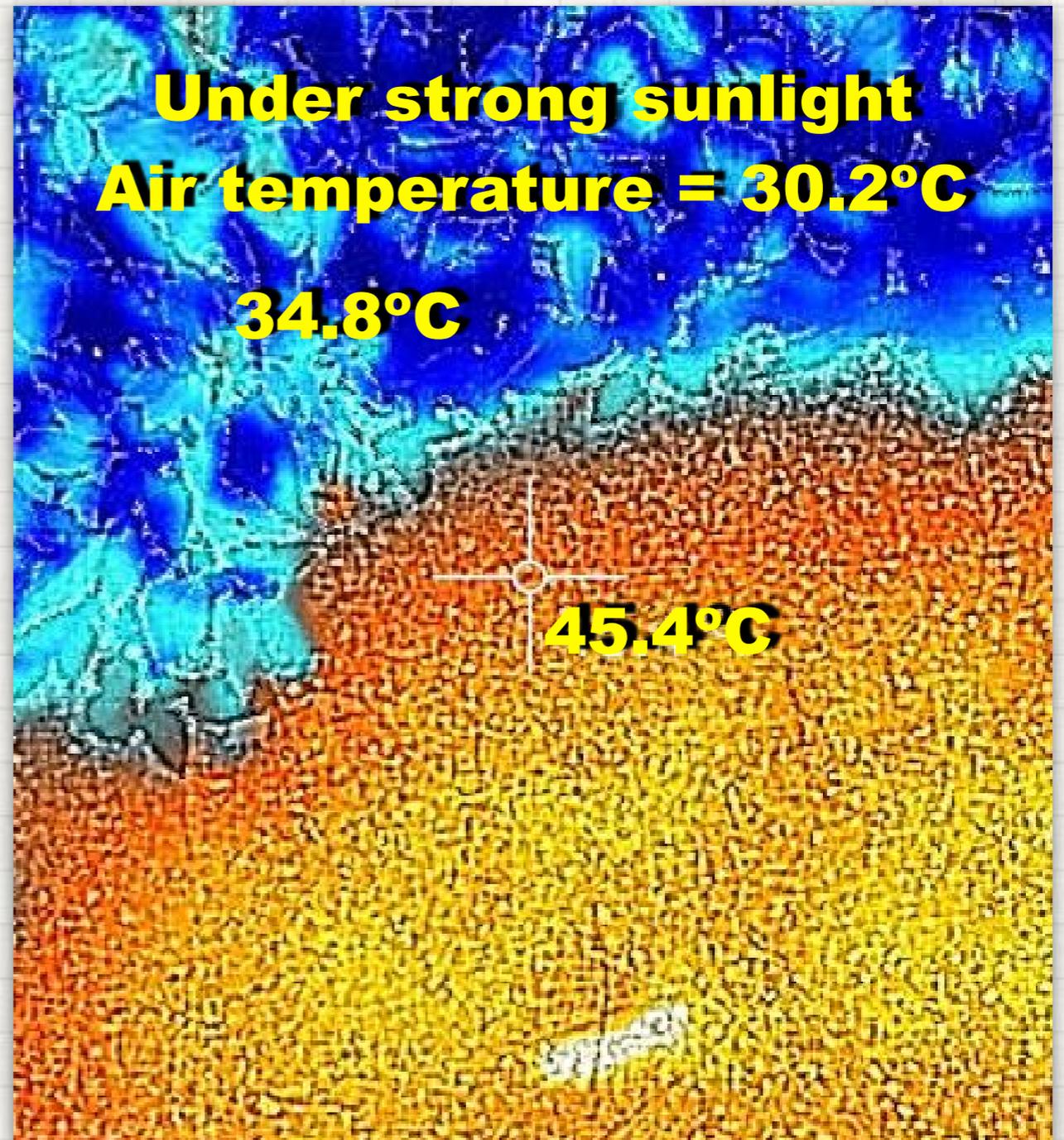


LOOKING INTO THE INVISIBLE
BIOLOGICAL WORLD

TEMPERATURE VARIATION
WITHIN AN ECOSYSTEM

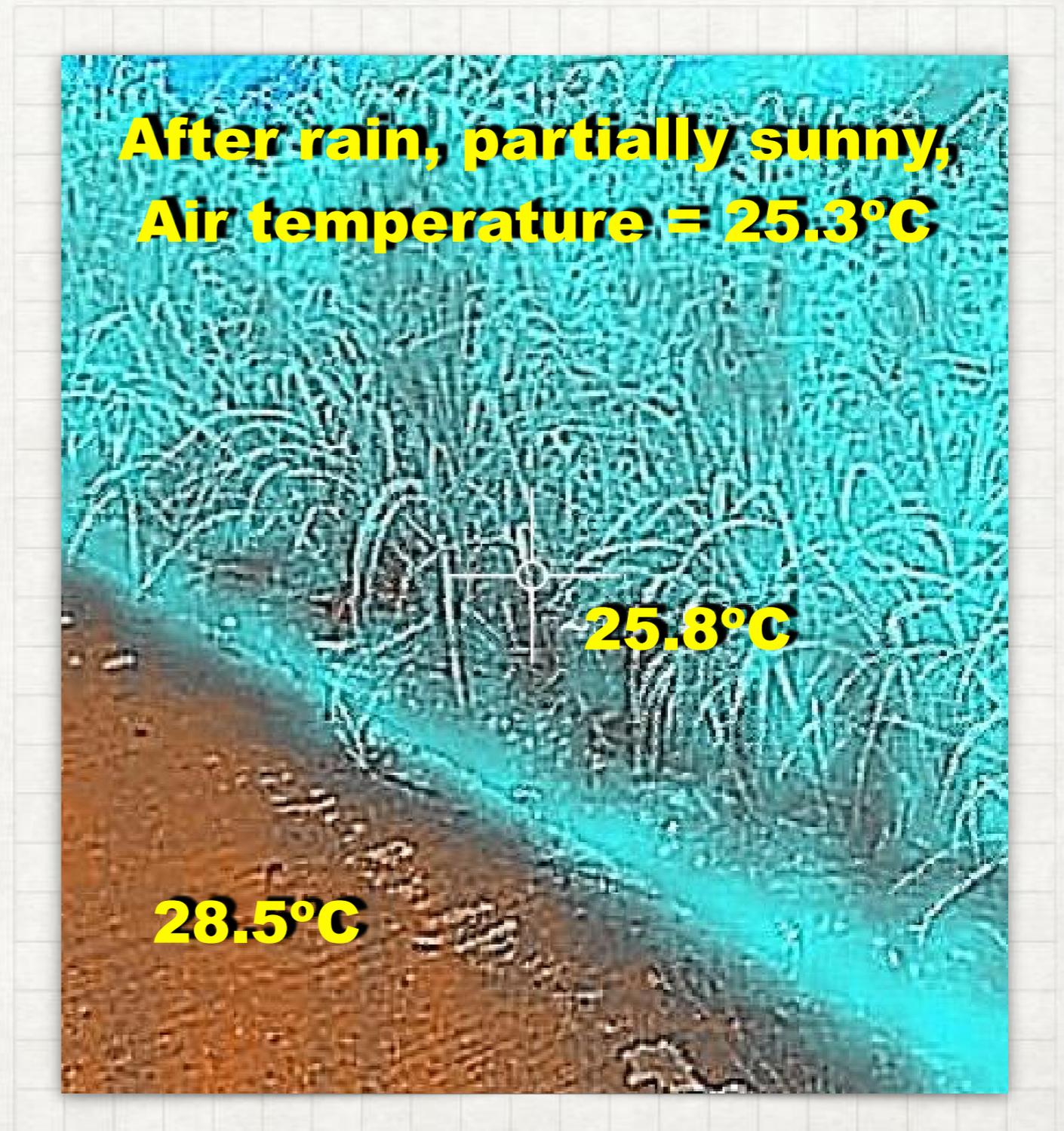
TEMPERATURE OF PLANT VS. CONCRETE

- Herbs temperature 4.6°C higher than air temperature
- Concrete surface 15.2°C higher than air temperature
- Concrete surface 11.6°C higher than herbs temperature



