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SUBMERGED CORPSE FOUND 24 YEARS AFTER THE MURDER – A CASE STUDY

ABSTRACT

Objectives

The main objectives of this paper are to define the issues related to a search for a drowned corpse, fishing it out and procedures to take evidence when the victim's body has not been found.

Methods

A case analysis was performed in which the criminal covered up traces by drowning the corpse. An extensive study in this regard was conducted covering 500 criminal cases concluded with a final and binding judgement. Finding a corpse in a lake 24 years after the crime is a case described in detail in this paper. The authors obtained the

consent of the District Prosecutor and the District Court in Olsztyn for publishing the case materials.

Results

Neither the process of the corpse search nor fishing it out were carried out properly in the case under study. The large number of search attempts was caused by poor coordination of the search groups and by using unsuitable tools. Most methods were ineffective given the small size of the package resting on the water reservoir bed.

Conclusions

A search for a drowned corpse requires good cooperation between the search team and law enforcement authorities and later with forensic medicine specialists in establishing the cause of death.

KEYWORDS: *murder, submerged corpse, evading criminal responsibility, disposal of a corpse, circumstantial evidence trial*

INTRODUCTION

Murderers behave in a variety of ways after the crime. Some of them make efforts to evade criminal responsibility – they cover up traces, throw away the murder weapon, clean up the place of murder or provide themselves with an alibi. Studies of tampering with a corpse by the perpetrator of a murder are particularly useful for the investigation practice, especially when it concerns the drowning of the whole corpse or its fragments. Studies show that the perpetrators usually drown the corpse in a lake (33%), in a river (25%), in the sea (17%), in a small water reservoir (pond) (17%) or in a lagoon (8%) (Gawliński A., 2018).

When searching for a corpse, one should consider whether the corpse is to be situated in standing water or in a river and to explore the specificity of the aquatic environment. It is important to know the water depth, its transparency, current and, in particular, whether it swells and can carry large objects (e.g. parts of a dismembered corpse) over large distances after intensive precipitation or a thaw. Gathering this data determines the search method and the equipment selection.

The corpse was not found in two cases, but the perpetrators were convicted in circumstantial legal cases (Gawliński A., 2021). One of the cases was the murder of Joanna G. in Olsztyn in 1996. After the murder, her husband submerged the body in a lake. When this study was first conducted (2018/2019), the victim's body had not been found despite an extensive search. However, the search team succeeded in 2020. The body was partially preserved, and this case is described in more detail in this paper.

CASE STUDY

Joanna G., aged 23 years, met 21-year-old Marek W. in May 1996. After three months, on 24 August, the couple got married. They argued frequently. The husband drank a lot and was jealous of his wife. On 16 September 1996, the woman did not sleep at home. When she returned home, the couple started to argue and Marek W. strangled her during a fight that ensued. He hid the body in the blanket compartment in a divan. He cleaned up the flat thoroughly, including wiping up the victim's urine which she had discharged while being strangled. He reported his wife as missing the next day. He told his brother Arkadiusz W. about what had happened. Together they planned how to dispose of the body. They decided to dump it in Lake Dywickie in their home town. After a few days, Marek W. packed the body of Janna G. into a large polyamide sack, closed with a zipper. The victim was ca. 166 cm tall and weighed ca. 50 kg. The man placed the body in the sack, on the back, then pressed and bent the legs at the hip joints. Subsequently, together with Tomasz H., he transported it in a borrowed car to a home in Dywity (ca. 6.5 km from Olsztyn). There, they placed it in an old, unused car on the premises, from where they carried it in the evening to a service pit in the garage. Marek W. and Arkadiusz W. decided to dump the body in the nearby Lake Dywickie. After a week, the men borrowed a pontoon boat. They put the victim's body into a jute sack, in which waste paper had been kept and they weighed down the sack with bricks and small metal objects. The brothers used a car to transport the corpse to the shore of the lake. With the help of Arkadiusz W., Marek W. placed the sack with the body and the weights in the

boat. Marek W. sailed out to dispose of the corpse while his brother held a line tied to the pontoon boat. In this manner, he helped his brother to return to the shore by pulling the line.

