STOMATA

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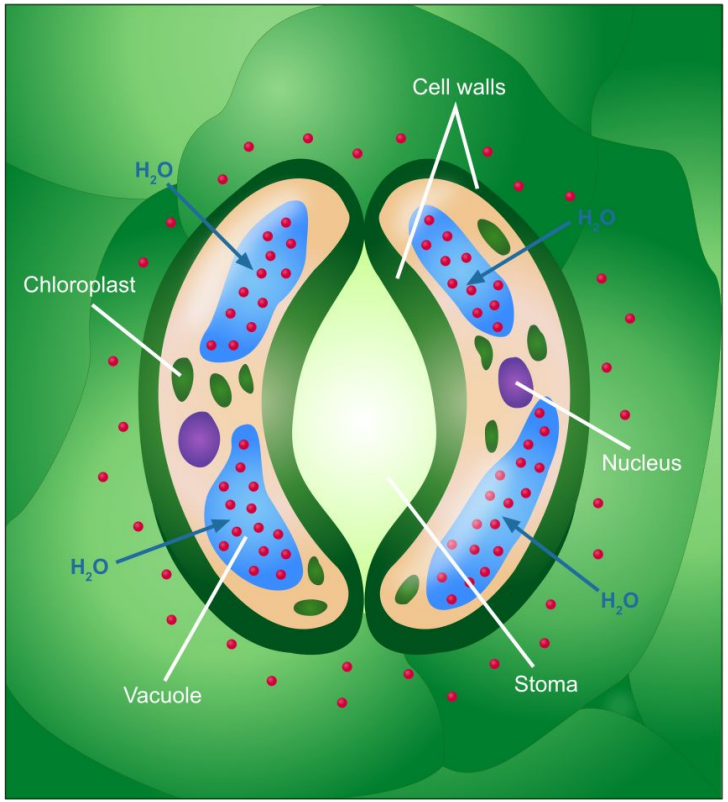
What is it?

A stoma (plural stomata) is a pore responsible for allowing gas exchange between the inside of the leaf and the atmosphere. Each stoma is made of two cells known as guard cells that are responsible for regulating the size of the stomatal opening.

When guard cells are swollen with water, they create an opening between them - the stomatal pore. Thanks to that, gas exchange occurs through the pore. When the guard cells are flaccid they lay together and close the stomatal pore. That prevents water loss and transport of gases such as oxygen and carbon dioxide (which is also a greenhouse gas) to the plant cells.

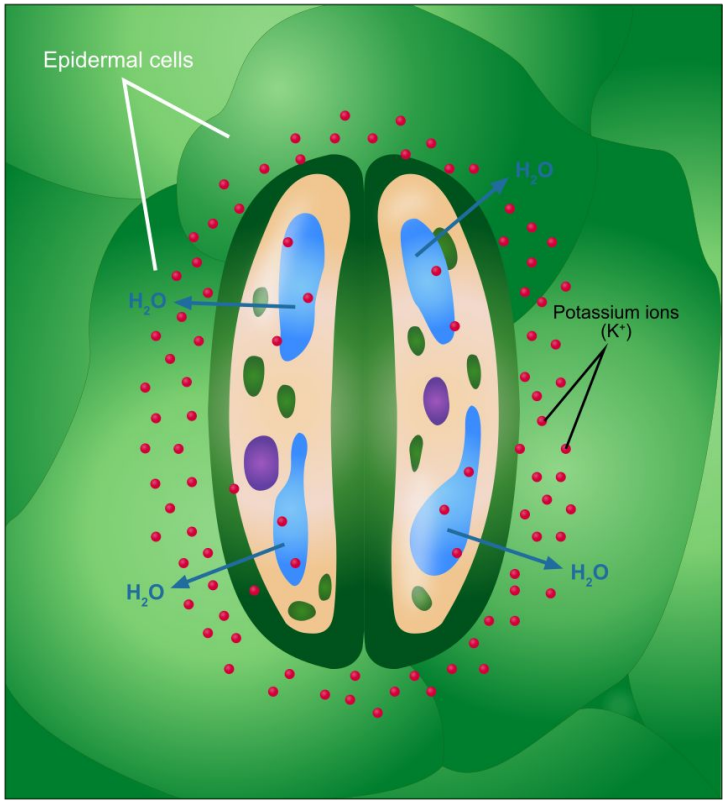
We can usually find stomata on both the top and the bottom of a leaf, but many plants have more stomata on the bottom of the leaf. It depends on the kind of environment that plants live in.