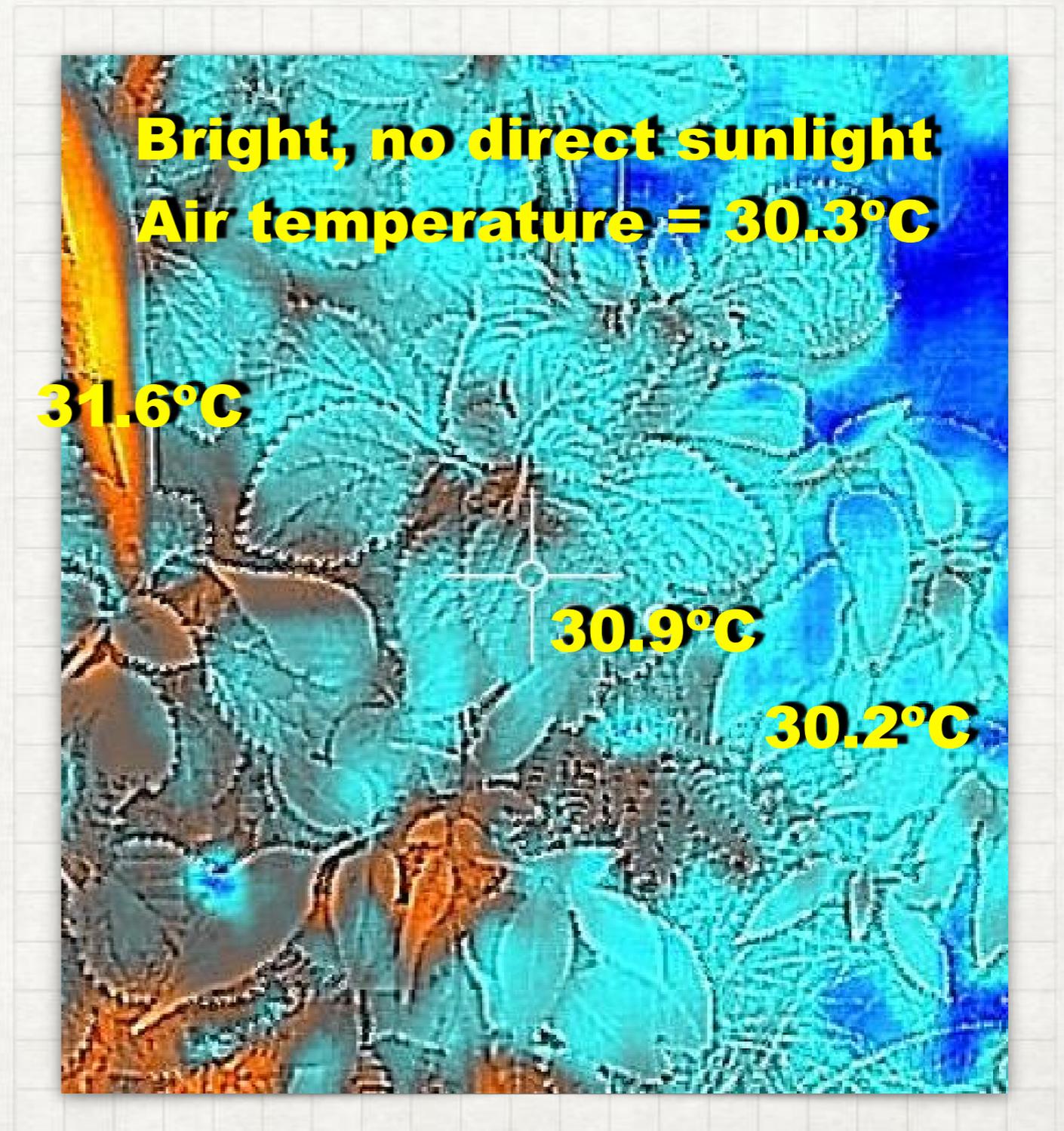
TEMPERATURE OF PLANT VS. CONCRETE

- Grasses temperature slightly higher than air temperature
- Concrete surface 2.7°C higher than vegetation
- Both living and non-living component in an ecosystem absorb heat from sunlight radiation, but concrete absorb more



