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ECOLOGY OF *Utricularia aurea Lour*. IN THE WATERS OF SRIWIJAYA UNIVERSITY, OGAN ILIR; NUMBER OF BLADDER, EMERGENCE AND INSPECTION OF PREY IN IT

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Abstract

Shallow water ecosystems such as artificial ponds or swamps, especially on campus, play an important role in maintaining micro-ecological balance. These aquatic ecosystems contain unique aquatic plants that are rarely studied in depth, one of which is *Utricularia aurea*. *Utricularia aurea* has the ability to capture small organisms such as rotifers, copepods and even mosquito larvae in the early instar phase or stage. In general, the ecological research of *Utricularia aurea* at Sriwijaya University provides an understanding of its interaction with prey organisms in its natural habitat, as well as an opportunity to assess the potential of this plant as a biological control. This triggered curiosity to find out about the number of bladders, the initial position of bladder appearance in *Utricularia aurea* plants, and what types of prey are found in *Utricularia aurea* bladders in Sriwijaya University waters. The method used in this research is a combined method that includes quantitative and qualitative methods. The average number of bladders found on the tip of *Utricularia aurea* along 10 cm in the pond near the FISIP building of Sriwijaya University was 2,029 bladders while in Lake Unsri Taman Firdaus was 3,216 bladders. Bladder appears since the first modified leaf sequence although its shape is very microscopic. Prey found in the bladder of *Utricularia aurea* collected from Sriwijaya University waters for now found 5 prey which are *Daphnia* sp., *Arrenurus* sp., *Closterium* sp. as well as additional prey from the order Trombidiformes and Coleoptera which can only be identified to the order level.

Keywords:

Utricularia aurea, aquatic carnivorous plant, bladder traps, prey organisms, Sriwijaya University waters.

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1. INTRODUCTION

Shallow water ecosystems, such as ponds or artificial marshes on campus, are often overlooked, yet they play a crucial role in maintaining microecological balance. These aquatic ecosystems contain unique aquatic plants that are rarely studied in depth, one of which is *Utricularia aurea.* According to Simanjuntak et al. (2020), *Utricularia aurea* is classified as an aquatic carnivorous plant, meaning it uses a specialized trap called a bladder to capture microscopic prey. This bladder operates through a negative pressure system, capable of sucking up prey within milliseconds. The presence of the bladder contributes to the dynamic interactions between the plant and surrounding microorganisms.

Utricularia aurea has the ability to capture small organisms such as rotifers, copepods, and even mosquito larvae in the early instar phase. Overall, the ecological research on Utricularia aurea at Sriwijaya University provides an understanding of its interactions with prey organisms in its natural habitat and opens up opportunities to assess the plant's potential as a biological control agent. This sparked curiosity to know about the number of bladders, the initial position of the bladders' emergence in the *Utricularia aurea* plant, and what types of prey were found in the Utricularia aurea bladders in the waters of Sriwijaya University.

1.1. Problem Formulation

Based on the background described, the following problems can be formulated:
1. How many bladders were found in *Utricularia aurea* samples?
2. What is the initial position of bladder emergence in *Utricularia aurea* plants?
3. What types of prey were found in Utricularia aurea bladders in the waters of Sriwijaya University?

1.2. Research Objectives

Based on the problem formulation and problem limitations, the objectives of this study are:
1. To determine the number of bladders found in *Utricularia aurea* plant samples.
2. To determine the initial position of bladder emergence in *Utricularia aurea* plants.
3. To determine the types of prey found in *Utricularia aurea* bladders in the waters of Sriwijaya University.

1.3. Research Benefits

The benefits of this study are to provide information and knowledge about the ecology of Utricularia aurea at Sriwijaya University. This includes providing information and knowledge about the number of bladders found in *Utricularia aurea* samples, the initial position of the bladder's appearance in Utricularia aurea plants, and the types of prey found in *Utricularia aurea* bladders in the waters of Sriwijaya University.

