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Can teaching on ticks increase learning about body and health?

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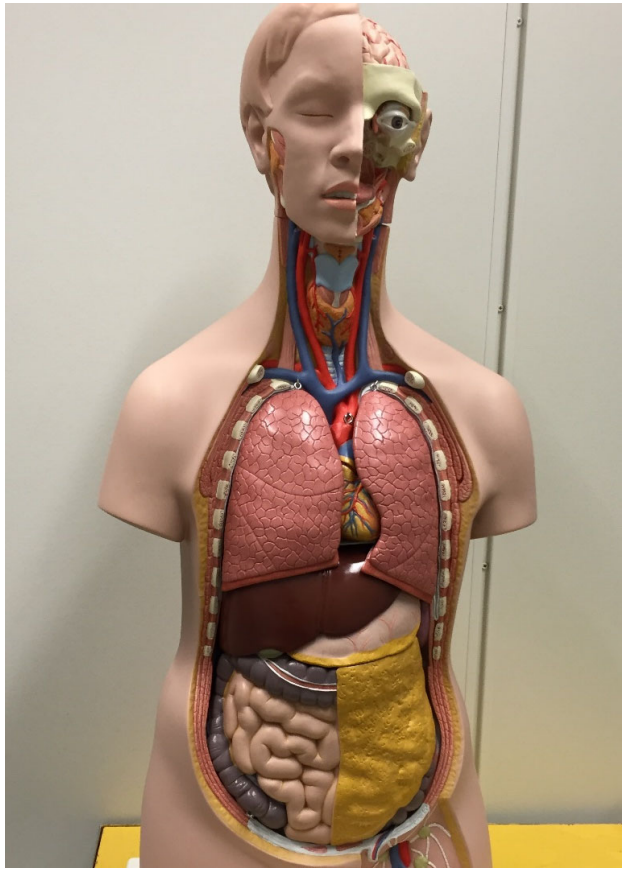
The purpose of biology in school

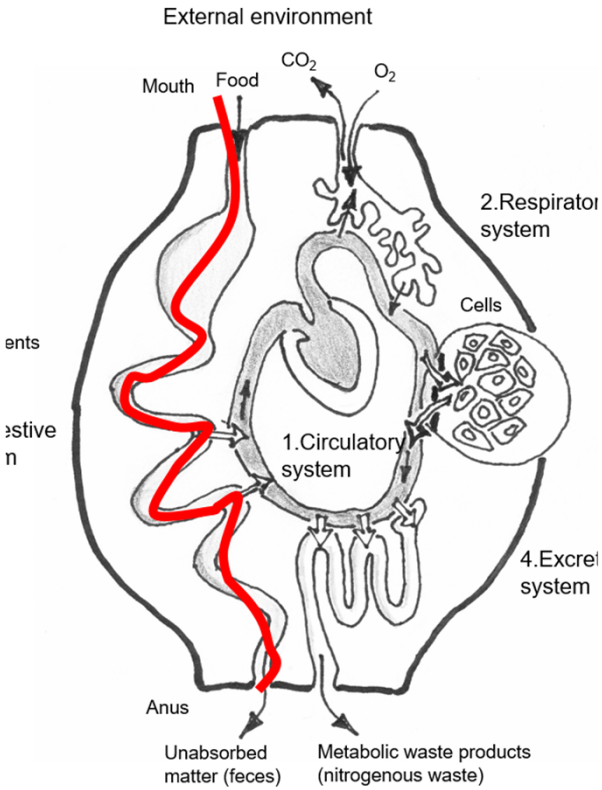
Biological processes in the human body and health for future life

- Circulatory system
- Digestion
- Respiratory system
- How to cure diseases
- Infection
- Importance of nutrients
- sleep