Marek W. apparently was involved in searching for his wife. He asked about her among his acquaintances. On 17 September 1996, he informed Joanna's mother – Danuta J. – that his wife was missing. He took part in a TV programme, which was popular in Poland, "Ktokolwiek widział, ktokolwiek wie [Whoever saw, whoever knows]", whose aim is to help the families of missing persons. He also made other efforts to divert suspicion from himself, e.g. he asked his friends to send postcards from Germany on his behalf, which was supposed to make it appear that he was looking for his wife. After three months, Marek W. entered into a relationship with Emilia F. and stopped searching for his wife.

REVEALING THE CRIME

There were a few people who knew about the crime – Tomasz H. and Arkadiusz W., who helped the perpetrator to dispose of the body, as well as the brothers' parents. However, no one reported the case to the authorities. The crime was revealed by accident. There was a conflict growing between Marek W. and Arkadiusz W. In 2003, Emilia F. found an anonymous letter at the door. It was established later that the letter had been prepared by Arkadiusz W. The man had started to blackmail Marek W., threatening to expose him if he refused to give up the flat that he was occupying.

"WHO KNOWS WHERE JOANNA G. W. IS NOW??????

WHAT ABOUT YOU?

DO YOU KNOW ALREADY????

WOULD YOU LIKE TO SEE HER AGAIN?

YOU HAVE THE TIME UNTIL 15.08.2003 TO LEAVE THIS FLAT.

FIND YOURSELVES SOMEWHERE NICE TO LIVE. IF YOU DON'T,

THEN THE STATE WILL LOOK AFTER YOU.

SO WHERE IS SHE NOW????

WELL? GUESS WHERE..."

While drinking alcohol with Marek W., Emilia F. asked him what had happened to his wife Joanna G. The man admitted to killing her and disposing of her body. But the woman did not believe him. She asked him for more details the next time they drank alcohol together. Concerned, she reported the case to the police on 16 September 2003. Marek W. was detained. Initially, he admitted to killing his wife and hiding the body, described the act in detail and showed where he had hidden the body. A forensic experiment – a site visit – was performed on 18 September 2003 on Lake Dywickie. However, Marek W. withdrew his admission of guilt later.

By a judgement of 16 March 2005, Marek W. was found guilty of killing Joanna G. and sentenced to 25 years in prison. Both the prosecutor and the defendant's attorney appealed against the sentence. As a result of the appeal, the second instance court remanded the case back. After the retrial, he was again found guilty of murder by a judgement of 9 November 2006 and sentenced to 15 years in prison. The second instance court upheld the sentence appealed against by the prosecutor and by the defendant's attorney. Marek W.'s prison term ended in 2018 and he was released. He died several months after that.

A conviction for murder is possible even if the corpse has not been found. Circumstantial evidence must make a pattern of a chain of evidence. It has to be inseparable and to allow for reconstructing the event and for adopting one version while excluding the others. A missing corpse does not prevent a trial from taking place. The perpetrators often tamper with the corpse, hoping it will prevent charging them with the crime. The corpse is referred to as the *corpus delicti*. If the victim's corpse is removed and a crime is probable, the investigation should be based on circumstantial evidence. In the case of Marek W., those included the witnesses' testimonies and the suspects' statements.

SEARCHING FOR THE BODY

The search began after information had been received about the place where Joanna G.'s body had been hidden. Multiple searches conducted over 24 years did not result in finding it.

The coordinates of Lake Dywickie are as follows: latitude $53^{\circ} 50'$; longitude $20^{\circ} 29.1'$. Its area is ca. 18.4 ha. Maximum length: 900 m, maximum width: 500 m. Maximum depth: ca. 7 m. It is surrounded by meadows and fields and its shores are overgrown with reeds and bulrushes. The shoreline length: 2,100 m. The lake capacity: 646.9 thousand m^3 . The lake bed is silted. The water transparency is very poor, and when the silt is stirred, the water transparency approaches zero.