Picture 1. Sampling profile

2. RESEARCH METHODS

2.1. Time and Location
This research was conducted from October 2024 to March 2025 at Sriwijaya University, Indralaya, Ogan Ilir, South Sumatra. Sampling was conducted in the waters surrounding Sriwijaya University.

2.2. Tools and Materials
The tools used in this study included stationery, petri dishes, cover glasses, a portable digital DO meter with a temperature sensor, a beaker, safety pins, a mobile phone camera, a light microscope, glass slides, a ruler, tissue, and a container. The materials used in this thesis were distilled water and Utricularia aurea plant samples collected directly from the waters around Sriwijaya University.

2.3. Research Methods
This study employed a combined method, encompassing both quantitative and qualitative methods. Quantitative data included the number of bladders found in each sample and the initial position of bladder emergence. The initial position of bladder emergence was based on the modified leaf sequence. The initial position of the bladder was recorded by counting the number of modified leaves from the tip of the shoot, where the bladder first appeared. Meanwhile, the qualitative data in this study included identification of the prey species found in the bladders of the Utricularia aurea plants sampled and described descriptively.

2.3.1. Method
A. *Utricularia aurea* Sampling

The sampling technique in this study was purposive sampling, a method of collecting samples based on specific criteria or objectives. The sampling locations were in the waters of Sriwijaya University, namely the pond near the Faculty of Social and Political Sciences building at Sriwijaya University in Indralaya and Lake at Sriwijaya University Taman Firdaus.

B. Sample Observation

The *Utricularia aurea* samples collected from the research location were taken to the Ecology Laboratory, Department of Biology, Faculty of Mathematics and Natural Sciences, Sriwijaya University, Indralaya. Next, the tools and materials to be used were prepared. The samples were then measured using a 10 cm ruler. Bladder examination and counting were carried out in stages by removing 4 to 12 bladders from the sample at a time using a safety pin and placing them on a dry tissue. The dried bladders were then transferred to a glass slide using a safety pin and then covered with a coverslip for observation under a light microscope at 100x magnification.

C. Prey Identification

Prey trapped in Utricularia aurea bladders were observed under a microscope and important morphological characteristics were recorded, such as body size and shape, organ structure, and other distinctive characteristics. Prey within Utricularia aurea bladders were identified using literature references.

D. Measurement of Physicochemical Properties of Water

DO parameters were measured once in each body of water to represent the general environmental conditions where Utricularia aurea grows. This data was used to support the analysis of bladder counts in each body of water, particularly to understand the possible influence of environmental conditions on differences in bladder counts between ponds. Pond water samples taken from each body of water were taken to the Ecology Laboratory, Department of Biology, Faculty of Mathematics and Natural Sciences, Sriwijaya University. Next, the equipment and materials for measuring DO, temperature, and pH were prepared. Each water sample was placed in a beaker. Dissolved oxygen (DO) and temperature levels were measured using a portable digital DO meter with a temperature sensor, while pH was measured using a pH meter.

2.3.2. Data Presentation and Analysis: Sample Standard Deviation

Quantitative data, such as the number of bladders, will be presented in tables and bar charts. Meanwhile, quantitative data, such as the initial position of bladders in the modified leaf sequence, will be presented in tables. The data will then be used to find the sample standard deviation. The standard deviation indicates how consistent the data in a sample is. This is important for understanding whether the data is uniform or variable. When sampling from a larger population, the standard deviation helps estimate how the data in that population will look. If the sample has a low standard deviation, we can be more confident that the sample mean is close to the population mean.
The following is the standard deviation formula for a sample:

$$S = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}}$$

Description:
S = Standard Deviation

x_i = Value of the i-th data point

$\bar{x}$ = Average value

n = Total data points

The qualitative data, including prey identification in the bladder of *Utricularia aurea*, is presented descriptively with images or photographs.

3. RESULTS AND DISCUSSION

3.1. Utricularia aurea Bladder Count

N (sampling)	**Pond 1**	**Pond 2**	**T statistic**
1	1,622	3427	0.0048
2	1,492	3256	
3	2,765	3416	
4	1,969	2991	
5	2,299	2989	
Mean	2029	3216	
Sd	517.74	216.95	
Conclusion			**No different**

After calculating the number of bladders, the quantitative data obtained were then presented and visualized in the bar chart below, showing the number of bladders in the *Utricularia aurea* samples in each water body. This data presentation aims to provide an initial quantitative overview of the differences in bladder numbers found in each water body at the research location, which will be further analyzed in the discussion.