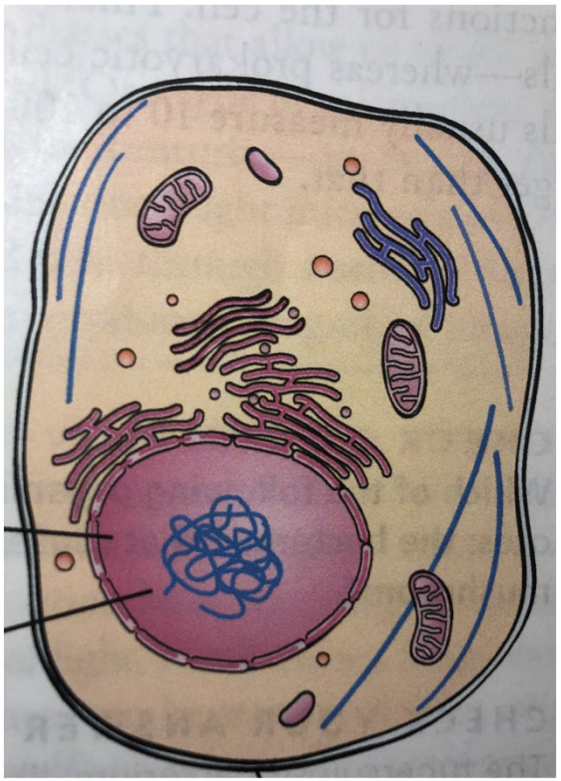
Organ system



Digestion

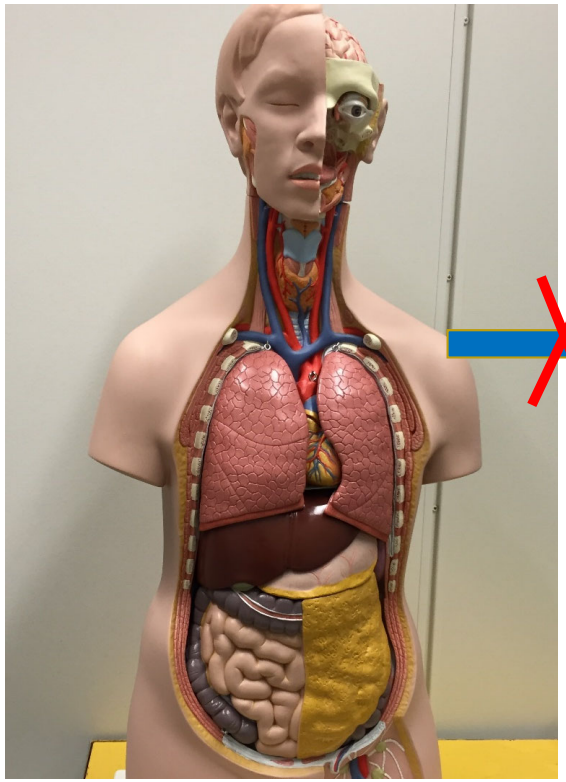

External environment
Mouth
Food
CO_2
O_2
2.Respirator
system
Cells
ents
estive
n
1.Circulatory
system
4.Excret
system
Anus
Unabsorbed
matter (feces)
Metabolic waste products
(nitrogenous waste)

