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Sapropel – black gold in Latvian lakes

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RSU, Institute of Occupational Safety and
Environmental Health

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Why Sapropel?

**Long term traditional
use in health care**

- Balneology
- Topical applications
- Mud baths

**Revived interest for use
in rehabilitation and
health care**

- Thermal capacity

**Virtually no recent
research**



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Sapropel in health care

History of the use of sapropel

- Ancient times-16th century
Traditional use
- 16-19th century Europe
Increase in popularity
Mud clinics and other facilities across the Europe
- 19-20th century
Medical research started

- 20th century
Decline in popularity with advance of modern medicine
- 21st century
Revived interest and increase in popularity
Interest in sapropel based products



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Use of sapropel mud in medicine

Several sources state that sapropel can be used for:

- improvement of antibacterial therapy due to antibacterial properties;
- improvement of antioxidation processes;
- regeneration of hydro-lipid membranes;
- improvement of skin structure, reduction of subdermatic fat tissue; reduces wrinkles;
- reduction of swellings;
- improvement of nail and hair growth and prevention of hair loss;
- reduction of symptoms of some skin diseases (psoriasis, seborrhoea, acne etc.)



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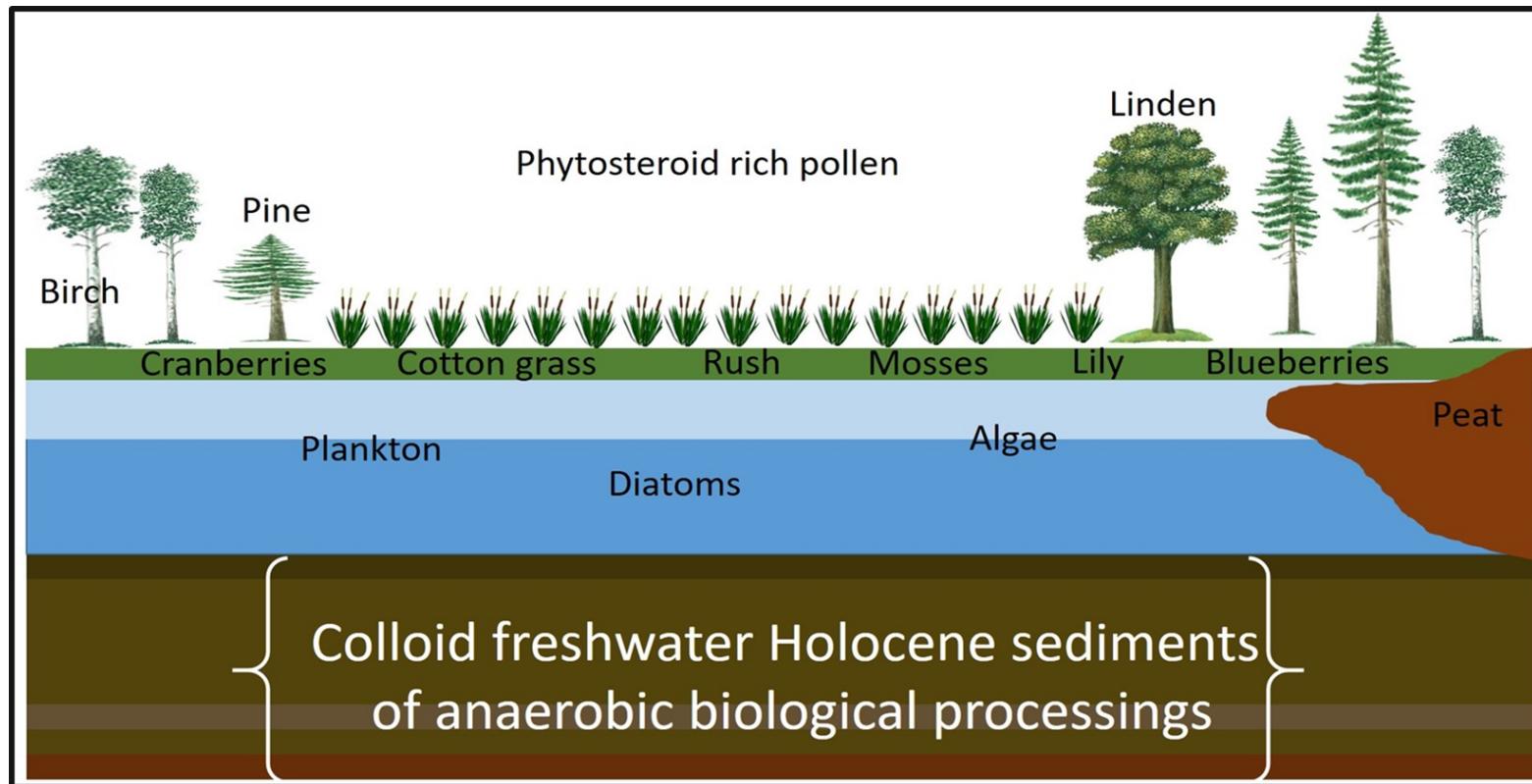
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Formation of Sapropel