The number of bladders in *Utricularia aurea* is an important indicator reflecting the plant's adaptation to its environmental conditions. Based on the bar chart in Figure 1, the number of bladders in water body 1 is lower than in water body 2. As the initial step in data analysis, the average bladder count was calculated for each water body. According to Sopingi (2015), the average is used to determine the middle value that represents all data. The average bladder count reflects the general condition of the *Utricularia aurea* population in terms of its ability to form trap structures and serves as a basis for comparing conditions across sampling locations.

The average number of bladders in Water 1 was 2,029, while in Water 2 it reached 3,216. The difference between the two, at 1,187 bladders, indicates that *Utricularia aurea* in Water 2 tends to be more active in forming trap structures than in Water 1. Because the environment surrounding *Utricularia aurea* is limited in inorganic nutrients, *Utricularia aurea* increases its bladder count as an adaptive strategy to meet its nutritional needs through carnivory. According to Torre (2019), carnivorous plants like *Utricularia aurea*, which thrive in conditions lacking essential nutrients, compensate by capturing and digesting prey.

The difference in the average bladder count between Water 1 and Water 2 indicates differences in environmental conditions that influence the growth and morphological responses of *Utricularia aurea*. The higher bladder count in water 2 suggests that *Utricularia aurea* in that water 2 is experiencing nutrient-poor conditions, possibly due to increased interspecific competition or lower nitrate and phosphate concentrations. According to Adlassnig et al. (2011), the purpose of prey capture in carnivorous plants is to obtain inorganic nutrients, particularly nitrogen and phosphorus.

Given these nutrient-poor conditions, plants need to increase their nutrient acquisition efficiency from prey.

The higher number of bladders in water 2 may indicate that the waters have oligotrophic or low nutrient conditions. Conversely, the lower number of bladders in water 1 may indicate that this habitat has relatively more nutrient-rich environmental conditions than water 2. This difference may reflect variations in the level of dependence on the carnivorous system, with direct nutrient absorption through vegetative tissues playing a relatively larger role in water 1. According to Adamec (2016), the genus Utricularia that lives in aquatic habitats not only obtains nutrients through bladders, but also directly absorbs dissolved nutrients in water through vegetative parts such as stolons and modified leaves by diffusion. However, this tendency for differences in the number of bladders is only at the nominal level, because the statistical analysis for the average difference between the two locations is not significant, meaning it is still considered the same.

Furthermore, dissolved oxygen (DO) measurements at each research location showed that DO in water 2, which was 6 mg/L, was higher than water 1, which was 4 mg/L. According to Sirajuddin et al. (2024), dissolved oxygen is required by aquatic organisms for respiration. The respiration process in aquatic plants such as *Utricularia aurea* is highly dependent on the availability of dissolved oxygen in the aquatic environment. Oxygen is needed to break down glucose produced from photosynthesis into energy in the form of ATP. Although DO plays a role in the respiration process and energy production, this parameter cannot be considered a major factor influencing variations in the number of bladders in *Utricularia aurea.* This is because the *Utricularia* genus is a plant that is able to adapt to aquatic environments with low oxygen levels, so DO fluctuations tend not to have a significant effect on bladder formation.

Temperature measurements in water body 1, at 28.5°C, and water body 2, at 28.7°C, showed only a slight difference, and both fall within the optimal growth temperature range for the Utricularia genus, which generally ranges from 20-30°C. Similarly, the pH in water body 1, at 4.88 and water body 2, at 5.79, is still within the tolerance range of *Utricularia aurea.* According to Haron and Chew (2012), carnivorous plants such as the *Utricularia* genus can grow in the pH range of 3-7. Differences in temperature and pH are unlikely to cause variations in bladder count. Other factors, such as nutrient availability, could potentially influence bladder growth.

