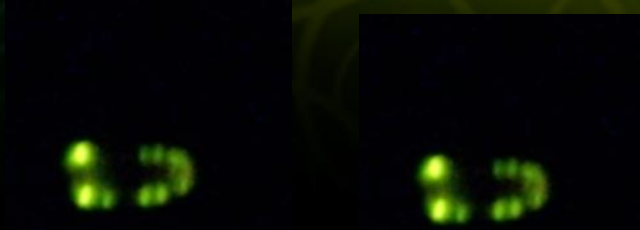


WHO SAW THE FIREFLIES?

Students: Bruno Trbušić, Maksim Stanković Šprajc, Vito Brozović
Dubovac Primary school, Karlovac
Students' mentor: Snježana Marković-Zoraja

Awarded project on State GLOBE competition of project 2021.
State GLOBE competition in knowledge 2021: 2nd

Research Question



Krešo Krijesnica



APEL ZA SPAS KRIJESNICA!!!

Potrebna nam je vaša pomoć, vi ste građani znanstvenici Hrvatske i možete biti tamo gdje ne možemo biti mi i pomoći nam da saznamo gdje se magične lampice još uvijek mogu vidjeti.

Pomognite nam da vratimo svjetla našeg djetinjstva!!!

Krijesnice, magične lampice koje su osvijetljavale ljetne noći našeg djetinjstva gase se u Hrvatskoj.



Tko smo mi?

Samo zabrinuti znanstvenici i studenti Sveučilišta u Zagrebu, Agronomskog fakulteta i Sveučilišta u Wollongong-u (Australija). Čuvari prirode i kukaca.

Naša misija?

Isključiva misija volonterske kampanje „Krešo Krijesnica“ jest saznati gdje u Hrvatskoj još svijetli čarolija krijesnica.

KAKO I VI MOŽETE POMOĆI ???

Šaljite informacije (i slike) o mjestu, vremenu, datumu i broju krijesnica koje ste vidjeli. Pridonijet ćete boljem razumijevanju ovog kulturnog hrvatskog kukca i pomoći njihovoj zaštiti u Hrvatskoj !!!

 mužjak i ženka krijesnice

 ličinka krijesnice

The University of Agronomy in Zagreb started a project in 2019 „Krešo – krijesnica“, from 1.6. to 15.7.2019

Aim of project:

- Noting firefly sightings
- Noting the location for each observation
- The GLOBE students in Dubovac Primary school participate

During the schoolyear 2019./2020. :

- Analysis data of observations in the school area and made new research project
- Some students didn't see any fireflies
- „Which environmental factors affected firefly sightings?“

Hypothesis

Most firefly observations are in the hot days of June and July from students who live in less populated districts and comitees with less artificial light.

Methods of Work

The research was conducted from 1.6.to 15.7.2019. godine

Activities:

- Observing the environment and the occurrence of fireflies every day during the research at our home addresses
- Noting the dates when fireflies were seen and MUC where students live
- Taking photos and sending data
- Analyzing results
- Comparison of atmospheric measurements of Dubovac Primary school with DHMZ data
- Comparison the occurrence of fireflies with atmospheric measurements (maximum air temperature, daily precipitation)

The abundance and species of fireflies weren't monitored in research. To know what the species look like, we searched in biological literature.

There are two types of fireflies in Croatia:

- Ivanjska krijesnica (*Lampyrus noctiluca* L.)
- Mala ivanjska krijesnica (*Lampyrus splendidula* L.)

- The light is used for communication, mating and warning predators
- The lightning is known as bioluminescence



Mala ivanjska krijesnica
(*Lampyrus splendidula* L.)

- Central and Southeastern Europe
- Males are dark brown and fly
- Size : up to 12 mm
- Males and females create light



Ivanjska krijesnica
(*Lampyrus noctiluca* L.)