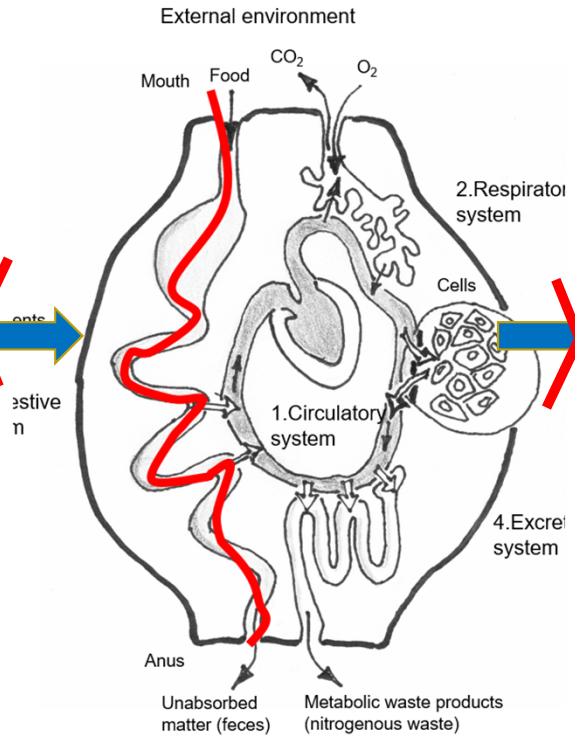
Energy production in the cell

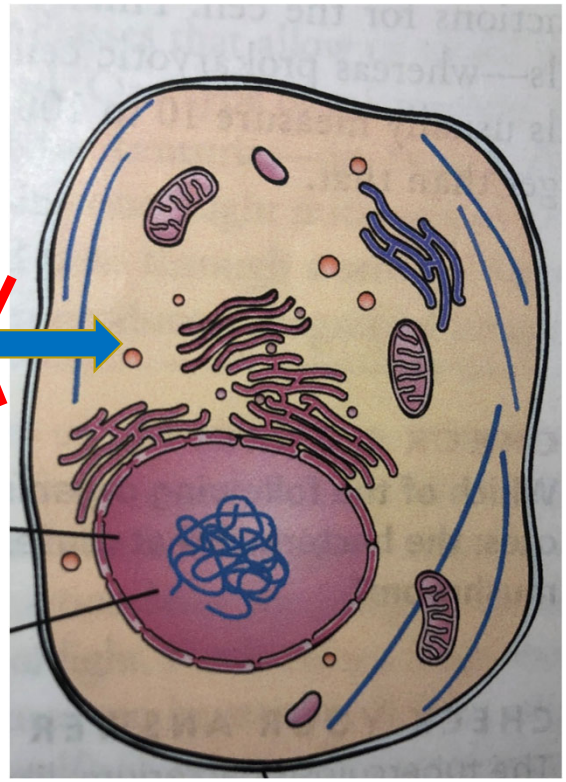


From Hewitt et al 2014
Conceptual integrated science

Few students understand the connections between organs, digestion and energy production







Organs

Digestion

Energy production

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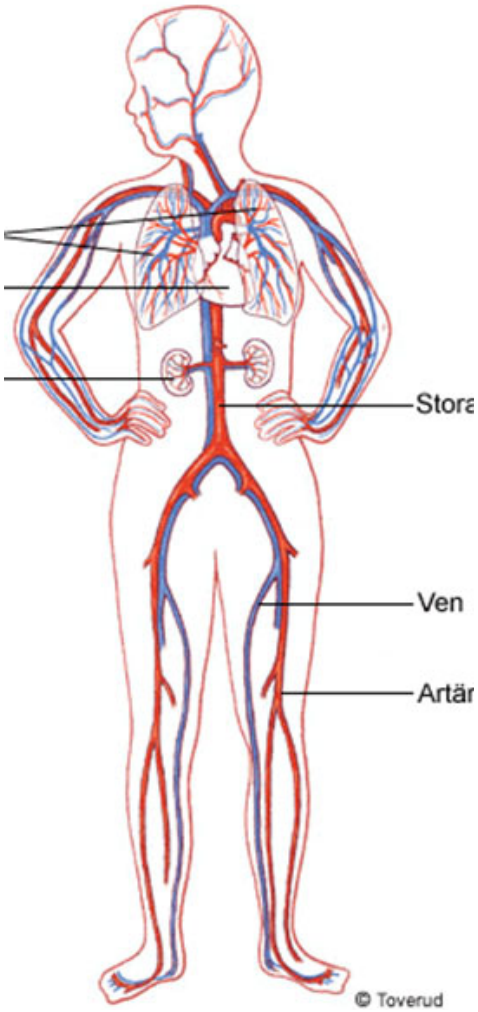
The blood circulation



