



# CAN PLANKTONIC ORGANISMS BE USED IN INVESTIGATING OF DIVING ACCIDENT?

## AN EXPERIMENTAL ANIMAL STUDY



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### Introduction

It is known that in the majority of fatal diving accidents, deaths were caused by drowning. When a body is recovered from the water after a fatal SCUBA diving accident, it is important to determine the depth of accident in order to make a comment about the cause of accident. Diatom identification has been used as an evidence for drowning in lungs and other organs. Planktonic organisms show seasonal changes as qualitative and quantitative. In this study, we investigated whether the planktonic organisms can be used for determining the depth of drowning.

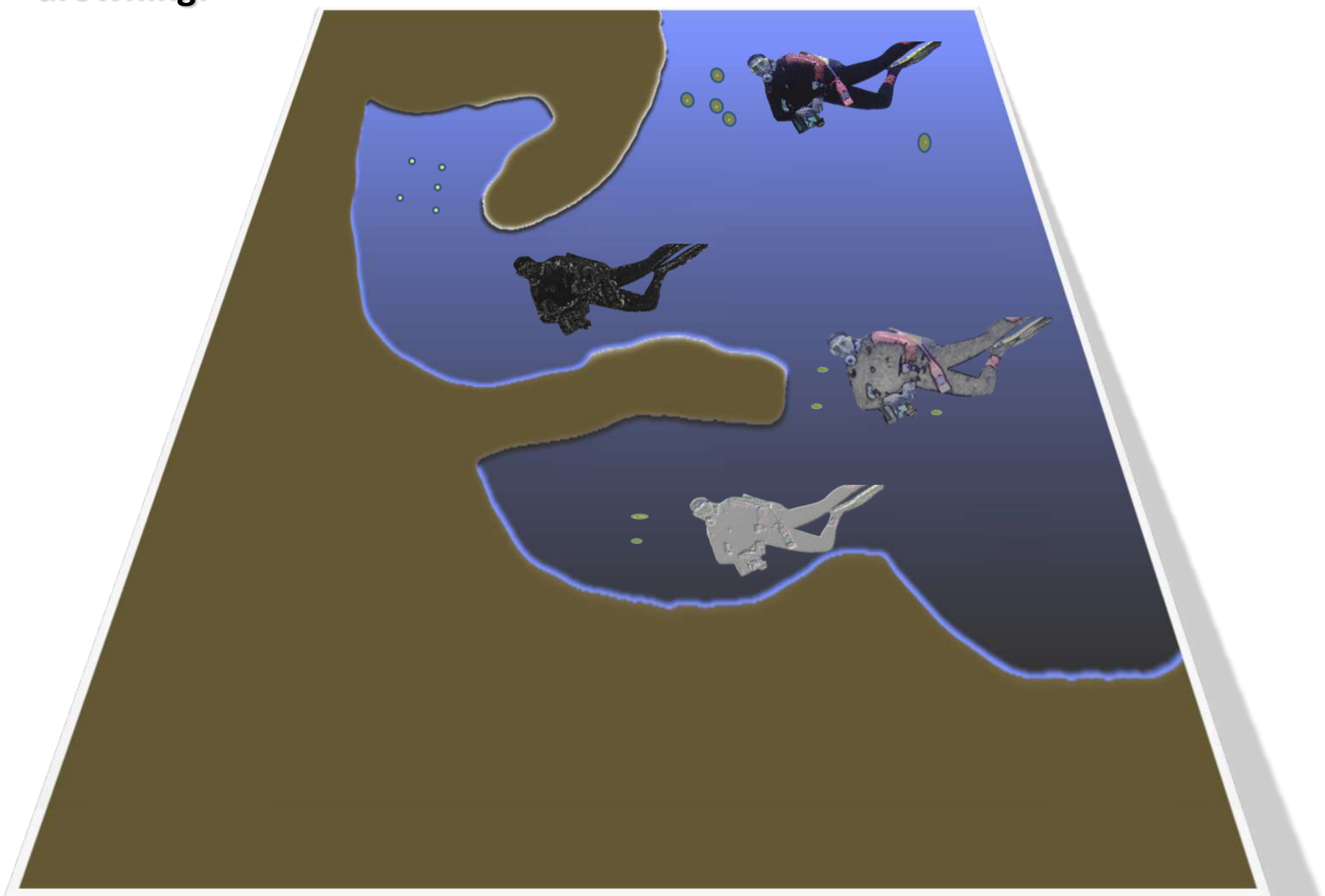


Fig. 1. Different depths and planktonic organisms – Schematic view

### Material and Methods

In the preliminary study, planktonic organisms were collected from the subsurface and 30 meters depth of Marmara Sea. Since the species determined in the water samples were different, the main study was performed. Sixteen wistar albino rats were divided into two equal groups. The rats in Group-1 were drowned by being immersed in the water sample from the subsurface, at 1 ATA, and the rats in Group-2 were drowned in the water sample from 30 meters depth, at 4 ATA in a recompression chamber. Planktonic organisms which were collected from the sea water and the lungs of the rats after drowning were observed by using an Olympus CK2 inverted phase-contrast microscope equipped with a microphotosystem.

