Using autochthonous microorganisms to decontaminate post-mining water

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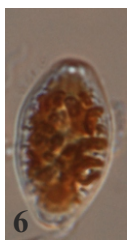
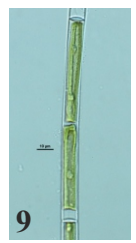
The aim of the study: is to model autochthonous algae communities for self-purification of post-mining waters using biological starters.

Research area: the Upper Silesian Coal Basin - two stations discharging post-mining water:
a) Bolko Pumping Station in Bytom and
b) Saturn Pumping Station in Czeladź.

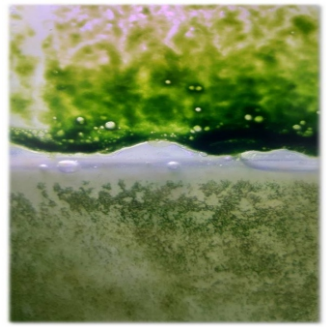
Taxonomic recognision:
1. *Achnanthidium minutissimum*, **2**. *Navicula phyllepta*, **3**. *Gomphonema minutum*, **4**. *Fragillaria gracilis*, **5**. *Pinnularia frequentis*, **6**. *Epithemia operculata*, **7**. *Pinnularia appendiculata*, **8**. *Klebsormidium dissectum*, **9**. *Mougeotia* sp.



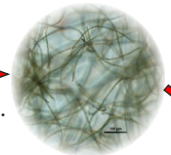


Conclusions: the basis for the development of epilithic communities, apart from bacteria, are diatoms; On the basis of autochthonous algae, fouling algae communities can be modelled in order to increase their share in water self-purification; mixed-species biofilm has higher tolerance and removal ability than pure culture.

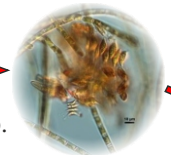
Laboratory study and results:
Algae growth in photobioreactor (aeration, temperature, photoperiod control).



Splash zone
Klebsormidium sp.



Wall
Diatoms
Klebsormidium sp.



Bottom
Tetradesmus sp.
Klebsormidium sp.
Diatoms

The most favourable zone for the development of communities is the spray zone, i.e. the border zone between the aquatic and terrestrial environment.

The universal measuring probe
- based on the "set it and forget it" principle,
- solar power supply,
- communication basen on LoRaWAN system,
- user has access to their data in real time,

Measurements:
- water colour spectrum (400–940 nm),
- turbidity, • water and air temp., • TDS,
- surface exposure, • atmospheric pressure,
- and other parameters if required.