1. 18.09.2003 – the first search attempt. The lake was searched by scuba divers of the State Fire Service and the Municipal Police Headquarters in Olsztyn. This action lasted three hours. The divers did five circles at a radius of 15 metres from the indicated spot.
2. 19.09.2003 – the second search attempt. The lake was searched with a motorboat, specialist diving equipment and metal detectors.
3. 23.09.2003 – the third search attempt. Diving equipment and a proton magnetiser were used. The search was done from the spot indicated by the perpetrator outwards. The action was divided into two stages: 1. Use of the equipment from the police boat. 2. When the device gave out a signal, a diver went underwater. A 2-metre-long steel tube was recovered.
4. 25.09.2003 – the fourth search attempt. This was done, among others, by a technician of the Department of Sanitary Geodesy and Navigation at the University of Warmia and Mazury in Olsztyn. The divers searched the bottom and probed the layer of silt to a depth of 40-50 cm.
5. 29.09.2003 – the fifth search attempt. A boat was used fitted out with a SIMRAD EA-501P echo sounder coupled with GPS and two computers. The search ended by identifying five places where the body could be.
6. 20-22.10.2003 – the sixth search attempt. It was conducted by specialists from the Naval Academy in Gdynia, Polish Army Diver and Scuba Diver Training Centre in Gdynia. The following equipment was used: a remote-controlled Super Achille underwater vessel, Marine Magnetics SeaSpy magnetometer, Simrad EA 400 hydrolocation sounder, Laica MX200 GPS, Trimble DSMPro GPS, "Academos" motorboat, electric power generator and a motorboat. Starting with the probable spot where the body had been hidden ($\varphi = 53^{\circ} 49, 942' N, \lambda = 020^{\circ} 29,219'$

- E), the hydrographic search was done of the 50-metre wide (in the E – W line) and 100-metre long (in the N – S line) basin. Only a can, tree branches overgrown with water plants and bunches of grass growing on the lake bed were found at the spot where the signal had been detected.
7. 05-09.06.2006 – the seventh search attempt. Polish Navy Academy in Gdynia (stage I). Searching the entire basin with a towed sonar and a magnetometer. Additionally, selected sites were searched with a variable depth sonar. Conclusions from the search: absence of a clear registered echo from the searched object. However, a hole with a ferromagnetic anomaly was detected in the lake bed structure.
 8. 22-24.09.2006 – the eighth search attempt. The Polish Navy Academy in Gdynia (stage II). No visual contact with an underwater object which could indicate the presence of the searched object in the area. The anomaly was confirmed and unnatural traces – probably of human activity – were found.
 9. June 2019 – the ninth search attempt involved The “Na Tropic” Foundation, the “5 Fal” Diver Group.
 10. 26-27.05.2020 – the tenth search attempt. The “Na Tropic” Foundation, together with Marcel Korkuś (an extreme diver, two-time Guinness record holder in high-mountain diving). Joanna G.’s body was found.

FINDING THE BODY

The body was found on 27 May 2020. The diver used a neodymium magnet, which revealed the presence of metal objects. It helped him to detect the sack on the lake bed at a depth of ca. 3 m. The body was dumped approx. 30 metres from the shoreline, coordinates: N 53°49 9047', E 020°29,0810. The underwater visibility was limited to several centimetres. The sack lay on a gravel bed. There were holes in the sack, with bricks visible inside it. An attempt was made together with the firemen to recover the sack from the water, but it broke and fell apart. As it could not be pulled out as a whole, the decision was made to recover individual objects that were inside. They were placed in a bag, which was then towed to the lakeshore on a tarpaulin.