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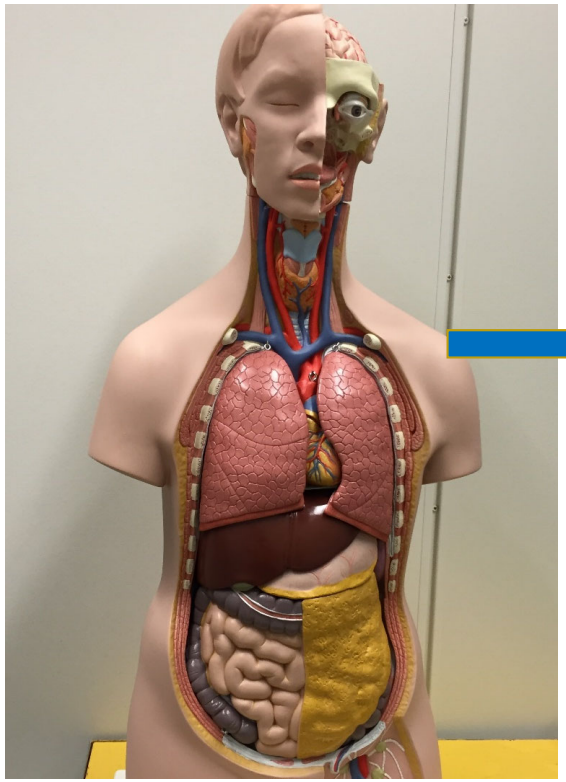
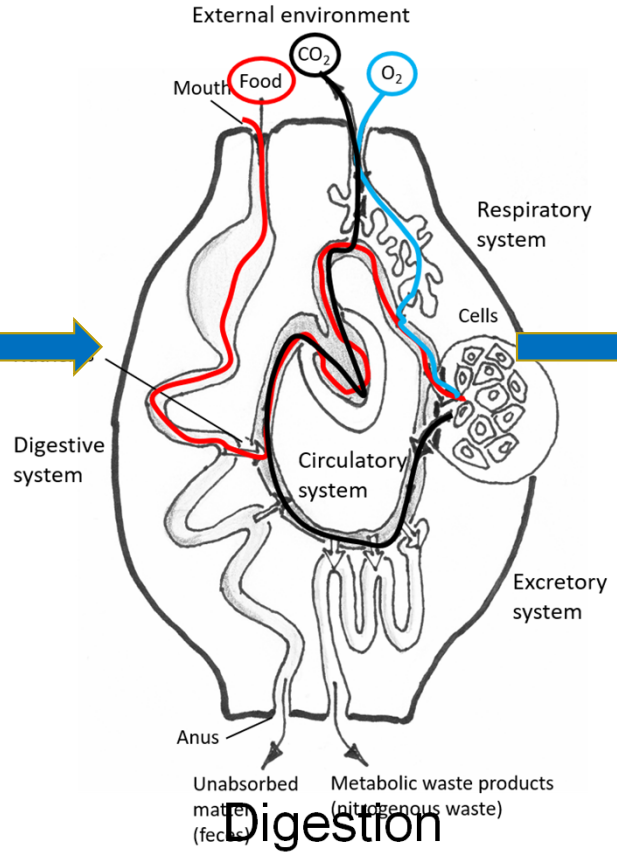
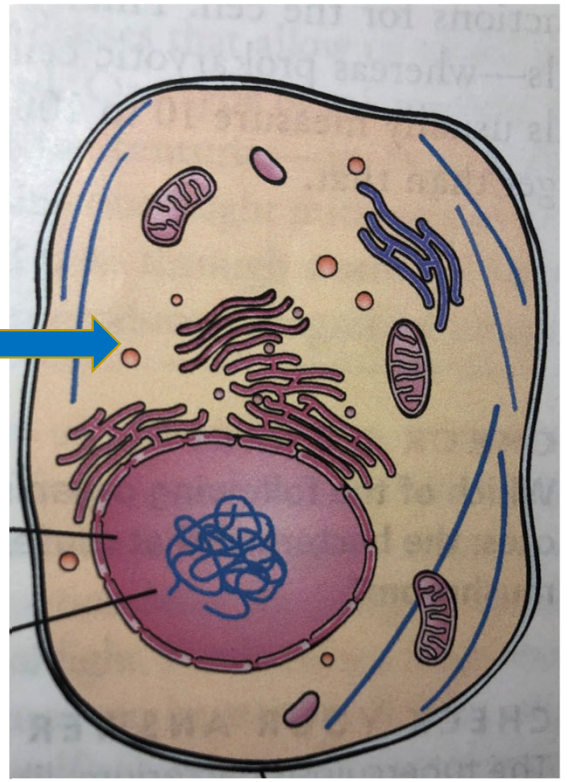


Organs



Digestion



Energy production

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Biological processes in the human body and health for the future life

How can we develop a biology course where the students:

- will get a holistic view of body function and health?
- improve the understanding of the interactions between different organ systems?
- understand function from a macroscopic view down to microscopic view at the cellular level ?
- understand illness?