Table 1 shows that water body 1 recorded a standard deviation of 517,738 bladders, equivalent to 25.52% of the average value of 2,029. The coefficient of variation in water body 1 is higher than in water body 2. According to Supranto (2000), if there are two data groups with one coefficient of variation greater than the other, then the data group is more varied or more heterogeneous than the other data group. This indicates that water body 1 reflects greater habitat heterogeneity. The high standard deviation indicates that the number of bladders is uneven, possibly due to differences in microhabitat conditions such as lighting, depth, or prey availability. Fluctuating micro conditions in a single water body can produce different morphological responses in aquatic plants, including the formation of specialized structures such as bladders.

For another species of Utricularia, U. foliosa, Guisande et al. (2000) reported that organic matter in the water body as a growth medium negatively correlates with the number of Utricularia bladders. Lack of organic matter in the water causes *Utricularia* to initiate the production of many bladders.

3.2. Initial Position of Bladder Emergence in Utricularia aurea

One important focus of the observation process of *Utricularia aurea* samples taken from the research site in the waters of Sriwijaya University was to observe the initial position of bladder emergence in the modified leaf sequence at the tip or distal part of the plant. Observations of the initial position of bladder emergence in *Utricularia aurea* were carried out carefully using a microscope, considering that the distal end of *Utricularia aurea* has very dense and complex branching of non-true leaves. Observations were made microscopically, as shown in Figure 2 below.

Figure 2. Stolon, modified leaves and bladder

Based on observations and Figure 2, the initial position of the bladder, measured from the tip of *Utricularia aurea*, is always at the first modified leaf. This tip of the plant is known as the meristem zone. According to Daniken et al. (2025), the meristem zone is the region of the plant composed of meristematic tissue, tissue whose cells actively divide to produce new cells. Because the meristem zone is an area of active cell division, this area plays a role in initiating the formation of new organs such as the bladder and modified leaf structures.

The bladder observed at the tip of the *Utricularia aurea* plant appears very small, even microscopic. This microscopic size indicates that the bladder is in the early stages of development and can be considered a bladder precursor. Its shape and structure are not yet fully developed, for example, indicated by the lack of a clear trapdoor, so it does not function optimally in capturing prey. According to Pandey and Sinha (2006), the bladder has a small opening, a valve-like door surrounded by trigger hairs. The presence of bladder buds remains important because it shows that each new growth has the potential to form a bladder.

3.3. Prey Types in the Utricularia aurea Bladder

One of the main characteristics of *Utricularia aurea* is its ability to capture prey using its bladder. The presence of prey in the bladder is clear evidence that this species is carnivorous and actively obtains additional nutrition from living organisms in its surroundings. Captured prey generally originates from the aquatic environment where *Utricularia aurea* grows and can reflect the condition of the microfauna community in those waters. The types of organisms identified as prey from both sampling locations are shown in Table 4.2 below:

Table 4.2. Prey Found in Bladders from Both Observation Locations

Prey	Pond 1	Pond 2
Daphnia sp.	√	
Arrenurus sp.	√	
Coleopters	√	
Trombidiformes	√	√
Closterium sp.	√	√

3.3.1. *Daphnia* sp.

