



International Young Naturalist's Tournament



# Problem №13

## «Skin conductance»

Team:  
«Unartificial Intelligence»

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# The problem

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Explore the correlation of electrochemical parameters and the psychosomatic state of biological objects.

# Solution plan

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- We introduced concepts
- We found out how to measure conductivity
- After measure parameters

# Conductance

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Conductance - the ability of a body (environment) to conduct an electric current. Measured in S

Resistance - the reciprocal of conductance. Measured in  $\Omega$

# Methods for measuring conductance

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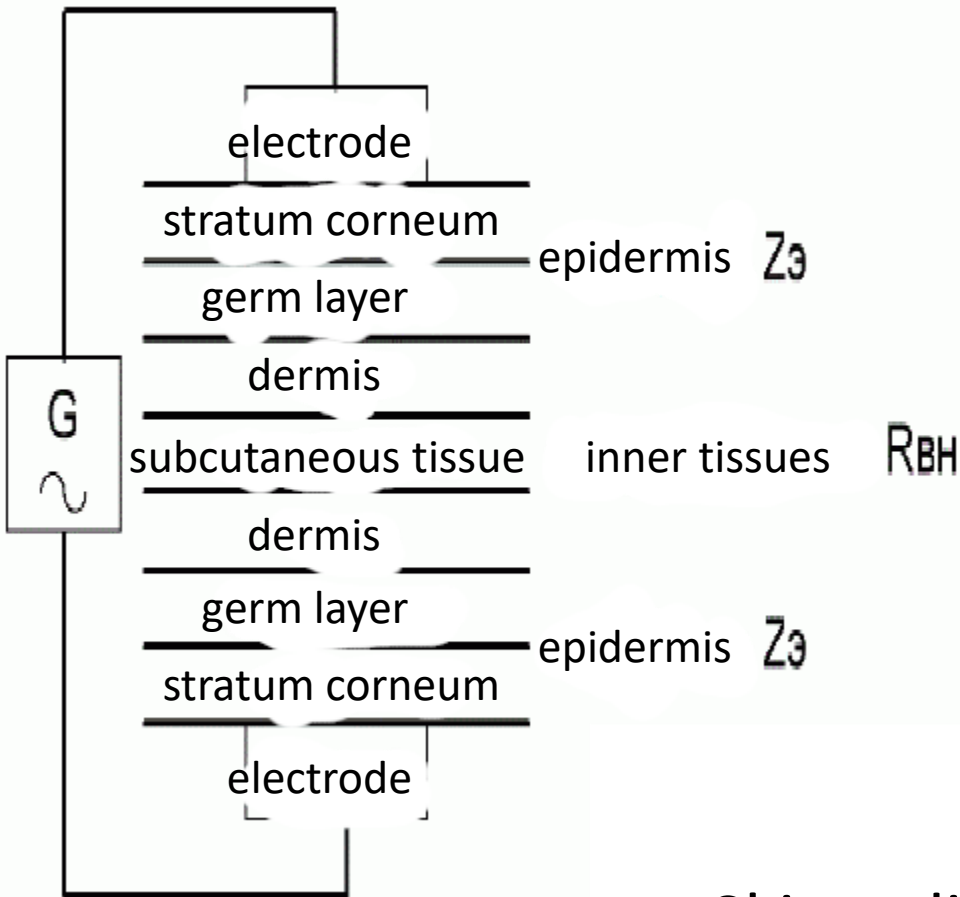
Methods for measuring conductance:

- through resistance
- voltage supply

$$G = \frac{I}{U},$$

where I - amperage, U - voltage

# Skin



Skin – dielectric

Conductivity depends on the work of the sweat glands

# Polygraph



The polygraph also measures the conductance of the skin

# Multimeter



Parameters:

Diapason:  $326\Omega$

–  $32,6M\Omega$

Error:  $\pm 1,2\%$



# Experiment №1

	cubit	belly	heel		cubit	belly	heel
12 Years	4,34 $\mu\text{S}$	4,9 $\mu\text{S}$	1,36 $\mu\text{S}$	12 Years	1,66 $\mu\text{S}$	2,22 $\mu\text{S}$	2,85 $\mu\text{S}$
14 Years	5,97 $\mu\text{S}$	-	2,89 $\mu\text{S}$	14 Years	9,09 $\mu\text{S}$	6,66 $\mu\text{S}$	2,94 $\mu\text{S}$
36 Years <sub>1</sub>	2,72 $\mu\text{S}$	9,43 $\mu\text{S}$	9,09 $\mu\text{S}$	36 Years <sub>1</sub>	4,95 $\mu\text{S}$	6,06 $\mu\text{S}$	2,85 $\mu\text{S}$
36 Years <sub>2</sub>	2,22 $\mu\text{S}$	9,52 $\mu\text{S}$	1,69 $\mu\text{S}$	36 Years <sub>2</sub>	4,48 $\mu\text{S}$	9,70 $\mu\text{S}$	1,9 $\mu\text{S}$