Successful teaching should

- Connect to students experience and everyday life
- Have connections between observations and theory
- Be inquiry based
- Create engaged, collaborating students enjoying further exploration

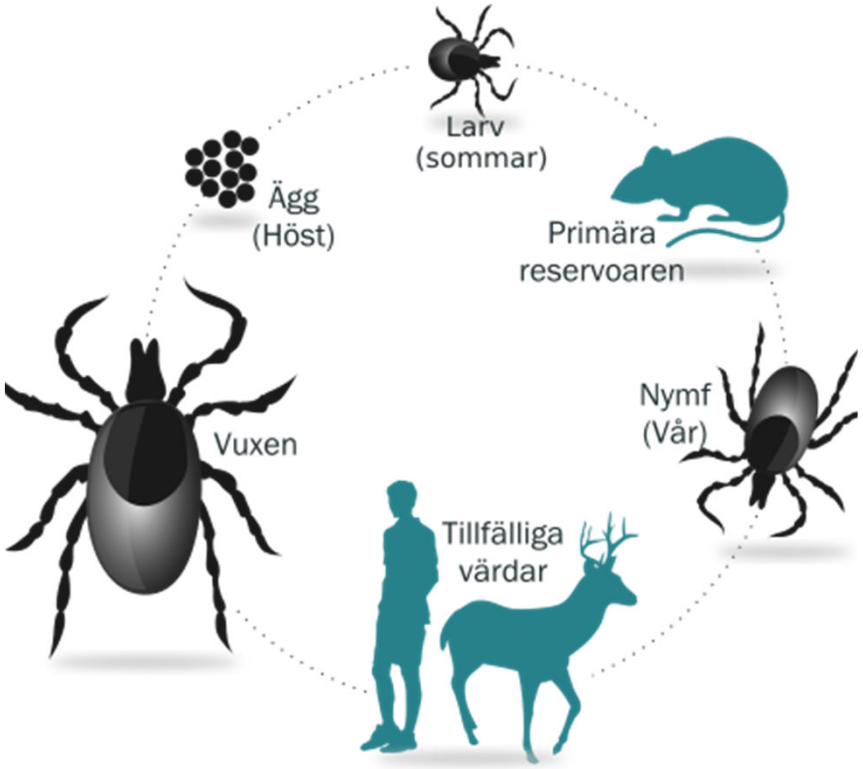
Course description

- Nine preservice teacher students
- Four-week course
- Teaching of ecological processes, different organism life cycles and, at the end, **health and physiology**
- Students made inquires and discussions in groups supervised by the teacher

Capturing ticks

Morphology and life cykel of Tics

Pfizer Sverige



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Links to previous content of the course

- Capturing of ticks
- Studying their morphology and life cycle
- Discussing Borrelia (bacteria) and Tick-borne encephalitis (TBE virus) caused by ticks
- Working with questions about antibiotic, bacteria, virus, vaccine and the defense system
- Video clip when the tick infect a human with Borrelia into the circulatory system

The tick bite transfers substances into the host's blood

Pfizer Sverige

Pfizer Sverige

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- functioning of the blood and circulatory systems, digestion, lung and respiratory system and the extraction of energy from nutrients in the cell

After the course

Student should write a reflection about:

- What did you learn from the lessons on body function and health?
- What surprised you?
- Write a lesson plan for body and health in primary school (year 4-6):
  - What area of the subject will you teach?
  - Why did you choose the subject to teach
  - How will you perform the teaching?