Guard cells (swollen)



Stoma opening

Guard cells (shrunken)



Stoma closing

How does stoma work?

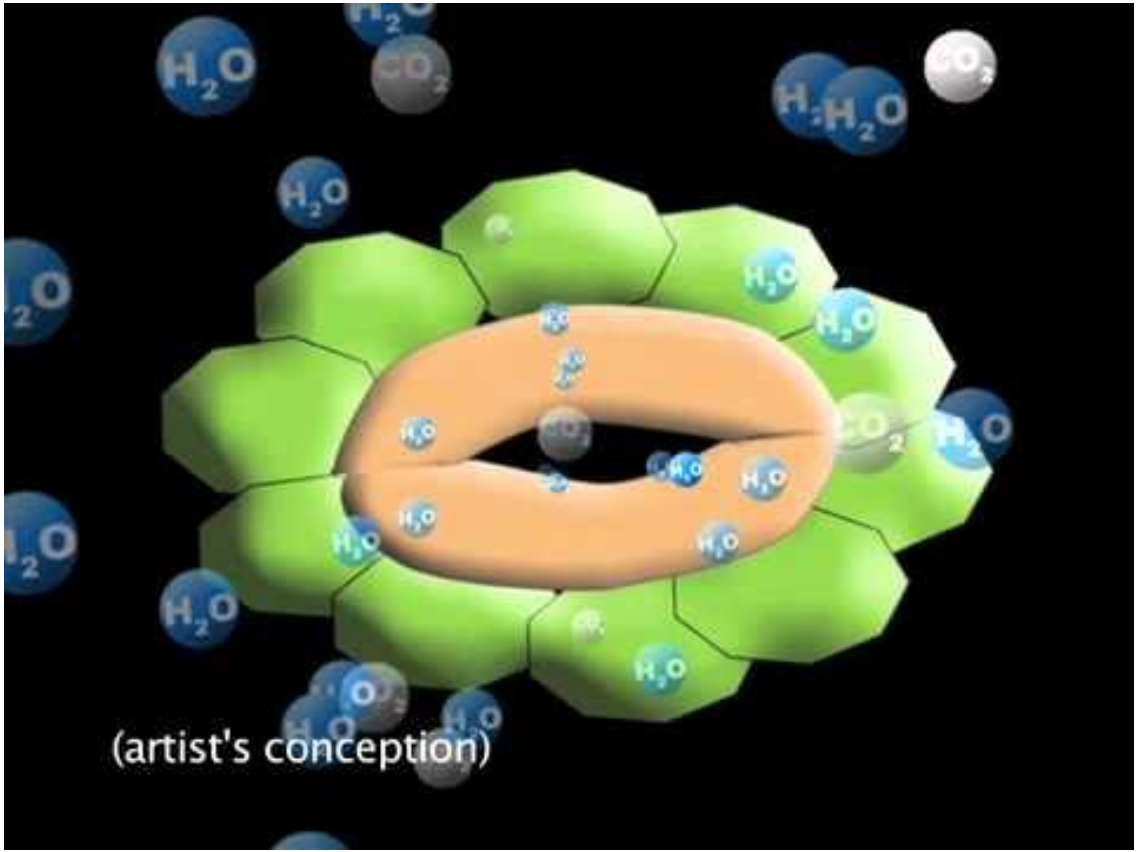
While gas exchange occurs, carbon (C) stays inside the leaf as a building block for the plant. Often, stomata are open during the day when **photosynthesis** is taking place and closed at night when it stops. Thanks to this process, plants don't lose too much water. However, not all plants open their stomata during the day. Some plants, for example cacti and succulent plants, open their stomata at night and close them during the day, in order to prevent losing too much water.

- ***MECHANISM***

If the stomata are open, gasses diffuse from areas of higher concentration to lower concentration. If photosynthesis is occurring the CO_2 higher concentration is outside the leaf. For H_20 and O_2 the area of higher concentration is inside the leaf.