without  
cream

with cream

# Experiment №2

	<b>dry hands</b>	<b>humid hands</b>	<b>wet hands</b>	<b>salty hands</b>
12 Years	2,17 $\mu\text{S}$	4,13 $\mu\text{S}$	4,58 $\mu\text{S}$	8,33 $\mu\text{S}$
14 Years	1,47 $\mu\text{S}$	5,15 $\mu\text{S}$	7,35 $\mu\text{S}$	9,09 $\mu\text{S}$
36 Years	2,59 $\mu\text{S}$	4,05 $\mu\text{S}$	9,09 $\mu\text{S}$	5,26 $\mu\text{S}$



The body changes properties with age

Water changes the conductivity of the body

# Experiment №3

foot-foot	foot-head	foot-hand
6,54 $\mu\text{S}$	6,05 $\mu\text{S}$	3,37 $\mu\text{S}$

Conductivity depends on the site of the body

# Average indicators

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Tendons, bones, cartilage, skin, adipose tissue:  
3-20 k $\Omega$ /m (0,05-0,3 mS/m)

Blood, muscles, lymph, brain and spinal cord:  
0,5-1  $\Omega$ /m (0,1-2 S/m)

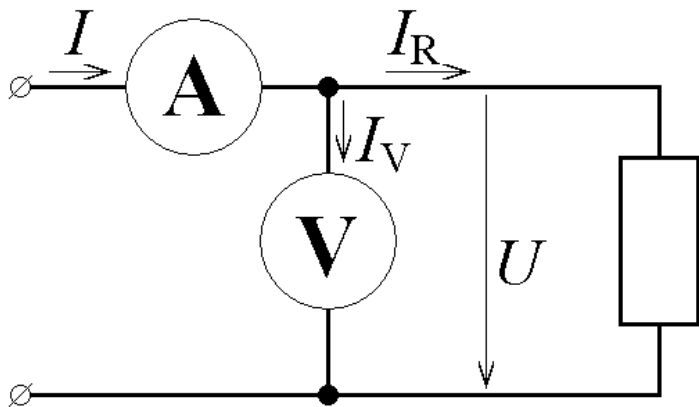
# The cat



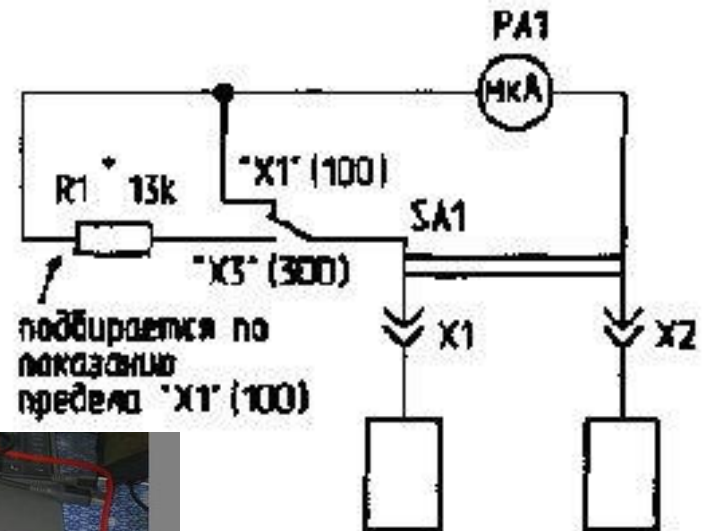
Conductivity: 3,86  $\mu\text{S}$

# “Biofield” meter

ohmmeter



“Biofield” meter



# Experiment №4

Calm state	Excited state
4,76 $\mu\text{S}$	8,26 $\mu\text{S}$

When excited, the conductivity of the skin rises sharply

# Conclusion

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The conductivity of the skin depends not only on the psychological state, but also on age, as well as on the moisture and areas of the skin and body. However, even these not quite definite indicators can complement the picture of what is happening with a person.