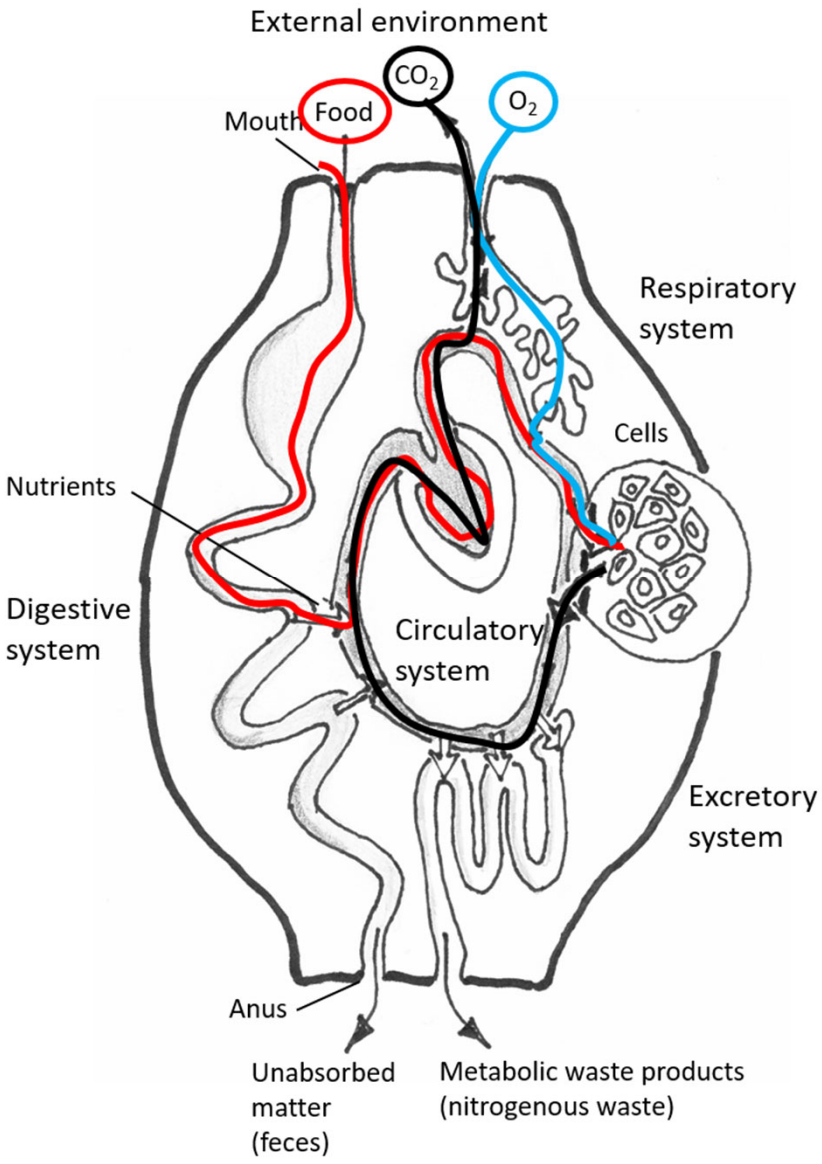
  Written exam

Analysis of student reflections

Qualitative method identifying and describing the learning processes and which themes the students regarded as important.

Results

- 2/3 of the students described the importance of how organs are cooperating and connected to each other
- Most students mentioned the circulatory system and the respiratory system as important



Examples of student reflections

What did I learn?

- **Health**
  - When I was studying ticks and how they infect, for the first time I understood the difference between virus and bacteria.
  - I learned that ticks as vectors for Borrelia and TBE are not only bad but necessary for the ecosystem.

Examples of student reflections

What did I learn?

- **Organ system**
  - I learned that the gut melts the food with the help of enzymes and that it is when it has become small enough that it can be absorbed through the intestinal wall, that it really is in the body.
  - I think it is important to emphasize how important the role of the lung is to the blood and that all the organs of the body work together
  - I learned the importance of seeing the whole as I talk about and study the various functions of the body. Without the whole I have a hard time understanding and remembering because there are many parts to remember, if you focus on the whole and learn the connection, this can act as a tool for understanding

Examples of student reflections

What did I learn?

- **Cell Function**
  - All life on earth is reminiscent of one another. Plants and animals have cells, although they differ slightly. All life on earth needs energy, our primary source of energy is the sun. Everything living on earth belongs together and shares energy and nutrition.

Conclusions

- Better results on the written exam
- Using students' own experiences of ticks indicate improved learning about body function and health
- Linking studies on ecological systems and life cycles of organism to health, bodily function and energy production enhance contextual understanding

Thank you for your attention!

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