	left		right		
	upper	lower	upper	middle	lower
Weight (g)	8.5	13.5	7.0	6.5	15.0
<i>Fragilaria</i>	540	640	330	280	920
<i>Chaetoceros</i>	230	540	210	190	650
<i>Cocconeis</i>	140	380	160	130	340
<i>Mel. varians</i>	30	120	110	100	130
<i>Tabellaria</i>	60	140	20	20	80
<i>Grammatophora</i>	30	60	30	40	80
<i>Coscinodiscus</i>	40	40	10	60	20
<i>Navicula</i>	10	20	40		80
<i>Mel. distans</i>			40	10	30
<i>Dictyocha</i>	10	20			10
Total	1090	1960	950	830	2340
per lg	128	145	136	128	156
palisade cell	1150	840	770	580	2450

Table 5. Detection of Diatoms from the various Organ in 4th case.

Organ	Stomach	Intestine					Liver	l. Kidney	r. kidney
		1	2	3	4	5			
Weight (g)	10.7	2.0		2.8		2.0	16.9	8.2	9.0
<i>Fragilaria</i>	95	12		9			4	5	4
<i>Chaetoceros</i>	35	3							
<i>Cocconeis</i>	20			3			2	2	
<i>Mel. varians</i>	30	6					2		2
<i>Coscinodiscus</i>	5						2		2
<i>Navicula</i>	10	1					1	1	1
<i>Mel. distans</i>	20	3					3	2	2
Total	215	25		12		0	14	10	11
per lg	20	13		4			0.8	1.2	1.2
palisade cell	170	7		0		0	0	0	0

## Case 5

A male infant seemed to be born at 40 weeks of age. The putrefaction was markedly progressed. Postmortem time was approximately one week. On the basis of autopsical findings, it was considered that the cause of death was due to asphyxia. The hydrostatic lung test was positive. The umbilical cord was approximately 50 cm in length. The one end was attached at the abdomen and the another end at the placenta, respectively.

The results obtained from the disorganized lung, stomach and intestine contents suggested that a diatoms were not contained at all.

## Case 6

A male infant seemed to be born at 40 weeks of age. There were not injuries except the signs of asphyxial cadaver. The hydrostatic test of lung was positive, the umbilical cord had been cut off at the position of about 8.0 cm in length apart from the navel, and postmortem time was assumed to be about one day.

In the disorganized lung, and stomach and intestine contents, diatoms did not be detected at all.

## DISCUSSION

Most of the infant cadavers who are buried under night-soil in the reservoir, are discovered by night-soil men and alleged by them. In 1 st case of 6 cases mentioned above, postmortem time was 26 days. Consequently, the brain, liver, and kidney were entirely disintegrated and vanished away by the putrefaction and worm-eating. Detecting diatoms and palisade cells in the bone marrow was a most suitable method for the judgment of whether the cause of death is due to the drowning death in the reservoir or not, especially such a cadaver, but by another method it is very difficult.

The suspected person of 1 st case was a 30 years old housewife who had two children. She stated to be precipitate labor at about 6 pm on September 6 th and a infant cadaver was discovered in the reservoir on October 2 nd. Diatoms were found in the disorganized bones. In the previous paper, Furuno<sup>5)</sup> had reported the identification of drowning cadaver from hard tissues such as bones and teeth, and showed that diatoms were detected in those of the drowning cadaver, but not found in the non-drowning one. At the same time, the author suggested that provided the bleached free bones of a non-drowning cadaver was sunk, diatoms enter into these by water pressure, whereas the number of diatoms found in the non-drowning cadaver was considerably fewer in comparison with that of diatoms in the drowning one. The dead cause of this case was assumed to be the drowning death in reservoir as a comparatively great number of diatoms were detected.