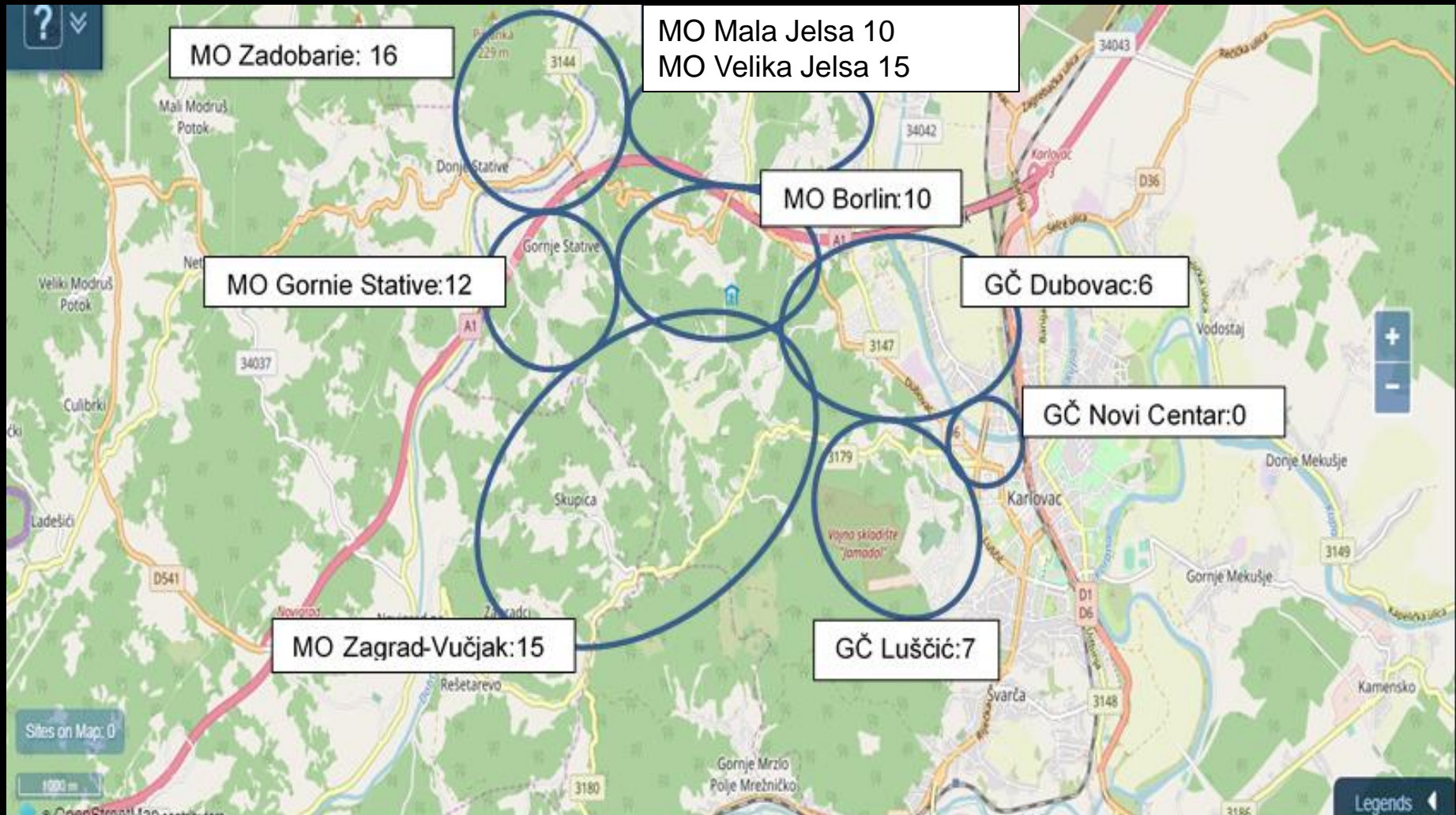
- Europe (temperate climate)
- Males fly, but not light
- Size : male 11-12 mm, female 16-18 mm
- Females create light

The name of insect comes from first flight on the night St. John, Jun 23th and 24th