Stomata and climate change

- The number of stomata depends on 2 factors: carbon dioxide concentration and temperature.
- The more stomata plants have, the better they can absorb carbon dioxide.
- Stomata density or pore index can be used to estimate climate change.
- The number of stomata on the epidermal surface can tell you a lot about a plant. Usually, a high concentration of stomata indicates fast growth and wet climate.
- Lower concentrations of stomata indicate lower rates of photosynthesis and growth or adaptations for dry weather.


(artist's conception)

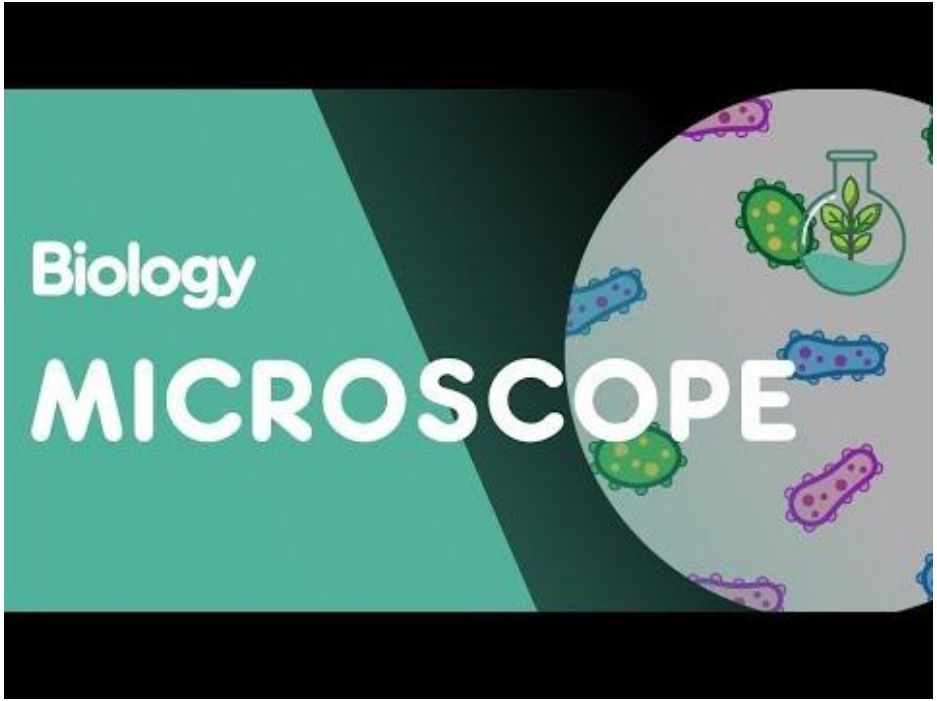

Biology
LEAF
STRUCTURE

Materials

What do you need for our microscope investigation?

- science data sheets,
- plant leaves (with a smooth surface!)
- transparent/packing tape,
- nail polish,
- microscope slides,
- microscope.

If it’s your first time with a microscope...



Task for you

KARTA OBSERWACJI/DOŚWIADCZENIA	
RESEARCH PROBLEM	
HYPOTHESIS	
PROCEDURE	Materials: Procedure:
RESULTS	
CONCLUSIONS	
REFERANCE	

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Research problem

Which plant has the highest density of stomata : rhododendron, common dandelion or tulip?

Hypothesis

Rhododendron has the highest density of stomata out of these three species.

Materials

- plant leaves (with a smooth surface!) - rhododendron, common dandelion and tulip
- transparent/packing tape,
- nail polish,
- microscope slides,
- microscope.

Procedure

1. Lay the leaf flat on the table, with the side that you want to examine under the microscope print facing up.
2. Paint a thin layer of clear nail polish on the leaf.
3. Wait a few minutes, then gently test a corner of the nail polish to make sure it is completely dry.
4. If dry, take a small piece of tape and put it directly over the nail polish on your leaf. Rub your finger over the tape firmly to make sure it is stuck to the nail polish.
5. Slowly peel the tape off of the leaf. The nail polish should remain on the tape.
6. Stick the tape to the center of a microscope slide. Then, place on the stage of your microscope.