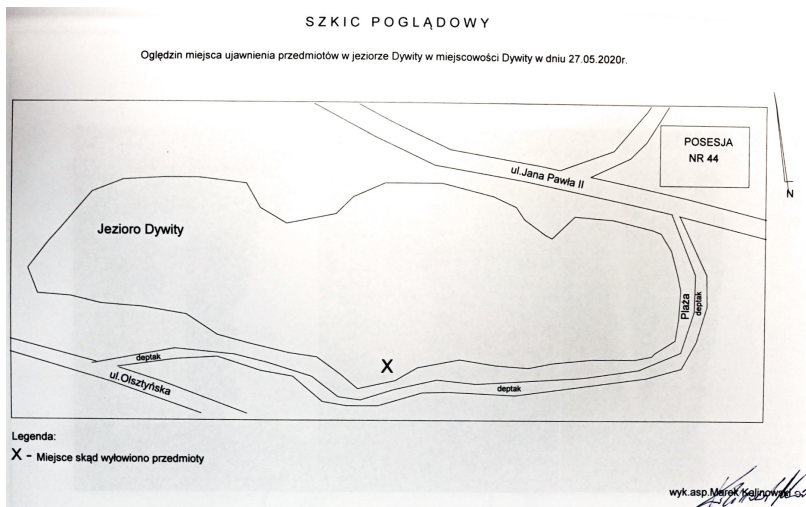
In the authors' opinion, the attempt to fish out the bag from the water should not have been made, as it was damaged anyway. Given the fact that it had stayed there for 20 years, it could have easily broken and the whole, or a part, of the corpse could have fallen out of it. This is how the skull may have fallen out, which has not been found since. Stretchers could have been used to transport the bag.

Fragments of a skeleton were recovered, partly decayed and with elements of soft tissues. Adipocere had been formed on parts of the corpse. The victim's clothes and personal belongings were found: a jacket from a leather-like material, a sweater with patterns on it, a pair of shoes, panties, a bra, a pair of socks, glasses, a piece of blue cloth (probably for cleaning glasses), a trouser belt with a metal buckle, a rectangular piece of glass (probably a mirror), a hairbrush, a deodorant, a cylindrical object with horsehair at the end (probably a makeup brush), a key ring, a key, a handbag, an empty wallet, trousers. Joanna G.'s skull was not found – it was probably lost when the remnants of her body were being recovered.

Presentation of the items found with the body was done on 23 June 2020. The victim's mother recognised them as belonging to her daughter.

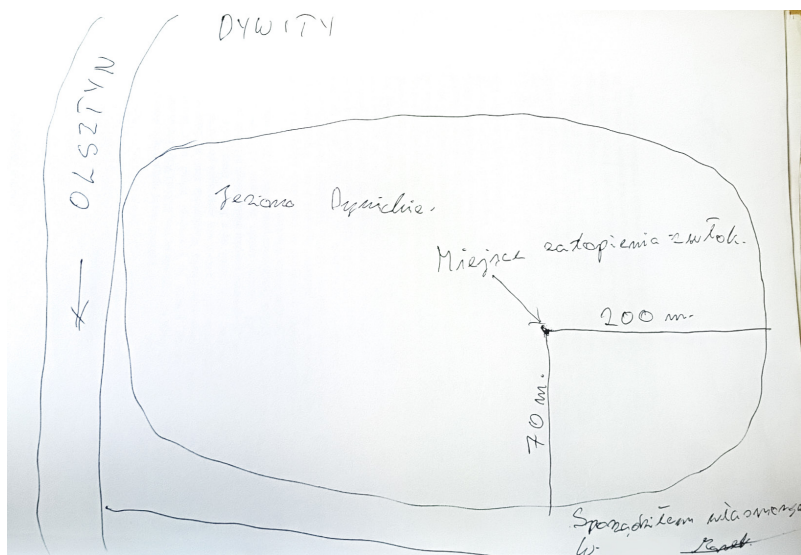
The expert witnesses issued their opinion on the genetic aspects of the samples taken from the remnants on 18 June 2020. The examination confirmed that the remains found in the lake were those of Joanna G.

Sketch 1. Sketch showing the place where the body and belongings of Joanna G. were found



Source: Case files, photo by the authors

Photo 1. Sketch made by Marek W. during the interrogation



Source: Case files, photo by the authors.