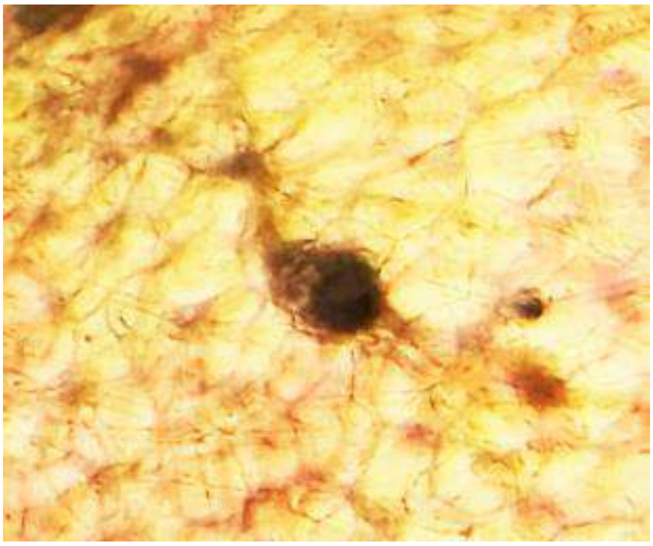

Figure 3. Daphnia sp, catched in bladder

The following is the classification of Daphnia sp. according to the book Freshwater Invertebrates of the United States (Pennak, 1953).
Kingdom: Animalia
Phylum: Arthropoda
Class: Branchiopoda
Order: Cladocera
Family: Daphnidae
Genus: Daphnia
Species: *Daphnia sp.*

Utricularia aurea has a bladder, or trapping sac, that functions to capture small microorganisms, such as Daphnia sp., as seen in the photo above. The process of capturing Daphnia sp. by *Utricularia aurea* begins when the animal swims near the bladder. When the Daphnia sp. touches the trigger hairs on the trap door, the bladder opens very quickly. According to Adamec (2011), water and organisms near the *Utricularia aurea* trap door are sucked into the bladder due to the pressure difference. Once the trap closes again, the trapped animal begins to be digested by Utricularia aurea.

Once trapped in the Utricularia aurea bladder, Daphnia sp. can exhibit typical physiological responses, such as tissue swelling and changes in body structure due to sudden osmotic pressure and the activity of digestive enzymes from the plant.

According to Manik et al. (2024), Daphnia sp. is a highly reproducible and rapidly growing zooplankton, making its abundance in waters a potential prey for carnivorous plants. Although protected by a carapace, Daphnia sp. remains highly vulnerable to rapid trapping mechanisms and the oxygen-poor, tightly closed bladder environment.

Observations of water fleas, or Daphnia sp., indicate that they are microscopic crustaceans from the class Branchiopoda with slightly oval, transparent bodies. Daphnia sp. range in size from 0.2 to 5 mm, depending on the species and growth stage. Their bodies consist of a head with a single large compound eye and antennae, which act as their primary means of locomotion. Daphnia sp.'s bodies are also covered by a shell composed of a transparent cuticle called a carapace.

According to Mulyani (2023), the carapace of Daphnia sp. contains chitin. Captured Daphnia sp. can cause their bodies to bend due to pressure within the bladder, and soft tissue damage can occur due to the activity of plant digestive enzymes.

3.3.2. *Arrenurus sp.*

Figure 4. *Arrenurus sp,* in a bladder

The following is the classification of Arrenurus sp.
Kingdom: Animalia
Phylum: Arthropoda
Class: Arachnida
Order: Trombidiformes
Family: Arrenuridae Genus: Arrenurus Species: Arrenurus sp.
Arrenurus sp. belongs to the order Trombidiformes and is a group of water mites that are very common in freshwater and can be a prey item for the *Utricularia aurea* plant. Arrenurus sp. that enter the bladder are digested by *Utricularia aurea* as additional nutrition. According to Jobson et al. (2004), the digestive process begins with the secretion of enzymes from the bladder wall that dissolve the soft tissue of the prey, including the mite's delicate cuticle, within hours to days, depending on the size of the prey.

Water mites of the genus *Arrenurus* have four pairs of legs, or a total of eight legs, which enable them to actively move between substrates and aquatic vegetation. This characteristic supports their role as small aquatic predators, particularly in preying on microscopic organisms or acting as ectoparasites on insect larvae during certain stages of their life cycle. According to Forbes et al. (1999), water mites of the genus *Arrenurus* spend only part of their lives as parasites, and adults are aquatic predators.

However, an *Arrenurus* individual found trapped in the bladder of Utricularia aurea suggests that Arrenurus' ecological role as a predator is not absolute.

Morphologically, *Arrenurus sp*. have oval to nearly spherical bodies, with body lengths ranging from 400-600 µm depending on the species. *Arrenurus sp*. lack antennae, but possess specialized mouthparts to support their function as ectoparasites in the larval stage and predators in the adult stage. These mouthparts, known as gnathosomes, pierce and suck fluids from prey or hosts. According to Więcek et al. (2023), several species in the genus *Arrenurus* have striking body colors such as red, blue, and green. Some species even exhibit color combinations, such as having red and blue body variants. *Arrenurus sp.* observed showed a blue-green body.