### Results

Table 1. Planktonic organisms in different depths

Groups and Types	Preliminary study		Main study	
	Subsurface	30 meter	Subsurface	30 meter
<b>PHYTOPLANKTON</b>				
<b>Dinophyceae (Dinoflagellat)</b>				
<i>Alexandrium minutum</i>	*			
<i>Ceratium fusus</i>	*			
<i>Dinophysis caudata</i>			*	
<i>Kofoidinium velelloides</i>	*			
<i>Noctiluca scintillans</i>	*			
<i>Phalacroma rotundatum</i>	*			
<i>Prorocentrum micans</i>	*			
<i>Protoperdinium divergens</i>	*			
<i>Pseudo-nitzschia pungens</i>			*	
<i>Pseudosolenia calcar-avis</i>		*		
<i>Rhizosolenia hebetata</i>		*		
<i>Rhizosolenia setigera</i>			*	*
<i>Skeletonema costatum</i>		*		
<i>Thalassiosira</i> sp.	*			
<b>Bacillariophyceae (Diatom)</b>				
<i>Cerataulina pelagica</i>			*	
<i>Chaetoceros</i> sp.			*	*
<i>Coscinodiscus radiatus</i>	*			
<i>Coscinodiscus</i> sp.			*	
<i>Cylindrotheca closterium</i>	*		*	
<i>Dactyliosolen fragilissimus</i>	*		*	
<i>Ditylum brightwellii</i>			*	
<i>Guinardia flaccida</i>			*	
<i>Hemialus hauchii</i>		*	*	
<i>Leptocylindrus danicus</i>	*		*	
<i>Proboscia alata</i>			*	*
<b>Euglenophyceae</b>				
<i>Eutreptiella</i> sp.	*			
<b>ZOOPLANKTON</b>				
<b>Ciliophora</b>				
Ciliates	*			
<i>Amphorellopsis tetragona</i>	*			
<b>Cladocera</b>				
<i>Penilia avirostris</i>	*			
<b>Appendicularia</b>				
<i>Oikopleura</i> sp.	*			
<b>Copepoda</b>				
Copepod naupli	*			