Photo 2. *Lake Dywickie during the search for the body in 2020 (view of the place where the body was found)*



Source: Case files, photo by the authors

Photo 3. *Lake Dywickie in 2021 (view of the place where the body was found)*



Source: Photo of the authors

CONDITION OF THE BODY

The body of Joanna G. lay underwater from September 1996 to 27.05.2020. The following were identified in the course of the inspection:

1. A nearly complete human skeleton with elements of clothing (a trouser belt, trousers, panties, socks) and partly preserved soft tissues in the pelvis and thigh area, which had the form of brittle, hard adipocere stuck to the pelvis, femurs and lumbar vertebrae 4 and 5 – the upper part of vertebra 4 was even, and the bodies – soft and spongy, the ligaments connecting the skeleton parts had partly decomposed.
2. The mandible with preserved teeth, except for the permanent ones, missing teeth 46 and 36, and empty undamaged teeth 41 and 31.
3. Six cervical vertebrae, twelve thoracic vertebrae, three lumbar vertebrae.
4. Twenty-two fragments of ribs.
5. Two patellas, two tibias and two fibulas.
6. Tarsuses and feet bones preserved in socks.
7. Two scapulas with carietic spots.
8. Two clavicles with carietic spots.

DISCUSSION

A corpse may find itself in a water body in various circumstances. Some people commit suicide by drowning themselves (Copeland A. R., 1987; Avis S. P, 1993; Byard R. W., 2001; Wirthwein D. P. et al., 2002; Salib E., Agnew N., 2005; Todt M. et al., 2014), including suicides after committing a murder (Melez Ī. E. et al., 2014). Many people drown by accident (see Lunetta P. et al., 2004; Szpilman D. et al., 2012).

Three types of the perpetrators' behaviour can be identified in cases of submerging a corpse. Firstly, the perpetrator transports the victim after the murder to a selected place and submerges the corpse without dismembering it. It so happened that the perpetrators did not realise that the victim was still alive when he was throwing the corpse into the water body. In such cases, death

was caused by drowning or by hypothermia. In most cases, the perpetrator weighs the corpse down or ties it up.

Secondly, the perpetrator dismembers the corpse (usually at the crime scene). It may happen that the perpetrator submerges parts of the corpse at different places or places them in cases, bags, etc. (Trzciński M., 2021).

Thirdly, in some cases, the victim may have been drowned (Copeland A. R., 1986; Misliwetz J., Stellwag-Carion C., 1995; Lau G., 2002; Leth P. M., 2019). This can involve drowning the victim while being in the water together or pushing the victim, who cannot swim, underwater.

In some cases, a victim can be drowned (Copeland A. R., 1986; Misliwetz J., Stellwag-Carion C., 1995; Lau G., 2002; Leth P. M., 2019) or their body disposed of by throwing it into a water body or submerged with the use of additional weight.

It may be difficult to identify the nature of the death (Lawler W., 1992; Lunetta P. et al., 2003; Piette M. H., De Letter E. A. 2006; Papadodima S. A., 2010; Byard R. W., 2015; Schneppe S., Dokter M., Bockholdt B., 2021). The very fact of being in the water does not necessarily mean that the victim died by drowning (Sarvesvaran R., 1992).

The body undergoes many post-mortem transformations, which affect possible conclusions regarding the cause of the victim's death (Vanin S., Zancaner S., 2011). Putrefaction is the basic symptom (see Ambade V. N. et al., 2013). It can be slower in water than when the body is exposed on the surface. This is because the underwater temperature is lower and oxygen is less available.

The body sinks to the bed. However, it will float to the surface after some time due to putrefactive gas. It lies face down on the river or lake bed. Transformations taking place in a human corpse in water are significantly different than those on the land, which are well-known. The differences concern the time when signs of death appear and when post-mortem transformations take place along with post-mortem injuries, typical only of the water environment. Such transformations occur in corpses placed in water after death, e.g. with a view to covering up the crime (Siermontowski P., Olejnik A., 2010).