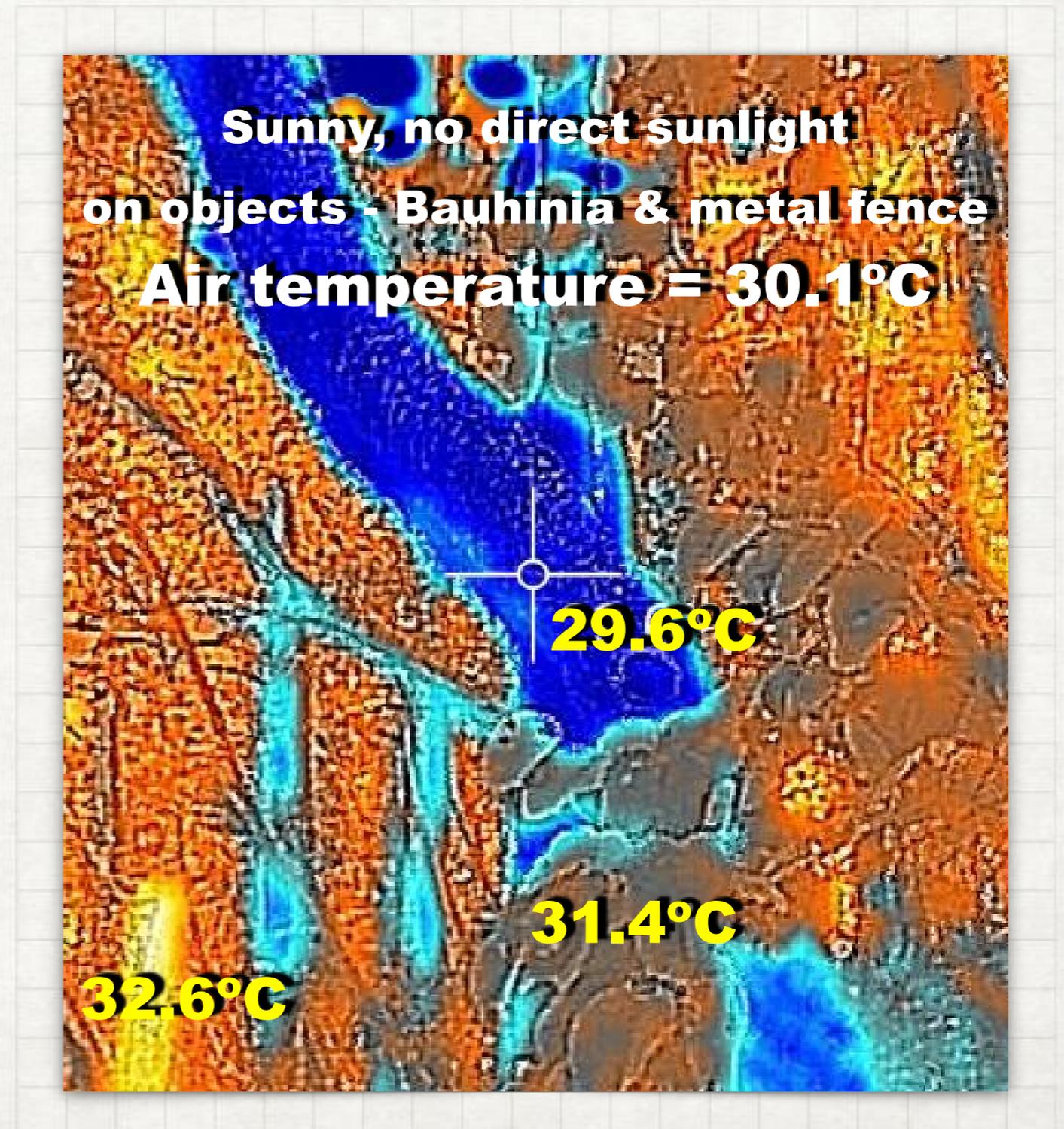
TEMPERATURE OF DIFFERENT PLANT SPECIES

- All plant leaves show slightly higher temperature than the air temperature
- Many-flowered Silvergrass has highest temperature
- Jamaica Vervain leaf is 0.5°C higher than that of Beggar's Ticks. The former is darker and harder than the latter.