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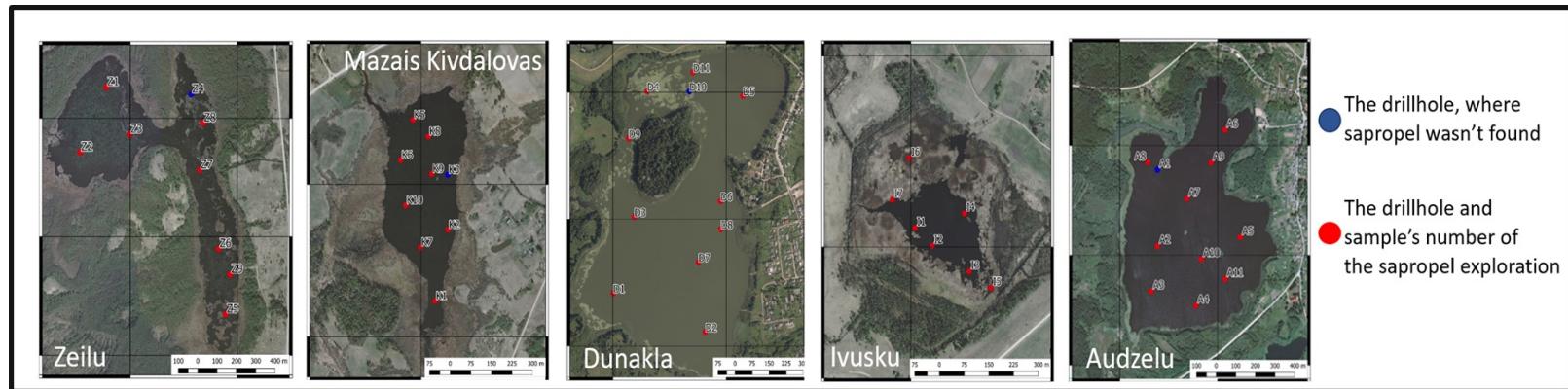
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Sapropel sampling



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Testing processes

Various pollution factors

- Pesticide residues
- Heavy metals
- Human pathogens/Bacteriologic al testing

Treatment effects

- Cell IQ on BALB/c 3T3 and HaCat
- Neutral Red Uptake Cytotoxicity assay on BALB/c 3T3
- Visual analogue scale
- Patient questioners

Extraction of active components from Sapropel

- Solid- liquide extraction
- Antioxidant status
- Biological active substance determination