After the corpse is found in water, it is of key importance to determine its supravitality. This is evidenced by water in the lungs and in the bronchi and diatoms in the dead person's internal organs. One should distinguish

the injuries suffered when the person was alive from those originating after death and injuries inflicted on purpose from accidental ones. It is important to determine the time that passed from the moment of death and to make an assessment of morphological changes (Cobbett H., Morrow P., Stables S. R., 2014). Since cases of drowning pose considerable diagnostic problems (Pollanen M. S., 1998; Bloch-Bogusławska E., Paradowska A., Piecyk K., 2008; Farrugia A., Ludes B., 2011), good cooperation between the investigators and the forensic medicine specialists is required (Davis J. H., 1986; Armstrong E. J., Erskine K. L., 2018). The condition of a corpse and the putrefactive processes may make it difficult to determine the dead person's identity (Byard R. W., Simpson E., Both K., 2008).

Many factors have an impact on the decomposition of a human corpse in water, e.g. water temperature, animal (fish, crustaceans) activity, the deceased person's clothes, microorganisms and water currents (J. L. Caruso, 2016). So-called "washerwoman's skin" is a typical external change on the human corpse, which appears on hands and feet. It involves skin exfoliation. However, this symptom is not a sign of supravitality. Development of "washerwoman's skin" depends on the duration of the period when the body remains underwater. Many studies of the subject have been performed, analysing such factors as the water temperature and salinity (Weber W., Laufkötter R., 1984; Reh. H., 1984; Püschel K., Schneider A., 1985;). Foam appearing around the corpse's mouth and nose is another symptom. Water with foam from the respiratory tract, the lungs and the bronchi, flows out. This symptom increases the probability that the person died in the water.

Adipocere is formed in specific environmental conditions. It is a late post-mortem transformation. It is sometimes called "grave wax". Its development is favoured by humid anaerobic conditions. Adipocere forms by triglyceride hydrolysis to glycerol and free fatty acids during the adipose tissue decomposition. The body becomes waxy and later – as fatty acid crystallise – transforms from more brittle to solid. This can contribute to the corpse being preserved for many years (DiMaio V. J., DiMaio D., 2001; Forbes S. L. et al., 2010; Widya M. et al., 2012).

Bathymetric, hydrologic and meteorological data should be gathered. One should note that when submerging a corpse, the perpetrator may have weighed

it down with metal parts, which is why an analysis of the hydroacoustic beam reflection could be insufficient. One should then focus on magnetic field anomalies with a magnetometer or a metal detector.

It is also important to determine the corpse buoyancy. Smaller and deeper water bodies have less water movement. A corpse can be moved by a water current of 4 km/h and more (Trzciński M., 2021).

It is important to have information on the lake bathymetric map, which shows whether there are “old river lake beds”. If the corpse that is being sought is in an old river bed (i.e. it is highly likely that the corpse is in a bottom area where there is a river bed or its tributary) the search should be started by defining the exact place of the event and then by dividing the water body into sectors, towards the dam. It is the natural course of the river, so it is highly likely that the corpse will move in this direction. Another issue concerns the situation that if the corpse is in an old river bed, it could soon be covered with bottom debris (slime), therefore, even searching with a very good underwater camera will be ineffective. Another obstacle, which poses a threat to the divers, is the “double river bed” occurring in natural lakes. There is lush aquatic vegetation in natural lakes, which turns into the upper layer as a consequence of rotting. When this “temporary bottom” is loaded, it sinks. The corpse, which is situated between the proper bed and the upper vegetation layer, will not float, regardless of the water temperature or depth (Bodziak A., 2005).

It is extremely important for searching objects at the water body bottom that, except in mountainous, oligotrophic lakes, the basin is filled with a thick (sometimes several meters) layer of deposits (silt), which is stirred by the slightest water movements. If there is a (thick) layer at the bottom, it is highly likely that a diver or an operator will swim above an object without even noticing it. The object will be totally covered with a layer of the bottom deposits, and it cannot be detected by a visual method (a camera, a diver's sight). In general, it is accepted that the bottom sediments do not deposit more than 1 mm annually, so even if an object stays at the bottom for several years, it should not be completely covered with silt. However, if the deposit in the water body is not very compact, a submerged human object can sink into the deposit to a depth of as much as 0.5 to 1.0 m. Obviously, this depends on the depth and the method of weighing down the corpse. Considering the above,

it is necessary to acquire information on the characteristics of the bottom deposits in the water body. (Siermontowski P., Olejnik A., 2010).