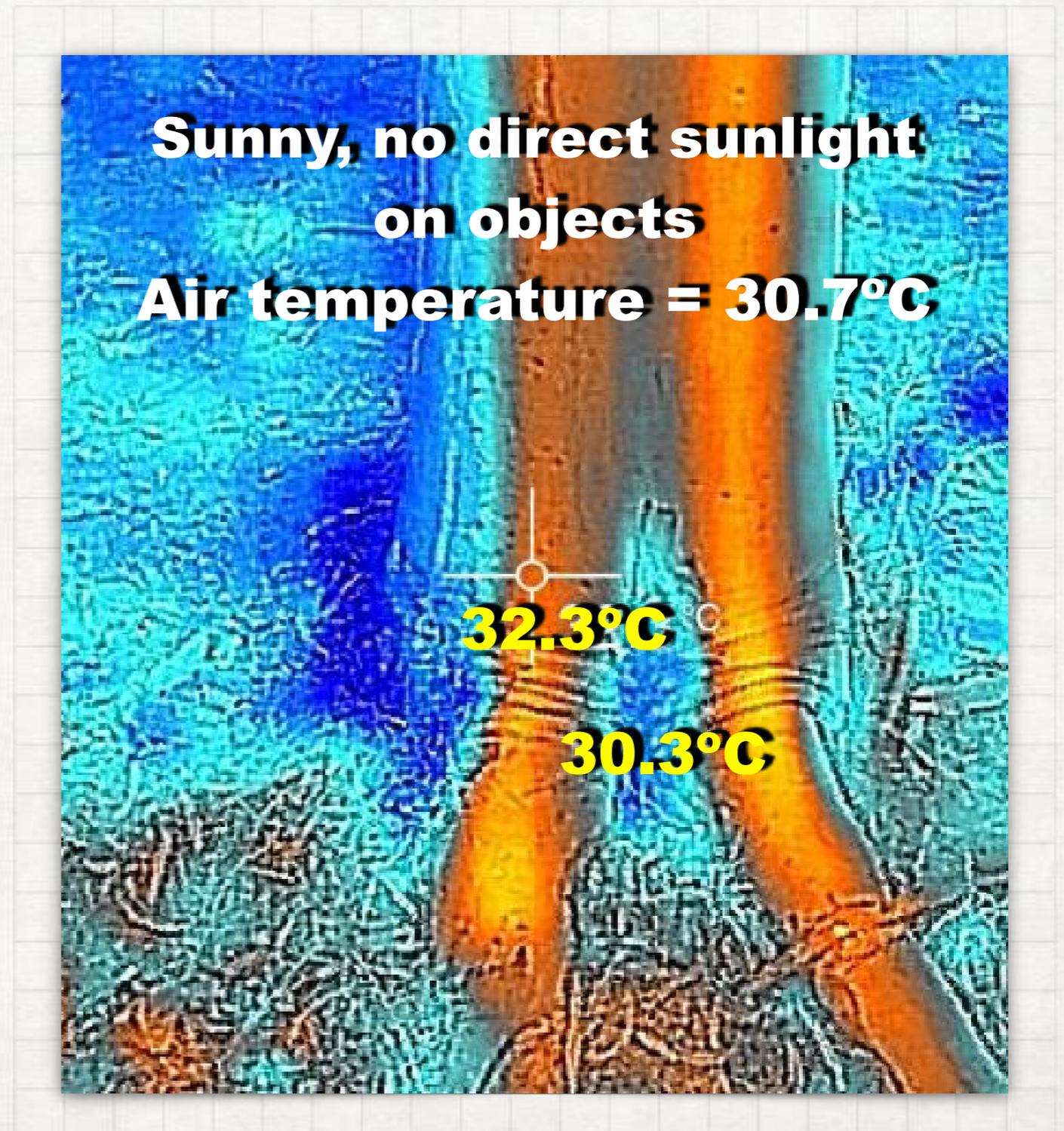
TEMPERATURE OF DIFFERENT PARTS OF A TREE

- Tree trunk is slightly colder than air temperature
- Leaves are 1.8°C hotter than tree trunk
- Metal fence has highest temperature