Visual inspection

- Colour
- Texture
- pH





Results

Lake	pH ↓	Total concentration, mg/ml			Metal concentration, ppm						Pesticide residues, ppb	Microbiology, Uncertainty ±15,40		
		Organic Carbon	Humic Acid	Fulvic Acid	Pb	Cd	Ni	Co	Cu	Cr	Sb			
Zelu	7.8	126.4	160.2	74.3	2.60	0.1	11.8	5.0	9.9	20.1	0.3	0.745	$2,65 \times 10^6$	Serratia fonticola/ Pseudomonas veronii/ Pseudomonas chlororaphis
Mazais kivdalova	7.3	129.1	167.8	72.9	2.66	0.2	18.4	8.2	12.0	27.2	0.4	1.088	$2,0 \times 10^5$	Pseudomonas veronii
Ivusku	8.0	106.5	113.1	76.5	3.10	0.2	3.1	1.7	3.9	9.1	0.3	<0.688	$1,1 \times 10^5$	Paenibacillus amylolyticus/ Aeromonas bestiarum
Dunakla	8.0	104.3	138.4	44.5	5.23	0.2	15.3	5.7	9.4	29.4	0.3	<0.688	$2,3 \times 10^7$	Aeromonas sobria/ Pseudomonas marginalis,/br/>Brevundimonas diminuta
Audzeliu	7.1	125.4	161.8	70.0	5.84	0.2	25.2	6.3	13.3	52.4	0.4	<0.688	$2,1 \times 10^5$	Acinetobacter johnsonii





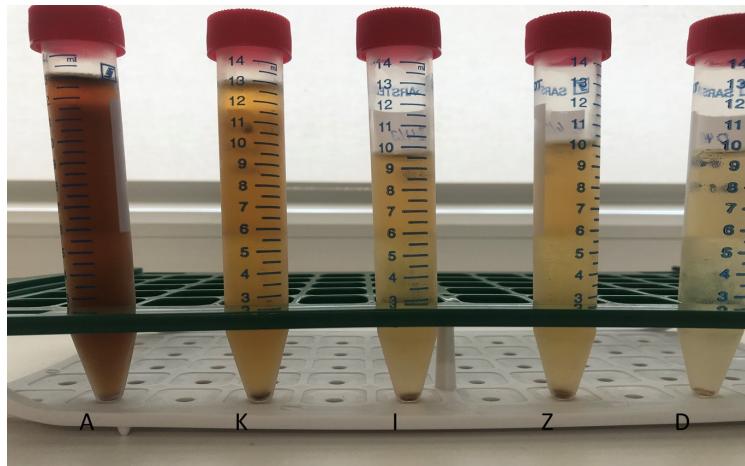
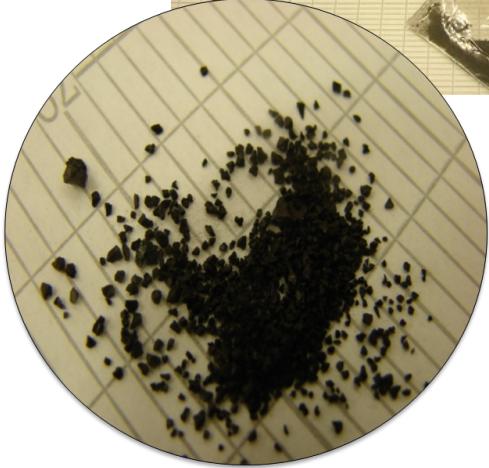
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Results – visual inspection



Sapropel extracts – Audzelu (A), Little Kivdalova (K), Ivusku (I), Zeilu (Z) and Dunaklu (D) lakes (from left to right)