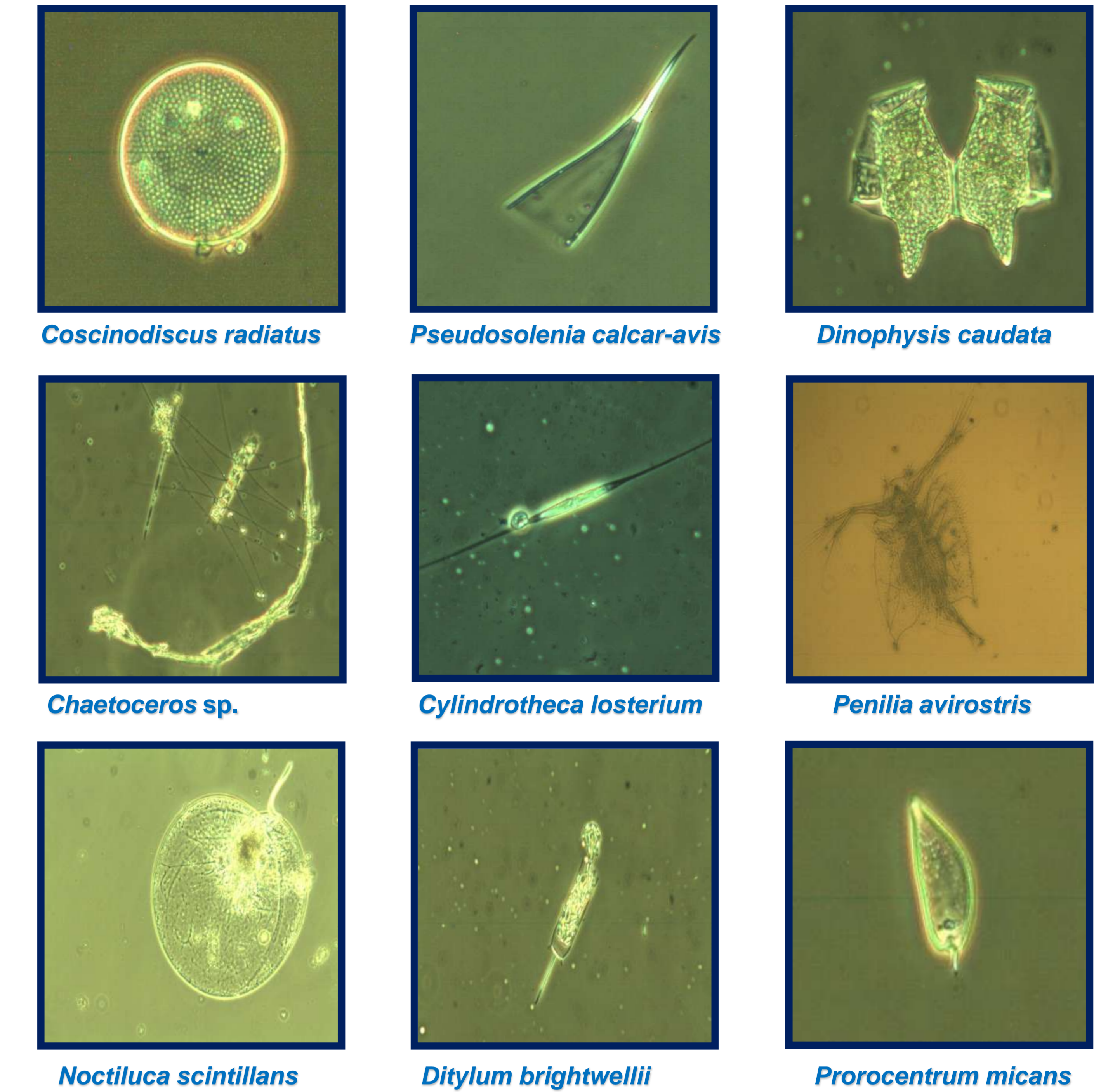


Fig. 3. Planktonic organisms in water samples

In the preliminary study, 18 and 4 species of planktonic organisms were determined in the samples taken from the subsurface and 30 meters depth, respectively. The species obtained in samples from 30 meters depth were not observed in samples from the subsurface. In the main study, 11 and 3 species were determined in the samples from the subsurface and 30 meters depths, respectively. But the species determined in 30 meters depth were also observed at the subsurface. We couldn't obtain any planktonic organisms in the lungs of the drowned rats (Table 1).

### Conclusion

Planktonic species may differ at different depths according to the season, the weather condition and the time of the day. It may be difficult to find planktonic organism in the lung of the drowned rats, since the amount of the water aspirated is not substantial. The obtained results from lung tissue could be associated with the method we performed.

Although our results may not give precise clue, the planktonic species in the lungs of victims in fatal diving accidents may give an idea about the drowning depth. Therefore, data about the planktonic species living in different depths could be valuable information in investigating of fatal diving accidents.



Fig. 2. Rat lungs. 1 ATA (A) – 4 ATA (B)