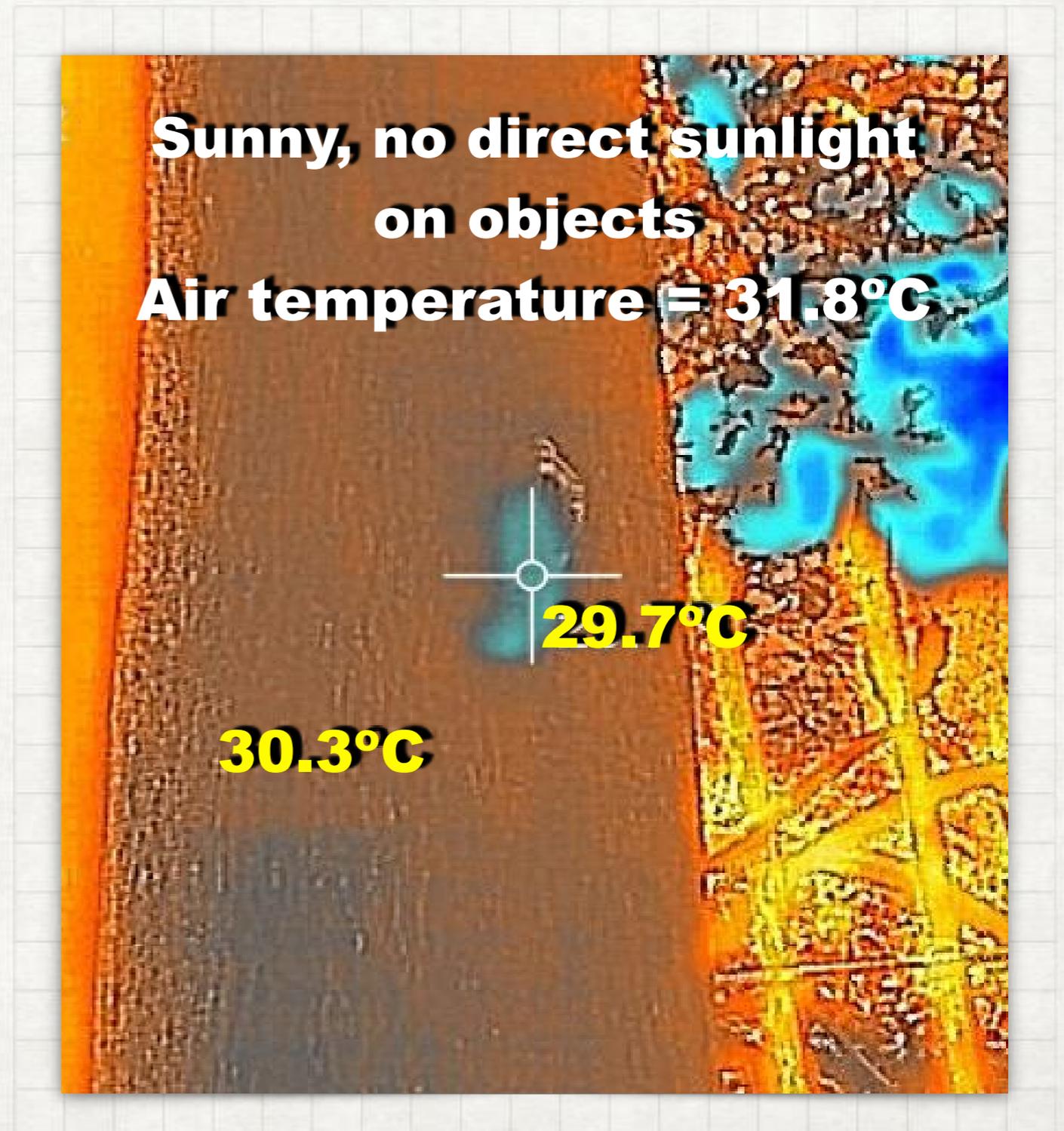
TEMPERATURE OF DIFFERENT PARTS OF A TREE

- More exposed part of the tree trunk has highest temperature
- Hollows of tree trunk is 2°C colder