Results

Density of stomata:

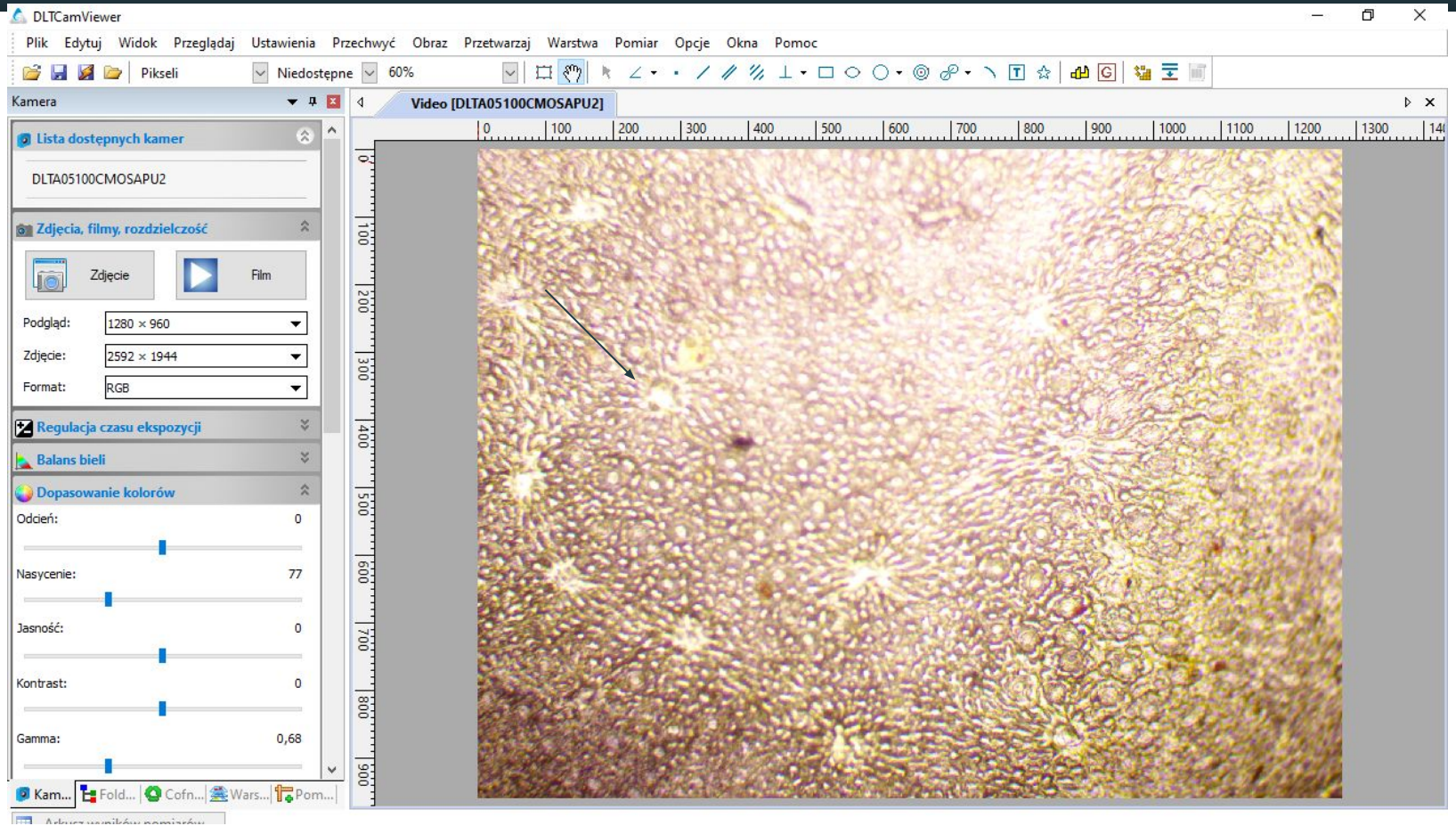
1. rhododendron ...
2. common dandelion ...
3. tulip ...