Searching for a corpse and its recovery can often pose problems. Activities depend on the type of the water body (sea, lake, river, etc.) and on the corpse condition. It is important to recover a complete corpse, although it may be difficult because of its decomposition and natural dismembering. The corpse condition and its position underwater should be documented by taking photographs as much as possible.

Literature reports provide descriptions of cases of corpses recovered from water bodies after they remained there for a long time. The bodies of two men were found after 10 and 11 months in a limestone cave filled with freshwater (Byard R. W., 2016). A man's body was found after seven years in a submerged car (Kasuda S. et al., 2016). No reports have been found describing a case of finding a corpse after such a long time as described in this paper – 24 years after the murder and disposal of the body. The corpses in all these cases were partially preserved owing to adipocere formation in specific environmental conditions.

Several factors may have affected the formation of adipocere on the corpse of Joanna G.:

- the fact that it had rested on the lake bottom, where the water temperature is lower than in the other parts of the lake (the depth of ca. 3 metres) and there is no oxygen,
- the fact that the murder perpetrator had placed the body in a sack, thereby making it less accessible to animals, whose activity contributes to a corpse decomposition),
- the dead woman's clothes (e.g. trousers),

The water body type and the fact that the corpse was weighed down (it rested in one place and was not displaced for 24 years).

When a corpse is found in a water body, it is of key importance to establish the cause of death and the circumstances in which it found itself in the water. This can be helped by external inspection at the site where it was found and a forensic post-mortem. Among the issues to be established include, among other things, the supravitality, the duration of the corpse's stay in the water

and the type of the event itself, i.e. suicide, accident or murder. One should bear in mind that some murder perpetrators throw the body into the water or submerge it using additional weights for the purpose. On the one hand, they want to imply a different cause of death, and on the other – to conceal the fact that a crime was committed. A perpetrator can put the corpse into a suitcase, a bag or weigh it down with concrete slabs, bricks, stones, metal objects, etc. Therefore, it is important to assess the method of weighing down the body (to exclude doing it by the dead person themselves) and to find additional injuries on the body which will testify to a different cause of death than drowning. One should note that they can be formed in consequence of the corpse displacement on the water body bed, which is affected by the water body type and the water currents. The corpse can be caught on branches and stones, which may result in additional injuries.

FINAL CONCLUSIONS

Marek W. showed the approximate place where Joanna G.'s body had been dumped. Despite this, it could not be found for many years. Considerable resources and specialist equipment were engaged (e.g. hydrolocation sounder, sonar, magnetometer, remotely controlled underwater vessel, specialist motor-boats, divers). The search was ineffective partly because of the lake conditions (poor visibility caused by large amounts of silt). The literature of the subject suggests that if a corpse lays in silt, special detectors with framework coils on floats can be used. Such detectors can find metal objects resting at depths of up to several metres. In this case, the body could have been found sooner with such a detector, given that it was weighed down with metal objects (Stojer-Polańska J., Lisowicz M., Gołębiowski J., 2015).

However, based on the case analysis, it is possible to draw some important insights into the search for the submerged corpses and to suggest new technical possibilities having an impact on the activity to end with a positive result.

1. HYDROLOCATION

When performing the hydrographic reconnaissance of a water body in search of a corpse underwater, one should bear in mind that crime victims usually stay hidden underwater due to being weighed down with various (usually metal) elements. When such information on the method by which the corpse was weighed down is obtained, for example, during the questioning, then, of all the objects detected by hydrolocation, one should focus on one properly reflecting the hydroacoustic beam and exhibiting a magnetic field anomaly. This means that not only sonar, but also a magnetometer or metal detector should be used (Stojer-Polańska J., Lisowicz M., Gołębiowski J., 2015).