3.3.3 Order Coleoptera

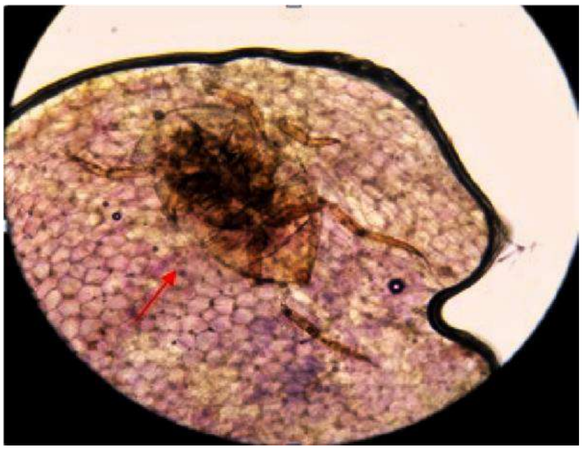

Figure 5. Order Coleoptera in a bladder

The following is a taxonomic classification of the prey shown in Figure 5, starting from kingdom to order.
Kingdom: Animalia
Phylum: Arthropoda
Class: Insecta
Order: Coleoptera
The prey or organism found in the bladder of Utricularia aurea, as shown in Figure 5 above, exhibits the typical morphology of an insect larva: a segmented body, no wings, and three pairs of distinct thoracic legs. According to Pracaya (2008), insect larvae from the order Coleoptera lack pseudolegs or prolegs. The body size of aquatic Coleoptera larvae in the early stages of development is generally under 1 mm. For example, larvae of the genus Liodessus, a member of the aquatic Coleoptera, have a body length of approximately 0.8 mm. Meanwhile, the bladder of Utricularia aurea shown in Figure 5 has a diameter of approximately 2 mm, making it large enough to accommodate the larva intact within the bladder cavity.

The presence of larvae from the order Coleoptera in the trap chamber or bladder of *Utricularia aurea* indicates that this plant has the ability to capture not only microscopic prey or organisms, but also actively moving larvae. These larvae have lightweight bodies because they are not yet fully sclerotized, causing them to be accidentally sucked into the bladder as they move around. This bladder mechanism is highly responsive after the trigger hairs are touched by prey, producing a strong suction capable of drawing in water and surrounding objects.
According to Adamec (2011), water and organisms near the trap door of *Utricularia aurea* are sucked into the bladder due to the pressure difference.

3.3.4. Order Trombidiformes

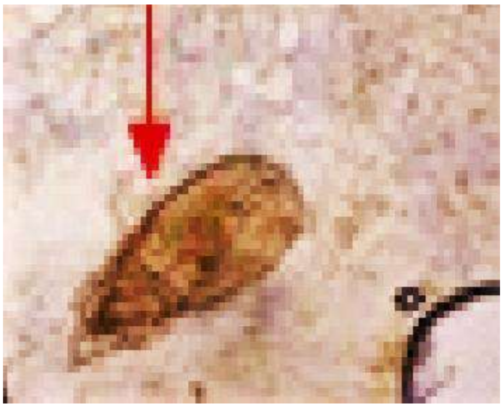

Figure 6. Order Trombidiformes in a bladder

The following is a taxonomic classification of the prey shown in Figure 6, starting from kingdom to order.
Kingdom: Animalia
Phylum: Arthropoda
Class: Arachnida
Order: Trombidiformes
The prey or organism found in the bladder of *Utricularia aurea*, as shown in Figure 6 above, belongs to the order Trombidiformes. According to Mendoza-Roldan et al. (2025), the Trombidiformes order is the largest and most diverse mite order, with over 26,000 species. Trombidiformes have small, soft bodies, eight legs, and stylet-type mouthparts used to suck fluids from their hosts or prey. This mouthpart is a typical adaptation of the Acari group, which live as predators or ectoparasites in aquatic and semi-aquatic environments. Their microscopic size makes them easy to suck into the bladder as they move closer to the trap opening.