Conclusions

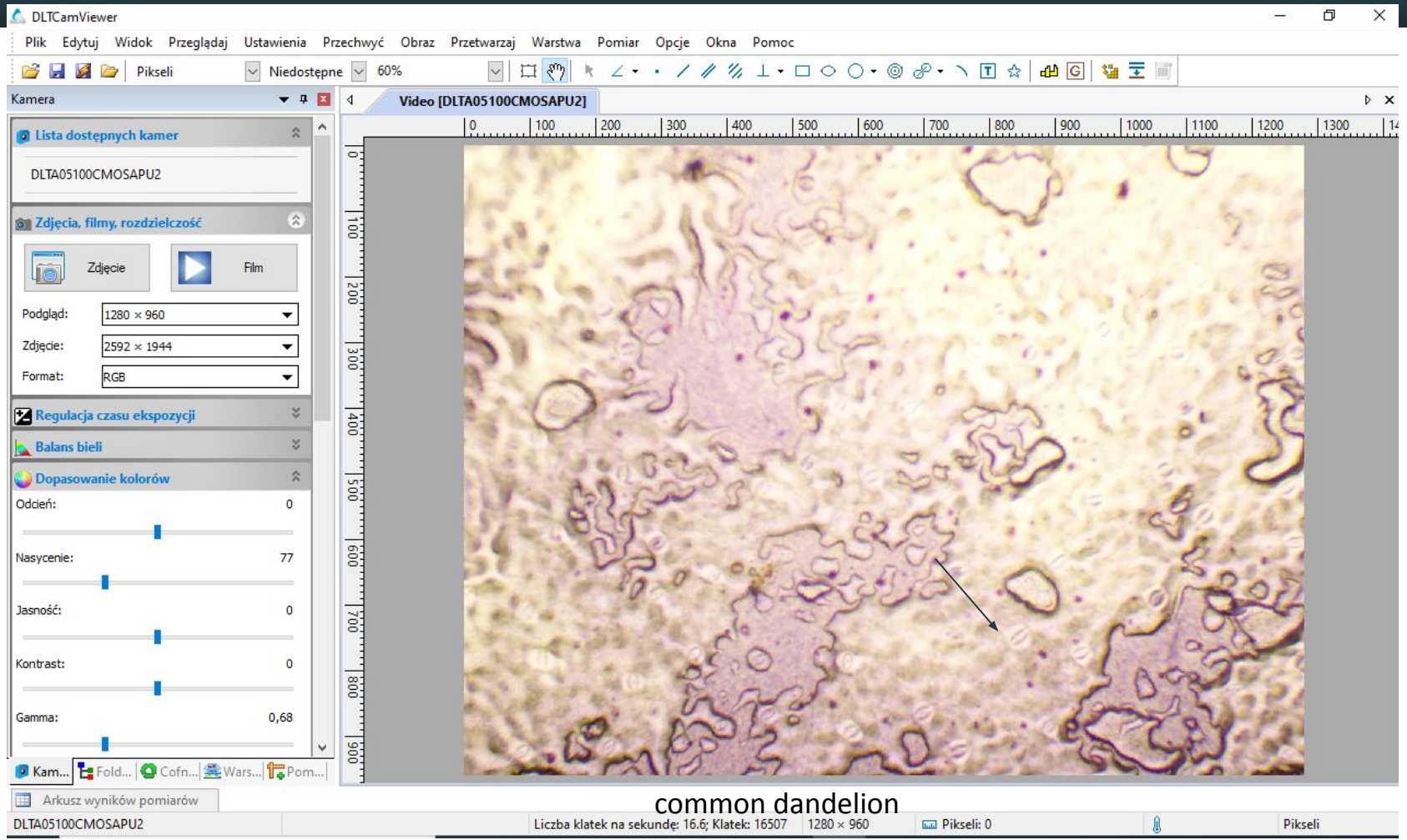
The highest density of stomata appears in the leaves of...

Reference (of our investigation)