A infant of 2<sup>nd</sup> case was judged to be asphyxial death due to closing the mouth and nostril from autopsical findings, but the suspected person emphasised that one was born by precipitate labor. Therefore, the disorganization was performed on account of verifying whether a infant inhaled the reservoir contents or not, but diatoms was not entirely found in the lung as well as in the stomach and intestine contents. The police investigators thereafter revealed the following facts. The suspected person was a maiden lady, who was delivered of a male infant in her bathroom at 4 am on March 3<sup>rd</sup> and killed one by closing the mouth and nostril with her hand after she beated with a stick and kicked with her leg, because one burst into tears.

The suspected person of 3<sup>rd</sup> case was a 30 years old housewife who had a child and alleged to be precipitate labor in her bathroom at 0.30 am on April 9<sup>th</sup> and infant cadaver was discovered in the reservoir on 12<sup>th</sup> inst. By the disorganization, a lot of diatoms and palisade cells were found in the lung, stomach and intestine contents, liver, and kidney. Therefore, the cause of death was considered to be drowning death to bury under night-soil in the reservoir. Fig. 1 and 2 showed palisade cells and a kind of diatom, *Melosira distans* is frequently found in tap water and authors have used tap water without taking diatoms into consideration, in the course of producing tissue preparat. Consequently, whether this diatom was derived from the reservoir contents or entered when tissue preparat was produced, could not be distinguished. However, as palisade cells are by no means found in tap water, a infant was easily assumed to inhale the reservoir contents.

The 4<sup>th</sup> case, the suspected person was a 21 years old bar hostess and alleged to be precipitate labor at about 1 am on June 26<sup>th</sup>, and her mother brought the infant cadaver with her hand. Diatoms were found in the disorganized lung and other various organs, and the cause of death was looked upon as the drowning death.

The suspected person of 5<sup>th</sup> case a 22 years old female shop employee, who stated that bore a infant at about 10 pm on November 12<sup>th</sup> and the delivery was precipitate labor. A cadaver was discovered by night-soil man on 19<sup>th</sup> inst. The suspected person of 6<sup>th</sup> case was a 21 years old maiden lady and one of her family said that she bore a infant by precipitate labor on February 5<sup>th</sup>. In 5 and 6<sup>th</sup> cases, diatoms were not detected in the disorganized tissues and their dead cause was recognized not to be the drowning death.

Most of infant cadavers found in the reservoir were born in secrecy without assistance of the obsterician and midwife. So, it is not seldom that they die at the delivery and immediately after delivery. A new born infant was easily suffocated to death even by very slight oppression, so that the traces given by violence could not be usually recognized. Such a cadaver was almost dumped into the reservoir under pretence of precipitate labor. So, a judge first detect the

diatoms and palisade cells in the various organs and bone marrow, and must obtain the evidence that a infant inhaled the reservoir contents. The detection of diatoms in the various organs and tissues, especially in the bone marrow is a best method because possible to carry out with not only a fresh cadaver, but also very one.

### CONCLUSION

Six infant cadavers found in the reservoir were examined through the disorganization and investigated on their dead cause. Moreover, authors have especially pointed out that the disorganization was a most suitable method for the identification of whether the cause of death was the drowning or not.

### REFERENCES

- 1) Honma, K.: Gerichtliche-medizinische Betrachtung über die Sturzgeburt, besonders eine Nachweismethode des Ertrinkungstodes in der Abortgrube. *Act. Crim. Japon.*, **13**: 461, 1939.
- 2) Mikami, Y. and Okuda, S.: Diagnosis of the Drowned Fetus in Labatory by Fluorescence of Chlorophyl. *Jap. J. Legal Med.*, **3**: 208, 1949.
- 3) Suyama, H. et al.: Drowning in a Fild Reservoir of Night-soil *Act. Med. in Gifu*, **8**: 84, 1960.
- 4) Furuno, J. and Mashimoto, Y.: Drowning in the Night-Soil Reservoir *Bull. Yamaguchi Med. School*, **15**: 173, 1968.
- 5) Furuno, J.: Identification of Death by Drowning from Bones and Teeth (3rd Report) *Jap. J. Legal Med.*, **23**: 328, 1969.