

Water Bears

Tardigrades, their preferred habitats, and their niche in the ecosystem

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KS Willisau 6c

Introduction

- The tardigrade is remarkably different from any other heterotrophic organism on Earth
 - > Has its own phylum (Tardigrada)
- Cosmopolitan (lives everywhere on Earth), aquatic micro-animal
- Can survive extreme conditions
 - temperatures as low as -200 °C and as high as 151 °C
 - pressure of up to about 6000 bars
 - extreme pH levels
 - insufficient water and oxygen
 => anabiosis and cryptobiosis: Extremely slowed metabolism
- Must always be surrounded by water when active
 - > gas exchange (diffusion)
- Found mostly in water, film of water between moss and lichen leaves
- In small densities in sand, dirt, and silt
 - > in cryptobiotic state
- 900-1200 species (in 2 classes) known
 - > more being discovered every month

Questions

- In which habitats do tardigrades occur and at what density?
- Which habitat is most suitable for tardigrades?

Materials and Methods

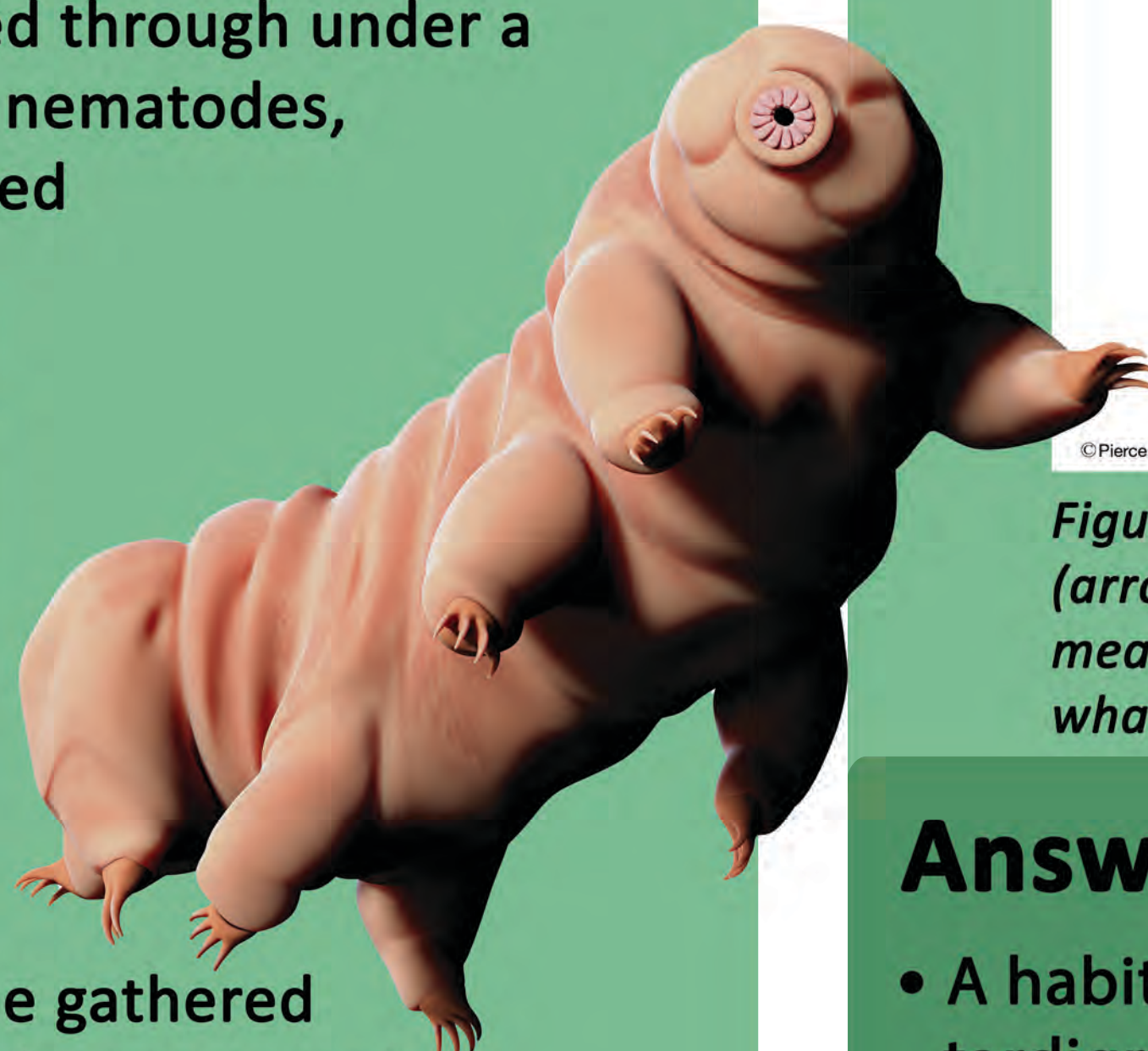
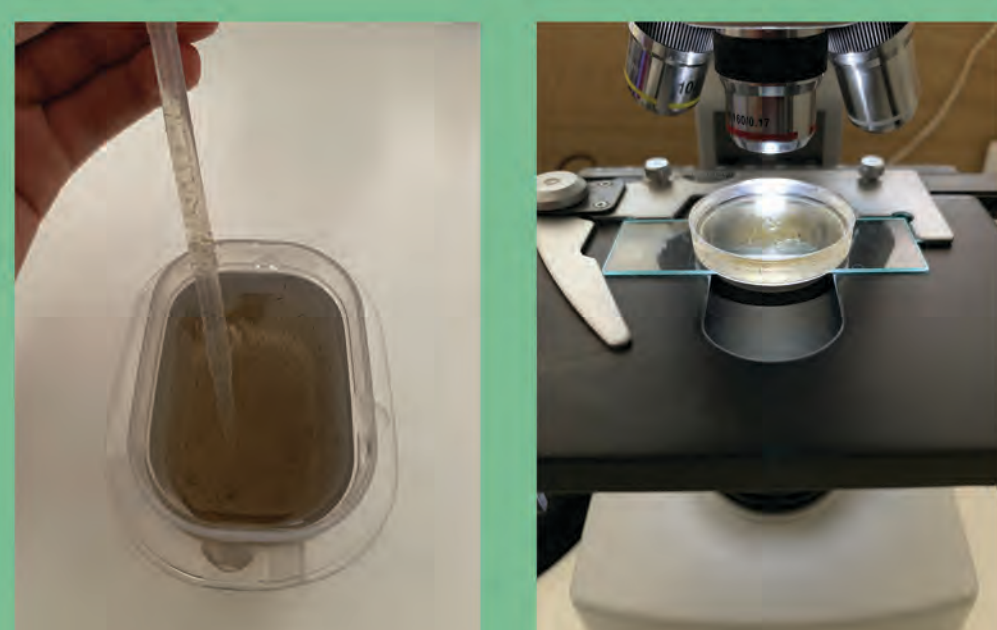
Phase 1:

- Samples from varying habitats were collected
- The conditions, under which they were, were noted for later analysis
- The samples were soaked



Phase 2:

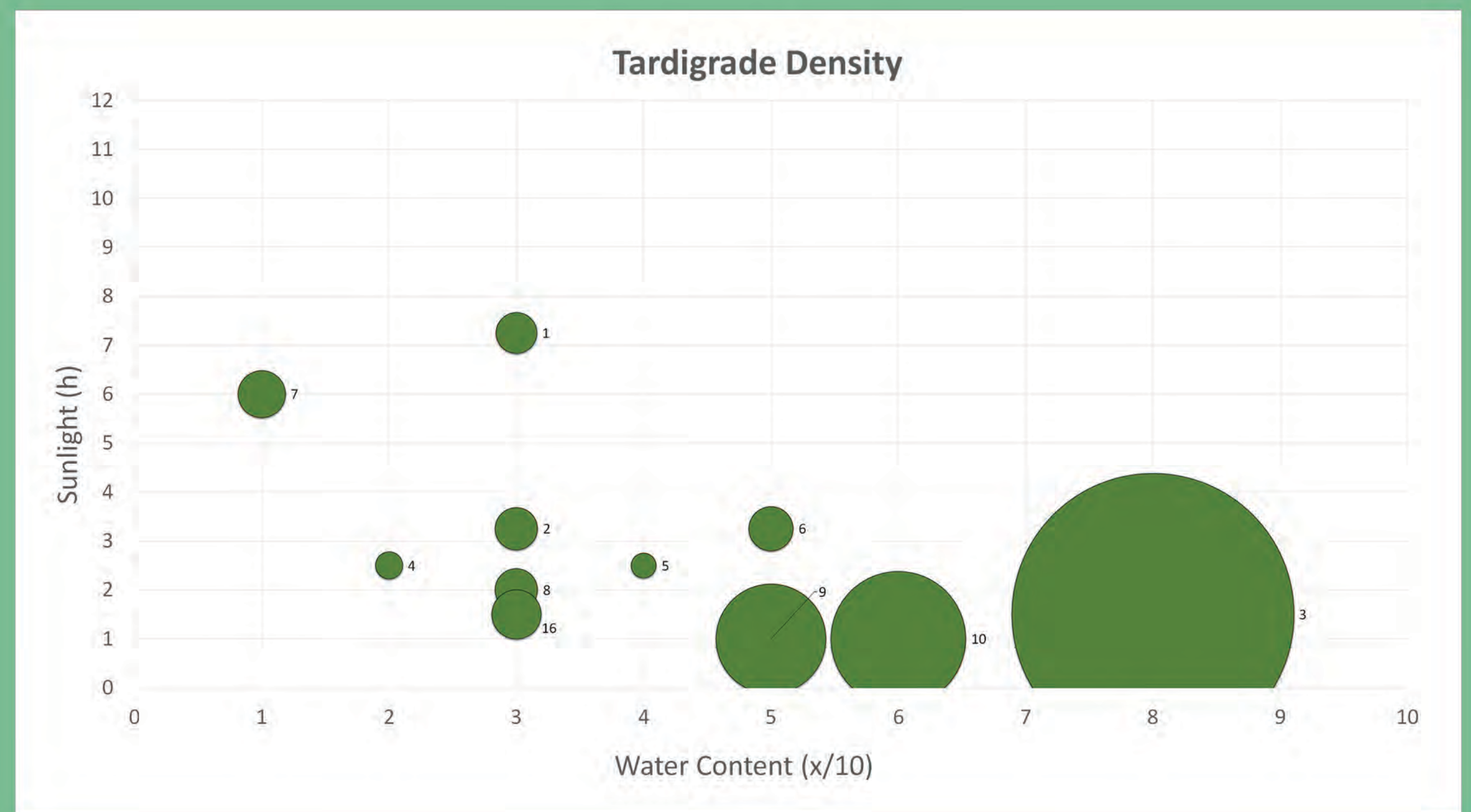
- A homogenous water-plant-matter-suspension was transferred into petri-dishes (consisting of 100 drops when filled)
- The petri-dishes were looked through under a microscope and all rotifers, nematodes, and tardigrades were counted



Phase 3:

- Using Excel for Windows, the gathered data was analyzed, and graphs were created
- The graphs were analyzed and hypotheses were stated
- These hypotheses were investigated, and factors influencing tardigrade density were identified

Results



Graph 1: The number of tardigrades in 100 drops (diameter of circle) in connection with the hours of sunlight the sample got, and the relative water content rating given to the sample.

- Tardigrade population density is higher where relative water content is higher, and hours of direct sunlight per day is lower
- Highest densities: Samples with a water content of 6-8, and 0-2 hours of direct sunlight per day

Discussion and Outlook

- Water content must be the main contributing factor to tardigrade density
- The fact that the number of hours of direct sunlight a habitat got also influenced tardigrade density, indirectly supports the first hypothesis
 - > sunlight intensity determines how much water a moss/lichen can contain for a longer period, and how often the habitat dries out