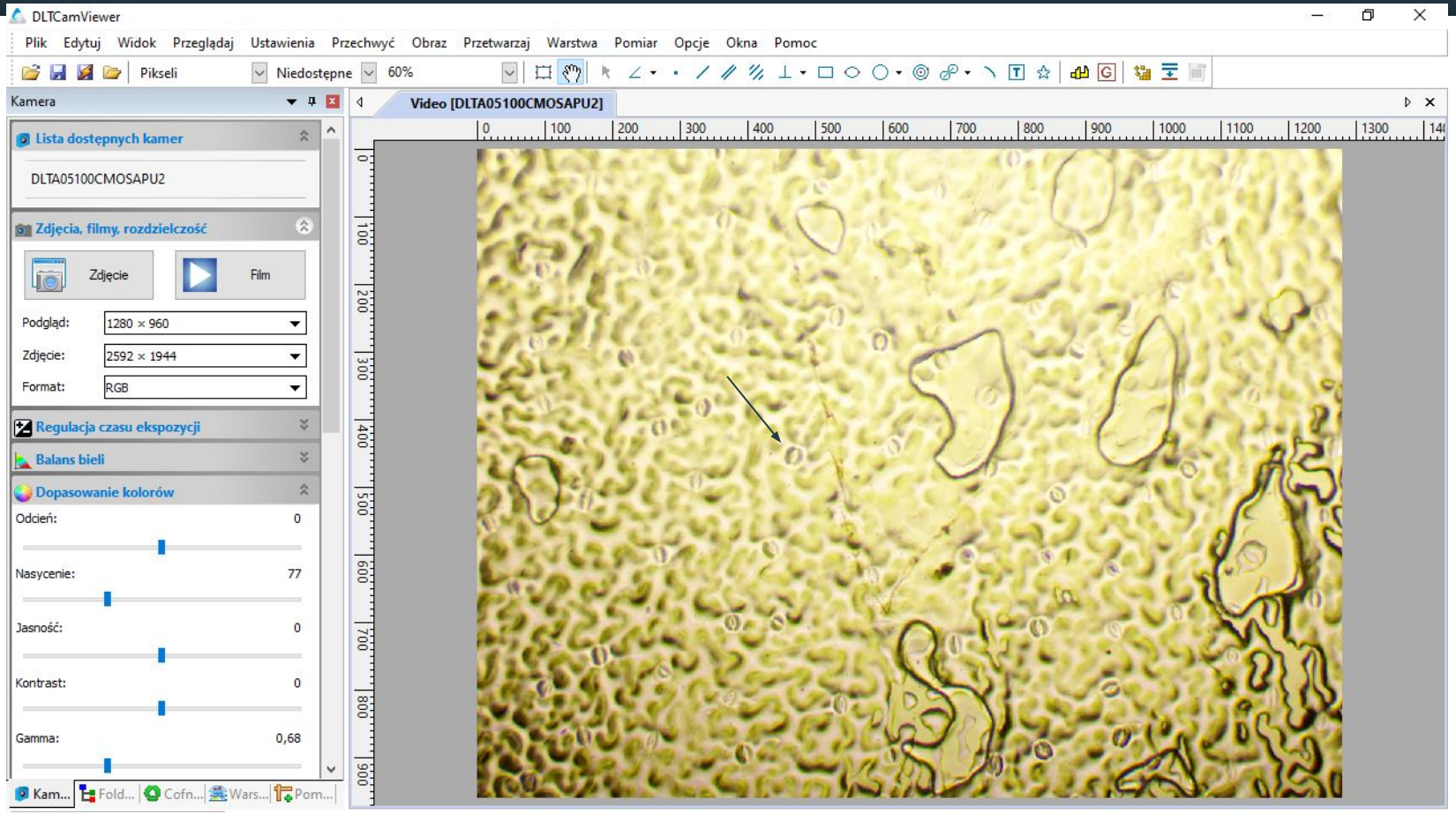
There are species of plants like... which have high density of stomata. That is the reason why they can absorb carbon dioxide more efficiently than other plants with lower density of stomata.