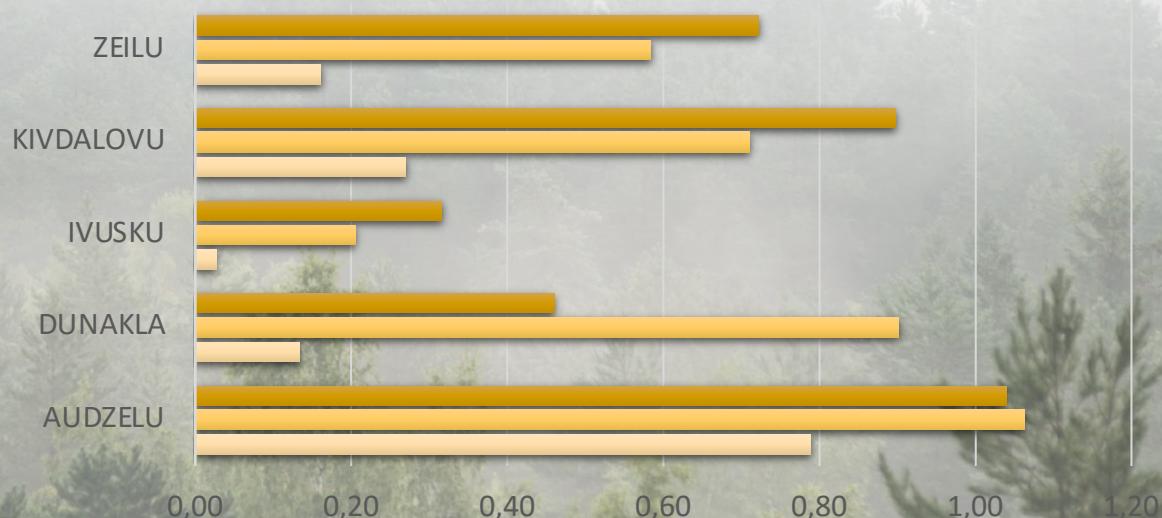


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Results

Antioxidant level in sapropel extract



	AUDZELU	DUNAKLA	IVUSKU	KIVDALOVU	ZEILU
■ Total antioxidant status, mmol/L	1,04	0,46	0,32	0,90	0,72
■ DPPH, mmol Trolox /L	1,06	0,90	0,21	0,71	0,58
■ ABTS, mmol Trolox /L	0,79	0,13	0,03	0,27	0,16





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Nine Hole Peg test and Visual analogue scale