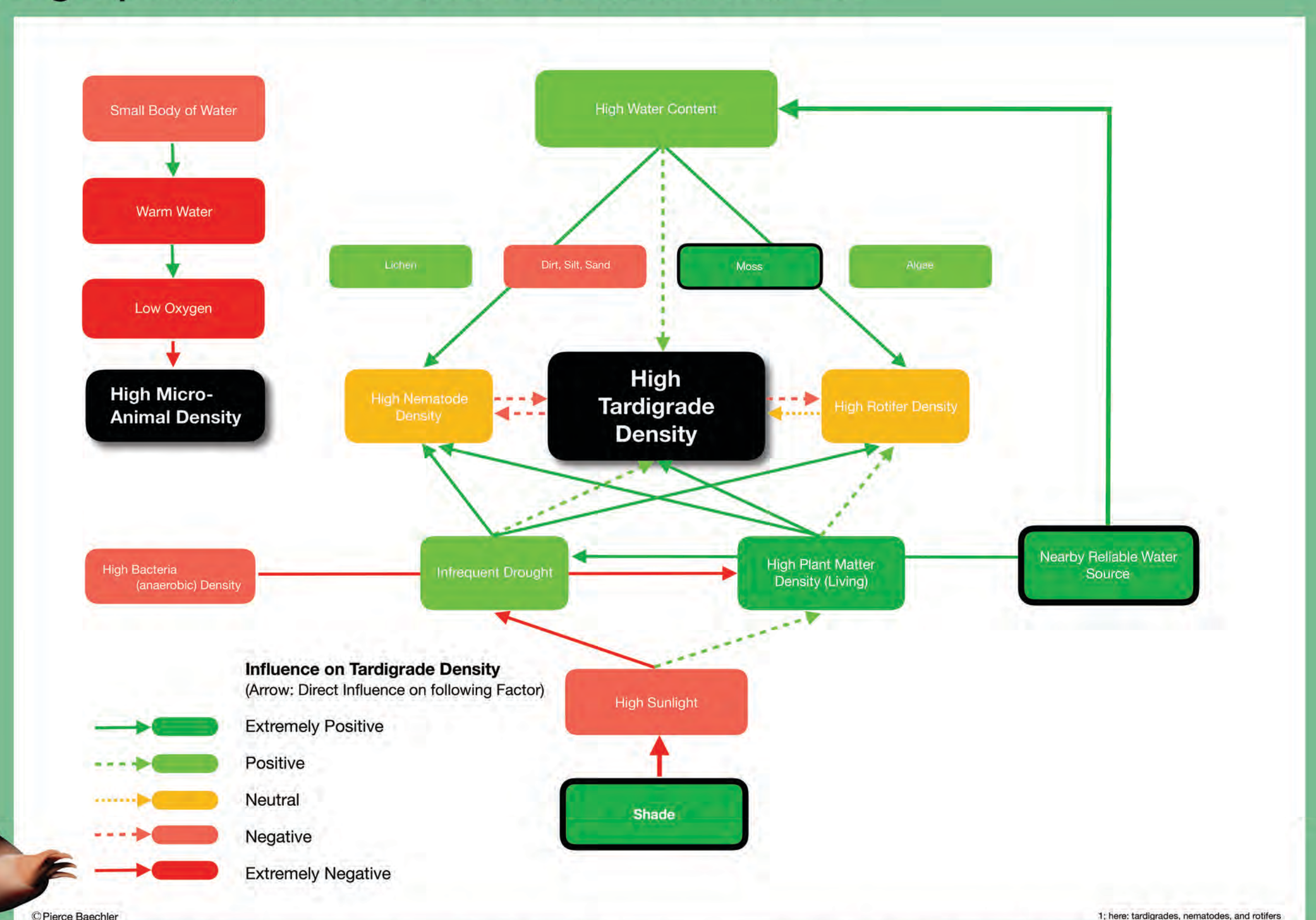


Figure 1: Factor Visualisation: Each rectangle represents a factor that has an influence (arrow) on the next factor and ultimately tardigrade density (black rectangle). The meaning of each color is explained in the bottom left, and the color of a rectangle shows what overall influence the factor has on tardigrade density.

Answers

- A habitat that is usually damp and close to a reliable water source is the tardigrade's preferred habitat.
- The tardigrade's niche in the ecosystem could be a habitat that dries out once in a while, because only they can initiate cryptobiosis and survive drought. Generally speaking, their niche (and most suitable habitat) is damp moss.