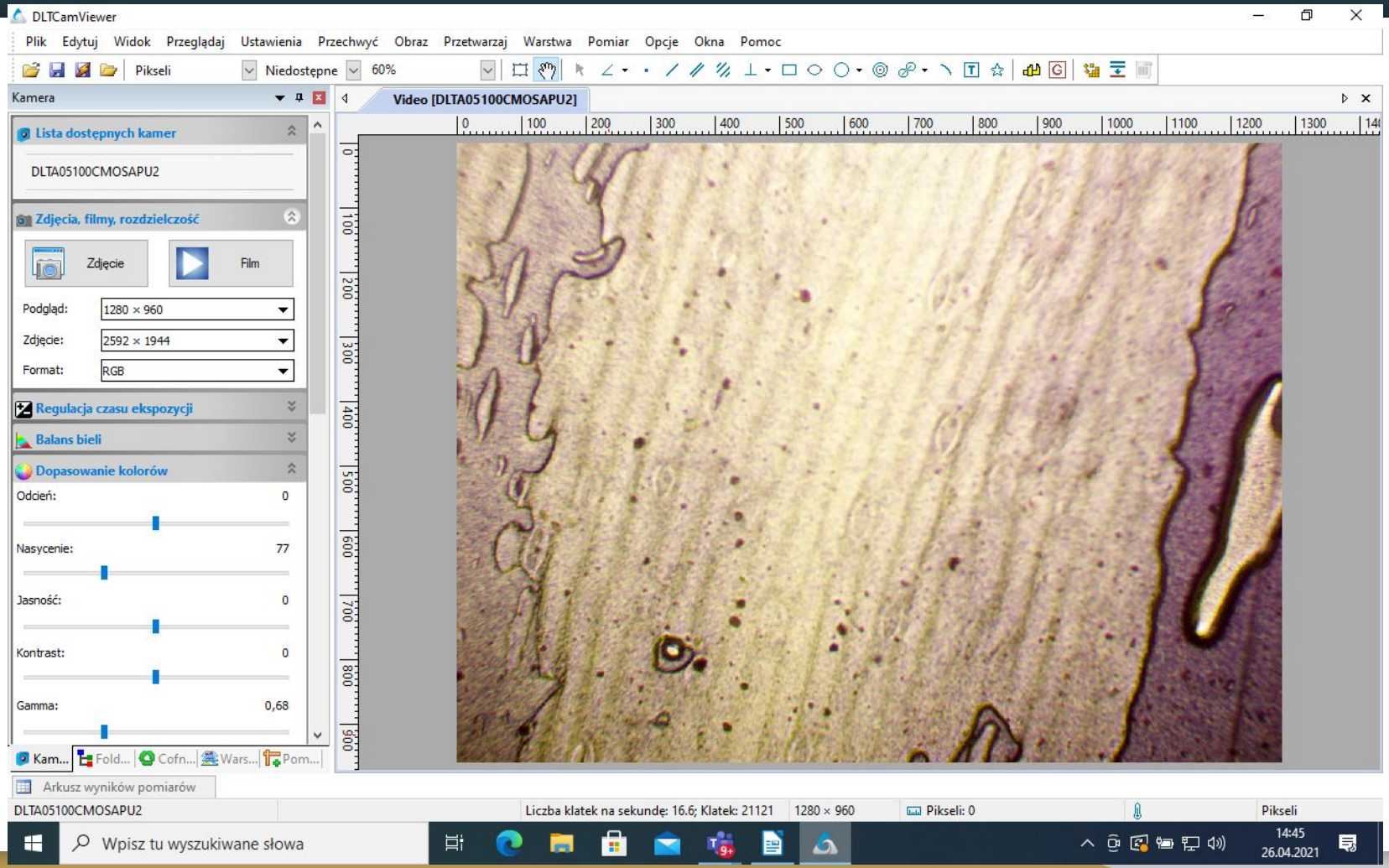
rhododendron



common dandelion



common dandelion


DLTCamViewer
Plik Edytuj Widok Przeglądaj Ustawienia Przechwyć Obraz Przetwarzaj Warstwa Pomiar Opcje Okna Pomoc
Pikseli
Niedostępne
60%
Kamera
Lista dostępnych kamer
DLTA05100CMOSAPU2
Zdjęcia, filmy, rozdzielczość
Zdjęcie
Film
Podgląd:
1280 × 960
Zdjęcie:
2592 × 1944
Format:
RGB
Regulacja czasu ekspozycji
Balans bieli
Dopasowanie kolorów
Odcień:
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Nasycenie:
77
Jasność:
0
Kontrast:
0
Gamma:
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Kam...
Fold...
Cofn...
Wars...
Pom...
Video [DLTA05100CMOSAPU2]
Arkusz wyników pomiarów
DLTA05100CMOSAPU2
Liczba klatek na sekundę: 16.6; Klatek: 21121
1280 × 960
Pikseli: 0
Pikseli
Wpisz tu wyszukiwane słowa
14:45
26.04.2021

Sources

https://www.calacademy.org/educators/lesson-plans/stomata-printing-microscope-investigation

https://www.esa.org/tiee/vol/v1/experiments/stomata/stomata_description.html

https://www.youtube.com/watch?v=IJLOmIb6q80

https://www.youtube.com/watch?v=JQvdXX7hGqI