2. DETECTORS

Once the search area has been outlined and if there is knowledge that the body is encumbered with metal objects, for example, special detectors with frame coils on floats can be used. Such detectors can detect metal objects resting at the depths of up to several metres. In this case, the body could have been found earlier with such a detector, given that it was loaded with metal objects (Stojer-Polańska J., Lisowicz M., Gołębiowski J., 2015).

3. UNDERWATER ARCHAEOLOGY

The role of underwater archaeology is increasing in this type of cases. Studying the condition of the bones discovered makes it possible, among other things, to estimate how long they have been underwater (Guareschi E. E., Tobe S. S., Nicholls P. K., Magni P. A., 2021). Sometimes these can be small remains, which makes the search even more difficult. Consequently, the detection process requires meticulousness, good organisation on site as well as innovation in the means used. Some authors rightly point out that the methodology for conducting searches for submerged corpses has not developed as much as the methodology for conducting searches for buried remains. Further work in this direction is required. Some even advocate the use of underwater geological

methods (Ruffell A., Pringle J. K., Cassella J. P., Morgan R. M., Ferguson M., Heaton V. G., Hope C., McKinley M., 2017).

4. SONARS

In doing so, it should be noted that among the models used in the search for human remains are towed side scan sonar, scanning sonar lowered to the bottom and scanning sonar integrated with an underwater vehicle. The latter are the most innovative group of such devices. ROVs (Remotely Operated Vehicles) are remotely operated unmanned vessels capable of submerging and staying below the surface. The robots act as a platform equipped with a sonar and a camera (or cameras) to visualise the object once it has been targeted. Due to their mobility, multi-tasking and versatility, they are instruments increasingly used in search operations. They can operate in polluted and contaminated waters as well as in difficult hydro-meteorological conditions, enable ongoing monitoring of the effects of divers' work underwater and even replace them in the performance of certain activities (Zubańska M., Knut P., 2018).

The use of sonar is becoming increasingly common (Blondel P., 2005; Williamson R., 2005). It can be concluded that future technological advances will probably play a significant role in the search for bodies in water. The use of underwater robots or water drones will increase as well. These either roam the bottom of a water body along the surface of the sediment, like those used in underwater surveys for telecommunications cables, offshore wind farms and oil rigs will be able to locate human bodies remaining therein (Ruffel, A., 2017).

However, there can occur many other difficulties in this field, such as ensuring adequate communication between the diver and the robot (Birk A., 2022).

5. SEARCHING METHOD AND TECHNICAL CONDITIONS

In Poland, issues related to water rescue equipment are regulated by the Regulation of the Minister of Interior and Administration on the detailed organisation of the national rescue and firefighting system of 17 September 2021, Journal of Laws 2021.1737. However, it does not specify the equipment with which a water rescue vehicle (SRW) is to be equipped. A system of

equipment standardisation for fire vehicles and other means of transport has been introduced in the organisational units of the State Fire Service. The aim of this system is to standardise, predominantly, the types of fire vehicles and their minimum equipment required. An analysis of the standards envisaged for the water rescue vehicle shows that they do not assume modern equipment for searching for bodies in water. It should be noted that the tasks of the State Fire Service are different from those of the Police. It should be postulated that a specialist unit for the whole country should be created even at the National Police Headquarters (KGP) to search for bodies in water in preparatory proceedings for the most serious crimes. The above would be rational and would give more chances for efficient and successful completion of searches for crime victims (the National Headquarters of the State Fire Service (KG PSP)).

6. COOPERATION BETWEEN SERVICES AND PROFESSIONALS

However, the place where a body was hidden underwater is not always known so well. Therefore, a search for a submerged body requires good cooperation between the search team and law enforcement authorities and later with forensic medicine specialists in establishing the cause of death. This case shows how complicated circumstantial legal cases are when a murder is involved and the corpse has not been found. The key elements have to be established: did a murder, in fact, take place, and who was the murderer? The evidence has to be collected, and the corpse has to be searched for.

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