Trombidiformes in freshwater ecosystems generally play the role of micro-predators, actively searching for prey among biofilms, sediments, or aquatic vegetation. With their eight legs and piercing-sucking mouthparts, they are capable of consuming protists and the tissue fluids of other small organisms. However, in this context, their activity actually increases their chances of being attracted by the bladder trigger mechanism of *Utricularia aurea*, which sucks in prey upon mechanical stimulation. According to Pandey and Sinha (2006), the bladder has a small opening that acts as a valve and is surrounded by sensitive hairs. The morphologically simple bladder trap is capable of trapping organisms from the group with sucking mouthparts, which generally actively move among aquatic plants.

3.3.5. *Closterium sp.*

Figure 7. Closterium in a bladder

The following is the classification of *Closterium sp*. according to the book Fresh Water Algae (Prescott, 1978).
Kingdom: Protista
Division: Charophyta
Class: Zygnematophyceae
Order: Desmidiales
Family: Desmidiaceae
Genus: Closterium
Species: *Closterium sp.*
Closterium sp. is a genus of green algae with crescent-shaped cells and bilateral symmetry. These algal cells are long, flattened, with usually tapered or rounded ends. *Closterium sp*. can reach 100–500 µm in size, large enough to be captured by the bladder of *Utricularia aurea,* which is typically around 1–5 mm in diameter. When *Closterium sp*. moves or drifts near a trigger hair, the door automatically opens and sucks the organism into the bladder. According to Foissner (2006), although *Closterium sp.* Having no means of locomotion such as flagella, it can move slowly due to changes in internal cell pressure or by water currents that could potentially trigger traps accidentally.

Closterium sp. is a member of the desmid group. The general characteristics of Closterium sp. are that they are unicellular, consisting of only one cell.
The cell wall can be smooth or have longitudinal striae. The cell is usually divided symmetrically into two parts and connected by a central region called the isthmus. According to Maryani et al. (2024), Closterium sp. cells are generally divided into two parts, but there is no boundary between the two parts. This type of phytoplankton has large, distinctively shaped chloroplasts, often containing pyrenoids, or starch storage sites. Closterium sp. phytoplankton generally have two chloroplasts and several pyrenoids along the chloroplast.

The presence of Closterium sp. in the bladder can present two possibilities: as prey to be digested or simply as bycatch (non-target) that cannot be utilized. However, according to Sirova et al. (2003), Utricularia is capable of producing digestive enzymes such as phosphatases, proteases, and esterases that have the potential to digest organic components of phytoplankton, including the cellulosic walls and internal proteins of algae. Although Closterium sp. is not an active primary prey, its body can be partially degraded and used as a source of nutrients, especially nitrogen and phosphorus. This is very beneficial for *Utricularia aurea*, which lives in nutrient-deficient habitats.

Figure 8. Bladder profile

4. CONCLUSION

4.1. Conclusion

Based on the research conducted, the following conclusions were reached:

1. The average number of bladders found at the tip of 10 cm-long *Utricularia aurea* in the pond near the FISIP building at Sriwijaya University was 2,029, while in Lake Unsri Taman Firdaus, there were 3,216 bladders.
2. Bladders appear from the first modified leaf sequence, although their appearance is very microscopic.
3. Prey Found in the Bladders

Utricularia aurea collected from the waters of Sriwijaya University currently contain five prey species: *Daphnia sp.*, *Arrenurus sp.*, *Closterium sp.*, and additional prey from the orders Trombidiformes and Coleoptera that could only be identified to the order level. Three prey species were found in the pond near the FISIP building at Sriwijaya University: *Daphnia sp.*, *Closterium sp.*, and prey from the order Trombidiformes. Meanwhile, there were four types of prey found in Lake Unsri Taman Firdaus, namely *Arrenurus sp.*, *Closterium sp.*, prey from the order Trombidiformes and *Coleoptera*.

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