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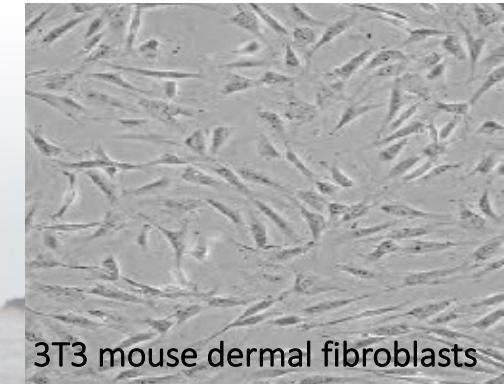
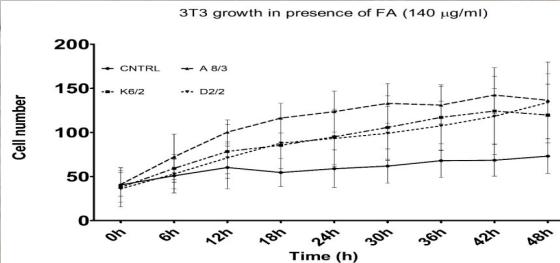
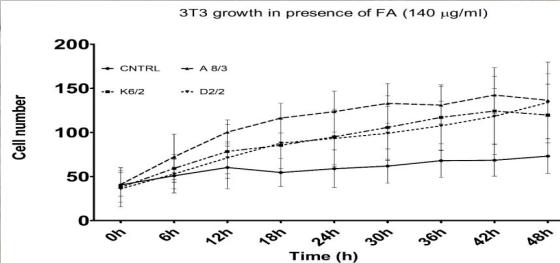
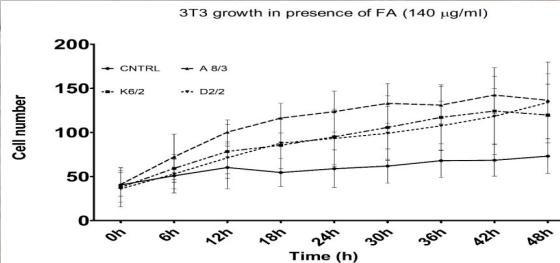
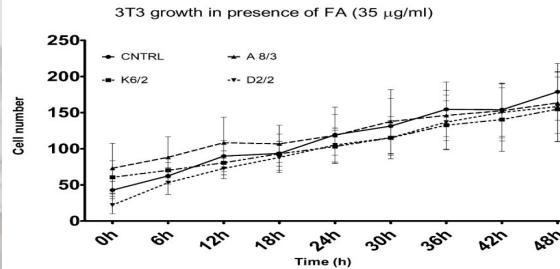
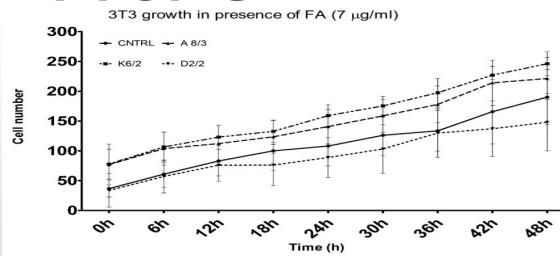
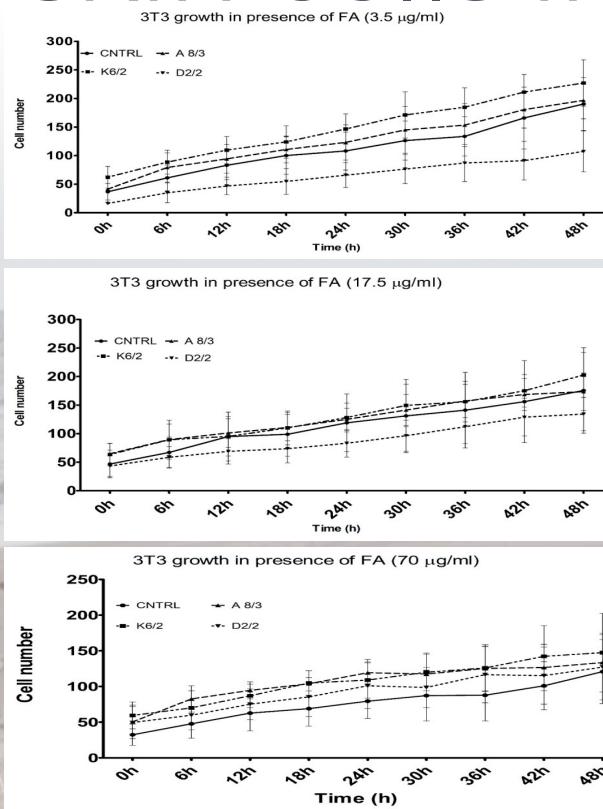
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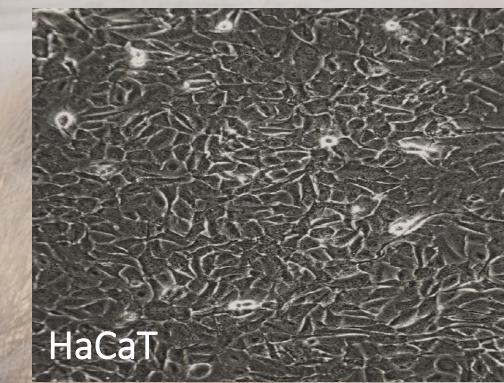
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Effect of sapropel extracts on skin cells in vitro



3T3 mouse dermal fibroblasts



HaCaT



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Conclusion

Lake and strata depth of the sample are important as properties varies for different locations

Organoleptic parameters for the correct identification of sapropel are

Color

Texture

Smell

pH and Humic and Fulvic acid content can be used for the characterization of sapropel samples and identification of the location

Cell growth results indicate that sapropel extract has the best qualities for short term application all could be potentially used in pharmaceutical application or in dosage forms.



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THANK YOU!
Questions welcome



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