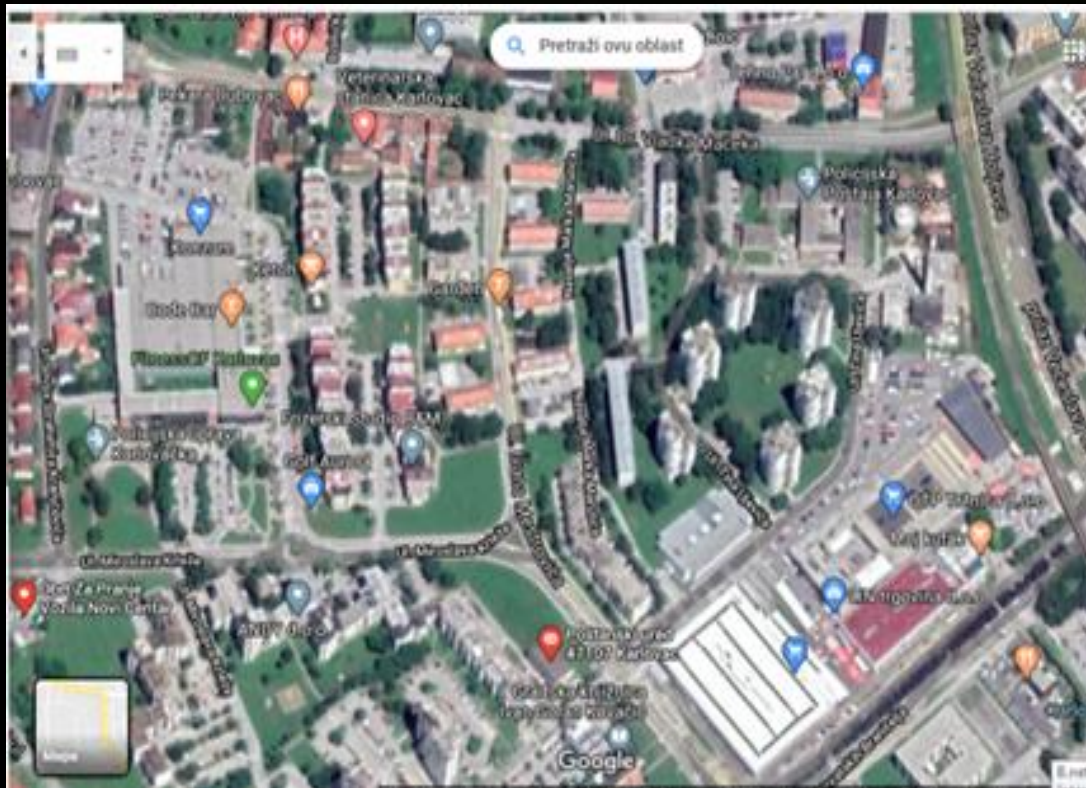
Results

Geographical location of parts of Karlovac city (GČ) and areas outside of city (MO) where students live.

The number of firefly observation is written for each location.



Population for each part of the city.
Percentage of observation on MUC 1123 and MUC 9 in surveyed area.



Area of the city: Novi centar
Observations: 0
Population: 5774 people



Area of the city : Dubovac
 Observations:6
 Population : 2237 people
 MUC 1123: 0%
 MUC 9: 100%



Area of the city : Lušćić
 Observations:7
 Population : 3890 people
 MUC 1123: 100%
 MUC 9: 0 %

Population for each area outside of the city.
Percentage of observation on MUC 1123 and MUC 9 in surveyed area.



Area outside of the city : Velika Jelsa
Observations: 15
Population : 1879 people
MUC 1123: 66,6%
MUC 9: 33,3%



Area outside of the city : Borlin
Observations: 10
Population : 1432 people
MUC 1123: 70%
MUC 9: 30%