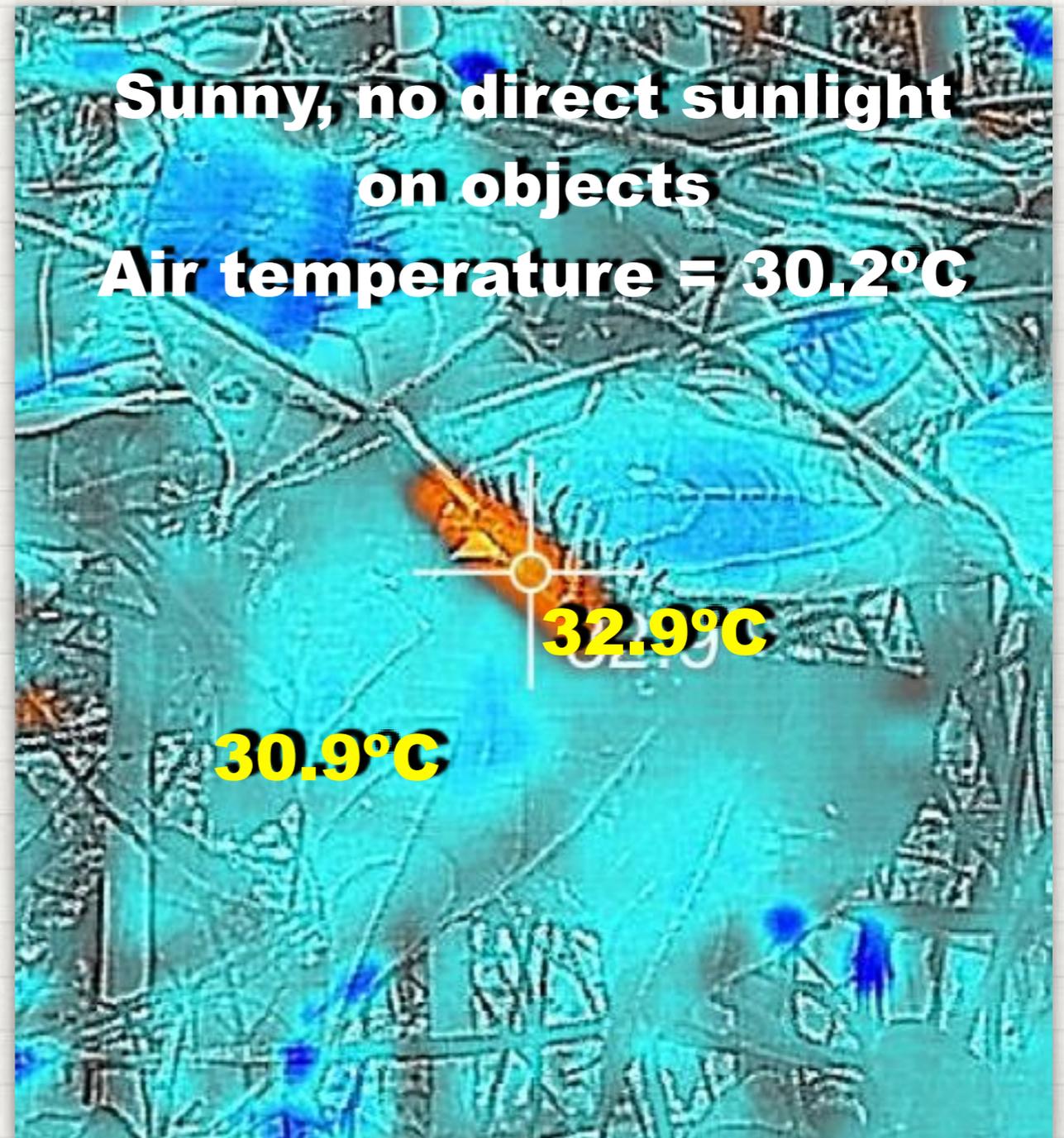
TEMPERATURE OF A SEMI-SLUG

- Tree bark is 1.5°C colder than air
- Semi-slug on tree bark is 0.6°C colder than tree bark



TEMPERATURE OF A CATERPILLAR

- Host plant leaves are 0.7°C hotter than air
- A feeding caterpillar is 2°C hotter than its host plant leaves
- A stationary caterpillar hiding under a leaf is 0.2°C colder than the leaf



DISCUSSION

- Both living and non-living components in an ecosystem absorb heat from sunlight radiation, but rocks absorb much more.
- Rock surfaces under direct sunlight could have 45°C. This could be fatal to most living things.
- Presence of vegetation can significantly lower the temperature of the ecosystem; at the same time provides more micro-habitats with much lower temperature.
- Leaves of different plant species may absorb different amount of heat in the same environment. Grasses leaves may absorb more. Darker and harder leaves may absorb more. Possible reasons: 1. water evaporation takes away heat and some leaves have higher transpiration rate than others; 2. some leaves have higher density of chlorophyll and absorb more light energy. At the same time absorb more heat energy; 3. darker surface absorbs more heat. It implies some plant species may be more adaptive to more exposed situation than others.
- Leaves of a tree is generally hotter than its tree trunk. Possible reasons: 1. tree trunk has much larger volume and less quickly heated up; 2. chlorophyll in the leaves absorb more light and at the same time absorb more heat.

DISCUSSION

- Hollows and crevices could be significantly colder than other exposed parts of a tree trunk. Possible reasons: 1. less exposed to sunlight; 2. water containing in the hollows and crevices evaporates and takes away some heat energy. In hot summer, hollows and crevices provide more favourable micro-habitats for small animals.
- Mucus of a semi-slug keeps the body surface wet. Water evaporation could lower its body temperature. However, higher water loss rate could cause dehydration. Perhaps this is the reason why terrestrial molluscs are generally reluctant to come out in the day time.
- Body temperature of a poikilothermic animal like an insect larva could vary - hiding itself under a leaf to lower the temperature; becoming hotter when moving or feeding actively.