Area outside of the city: Zagrad

Observations: 15

Population : 873 people

MUC 1123: 53%

MUC 9: 47%



Area outside of the city : Gornje Stative

Observations: 12

Population : 385 people

MUC 1123: 75%

MUC 9: 25 %



Area outside of the city : Zadobbarje

Observations: 16

Population : 368 people

MUC 1123: 50%

MUC 9: 50%



Area outside of the city : Mala Jelsa

Observations: 10

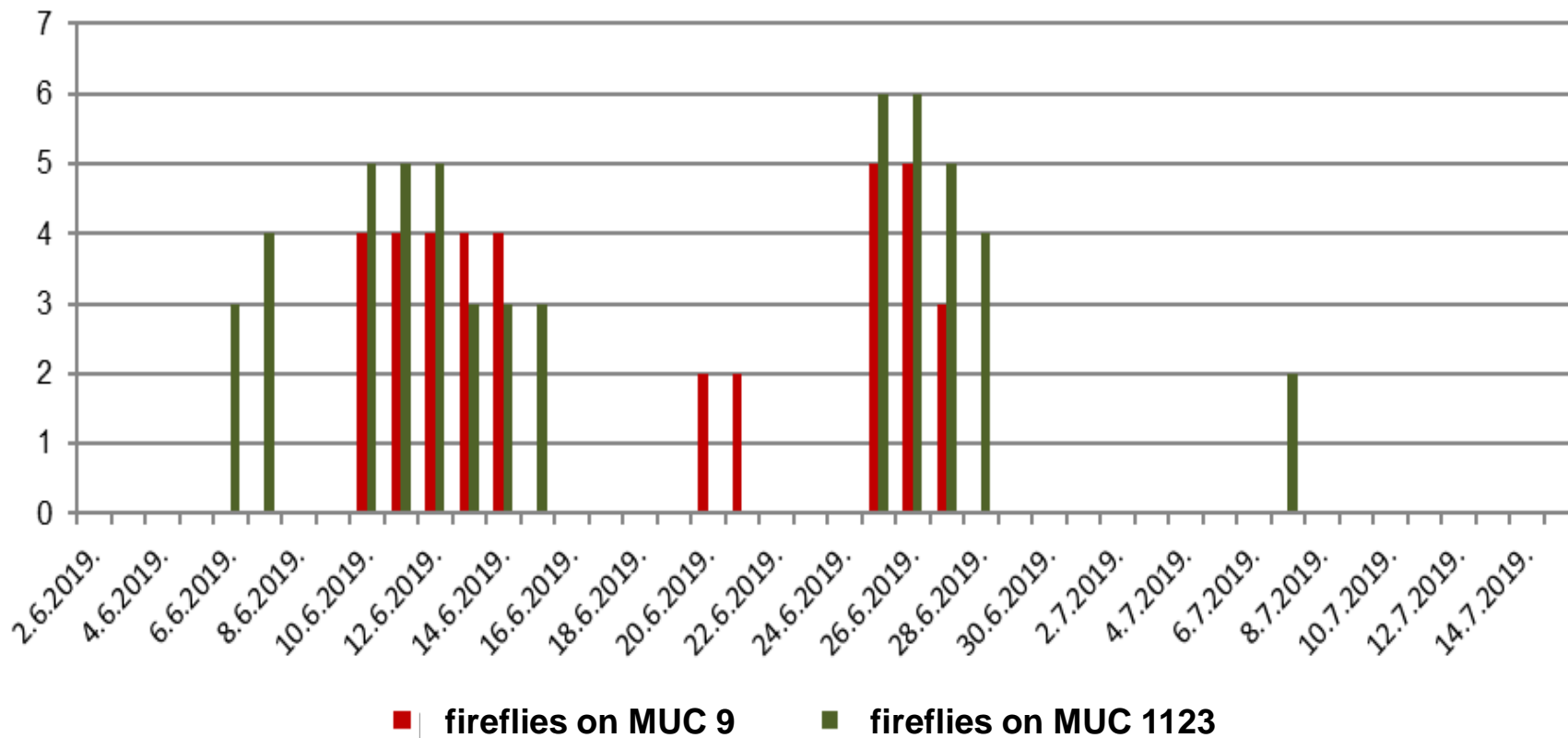
Population : 311 people

MUC 1123: 50%

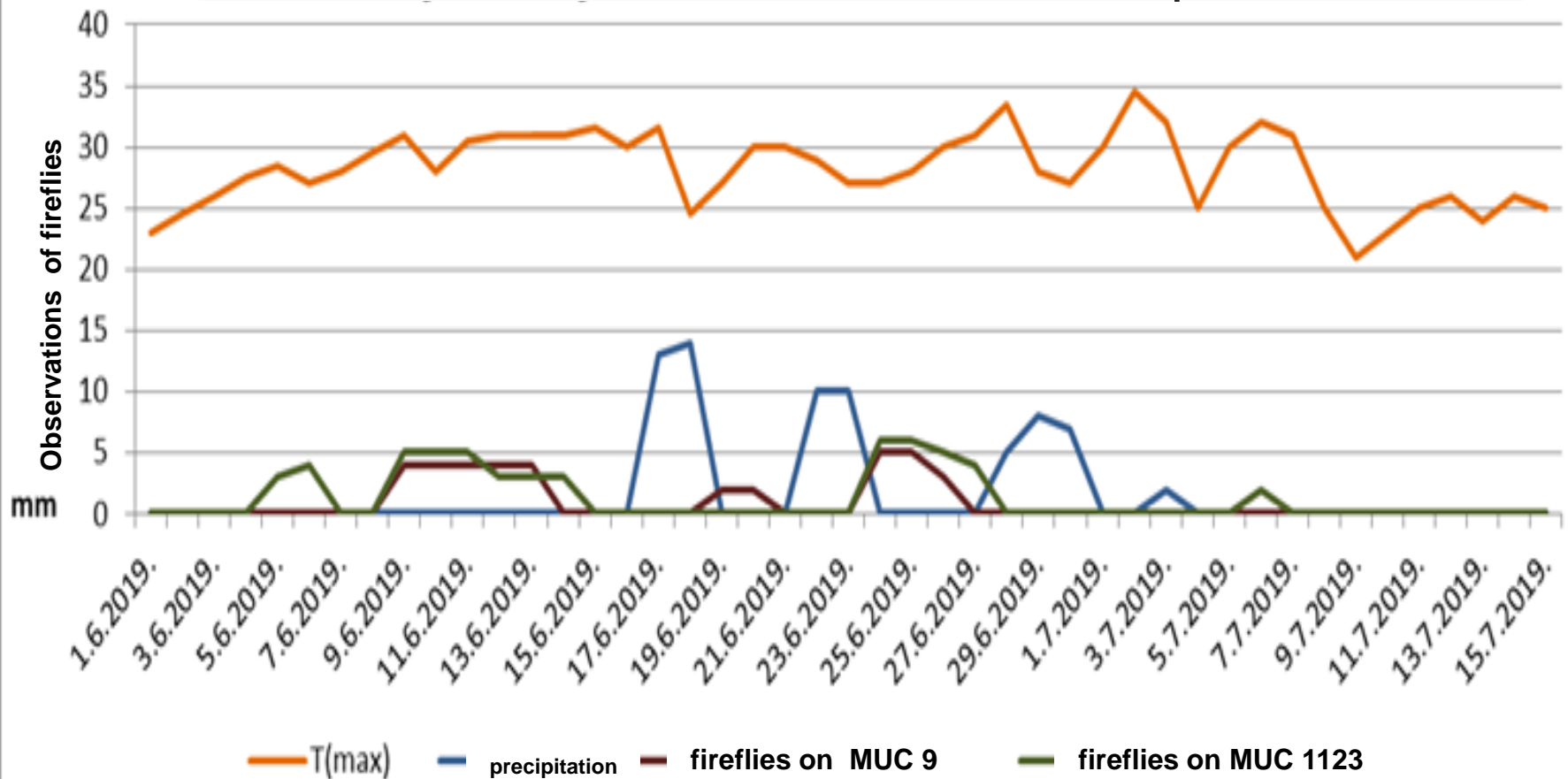
MUC 9: 50%

Number of fireflies occurrences since Jun 1st to July 15th 2019. on surveyed area

Number of
fireflies



Occurrence of fireflies in view of atmospheric factors

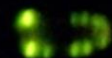
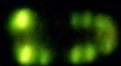


Conclusion

We confirmed the hypothesis.

The students who have seen the fireflies live in less populated parts or less illuminated areas (at addresses away of major roads).

The students observed fireflies in hot and warm days without precipitation.

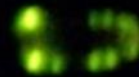
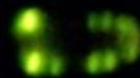
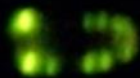


Analysis

A comparison with other researches on fireflies in Croatia couldn't be done.

Project managers from the University of Agronomy informed us that there is no research from previous years in Croatia. It's important to repeat the observations in the following years with monitoring possible changes.

Scientists warn the number of fireflies is rapidly decreasing although they aren't on the list of endangered animals in Croatia.



The communication between fireflies is disturbed by:

- Artificial light (long-term desynchronization)
- Car lights (disrupted synchronization for few minutes)



Causes of reduction in the number of fireflies are :

- urbanization
- light pollution (light harms living beings)

Project goals:

Inform and teach students, parents and citizens on reduction of the number of fireflies

In the city of Karlovac, the fireflies are especially important because of the city's yearly bonfire traditional event („Krijes”).

Krijes (eng. Bonfire) -> Krijesnice (eng. Fireflies)
(Ivanje, the night before St.John, Jun23th)



Post competition activities:

- Educating students, parents and teachers
- Presenting project to our local community
- Publication of the research in local newspaper
- Publication of research in biological journal (University of Biology)



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6. Garms, H., Borm L.,: Fauna Evrope, Mladinska knjiga, Ljubljana, 1981.



„On summer nights, look at the nature, at the light of fireflies, which adorn our lives“

The background features a vertical green gradient, transitioning from a light, almost white green at the top to a dark green at the bottom. Overlaid on this gradient is a pattern of numerous white, thin-lined circles of varying sizes. These circles are arranged in a way that they overlap each other, creating a complex, web-like texture across the entire image.

Thank you for your attention!