

The Types of Lichenes in the University Area of North Sumatra

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Abstract. *Lichenesis* a symbiosis between fungi (mycobionts) from Ascomycetes and Basidiomycetes, and algae (phycobionts) from Cyanobacteria or Chlorophyceae so that morphology and physiology are one unit. Lichenes corticolous live as epiphytes in the substrate of tree bark branches. Lichenes grow in the university area of North Sumatra where many shade trees are found as the substrate. This research used survey method and morphometric method was used to identify the morphology of licheness. Sampling was found in 4 areas of North Sumatran Higher Education: 1. Universitas Negeri Medan, 2. Universitas Sumatera Utara, 3. Universitas Medan Area, 4. Institut Teknologi Sawit Indonesia. This study found 23 species of lichenes from 11 families: *Cryptothecia striata*, *Cryptothecia scripta*, *Arthonia radiata*, *Cryptothecia granulatus*, *Arthonia patellulata* (Family Athoniaceae), *Xanthoparmelia conspouge*, *Pectenium plumbea*, *Flavopuctelia soledica* (Family Parmeliaceae), *Hypogymnia physodes* (Family *Hypogymniaceae*), *Dirinaria applanata* (Family Caliciaceae), *Lepraria incana*, *Lepraria lobbyficans* (Family *Streocaulaceae*), *Ochrolechia subviridis* (Family *Pertusariaceae*), *Lecanora symmicta*, *Lecanora strobilina*, *Lecidella elachoroma* (Family *Lecanoraceae*), *Ochrolechia tartarea* (*Orchrolechiaceae*), *Viridothelium virens* (Family *Trypeteliaceae*), *Rinodina roboris* (Family *Physciaceae*). The types of licheness found included crustose and foliose thallu types.

Keywords: *Lichenesis*, Fungi, Ascomycetes, Basidiomycetes, and Algae

1 Introduction

North Sumatra is a province in Indonesia which is located in the northern part of the island of Sumatra. The capital city of this province is Medan City, with an area of 72,981.23 km². The North Sumatra area certainly has many buildings and public facilities provided by the government for the benefit of the community. One example of public facilities is educational facilities. Education is inseparable from the academic field, namely teaching and learning. The current education level is the highest, namely the tertiary level. The university is the highest education place in higher education after the high school period has been completed. Lichens material is

studied in depth at the college level, because the material is contained in the Taxonomy of Low-Level Organisms course which studies lichens specifically. Therefore, researchers use the environment around students to collect data about lichens to find out the types of lichens that exist in universities in the North Sumatra region.

Lichenes (lichen crust) is often confused with moss or other plants that live in rocks, rotten wood and roofs. Though licheness does not include mosses or other types of plants. Lichenes are also not part of living things or individual sensitivity. Organisms are a collection of millions of photosynthetic microorganisms connected in a network of fungal hyphae(1). Algae and fungi are symbiotic to form new lichens when they meet the same species. Lichenes are an association of fungi and photosynthetic symbionts forming a stable and specific thallus. Corticolous licheness is a type of lichen found living as epiphytes on the bark substrate. Corticolous licheness is an important component of forest ecosystems as sensitive autotrophs contributing to biomass in the ecosystem and sensitive to environmental changes due to air pollution and climate change. The existence of a type of lichen is highly dependent on the host tree (its phorophyte) because some types of lichens choose certain types of trees as hosts.(2).

The morphological structure of lichens does not have a cuticle layer, stomata and sensitive organs, thus forcing lichens to survive under the stress of pollutants in the air. Tolerant types of lichens can survive in areas with polluted environmental conditions. Meanwhile, sensitive types of lichens usually cannot be found in areas with poor air quality. The difference in sensitivity of lichens to air pollution is closely related to their ability to accumulate pollutants. The sensitivity of lichens to air pollution can be seen through changes in their diversity and accumulation of pollutants in their thallus(3). The environment greatly influences the presence of lichens in nature, so lichens have a role as environmental bioindicators.(4).

Based on the form of lichens, they are classified into four forms, namely::a. Crustose: Thallus crustose has a thallus with a small size, thin, flat and often attached to the bark of trees, rock surfaces or on the ground. 1 sticking *lichens* in this habitat makes sampling difficult, making it difficult to take it without destroying the substrate. b. Foliose: The foliose thallus is shaped like a leaf. The upper cortex is the upper part that is protected and covered with gelatin and looks like pseudoparenchymatous. The thallus structure of foliose crustaceans is almost the same as the leaf structure, in the lower and upper cortex representing the epidermal layer of the leaf, then the algae and medulla representing the mesophyll. c. Fruticose: Tallus fruticose has a thallus shape in the form of a bush, like hair, ribbon, with many branches. It has lobes, which can be either flat or cylindrical. Fruticose thallus grows upright or hanging on a substrate that is often found on rocks, leaves, and tree branches. and D. Squamulose: The squamulose thallus consists of lobes like scales,(5).

2 Research methods

This study aims to determine the types of lichens in universities in North Sumatra. This research took place from January 2021 to April 2022. Lichen data collection was carried out at four universities, namely Medan State University, North Sumatra University, Medan Area University

and the Indonesian Palm Oil Institute by directly determining the sample area first, the tree stands were explored to obtain lichen homogeneity, to obtain areas that will be blocked as habitat areas for lichens. Lichen samples were taken from tree trunks growing along the green line at each observation location. Lichen sampling at each location was carried out to determine the plot area and 1 meter length of each plot from the ground surface, recording the number of lichen species found in each plot using both individual and colony counting techniques, taking documentation of samples with a digital camera, and recording all important data related to lichens. Furthermore, the data is organized into tabular form and details of lichens.

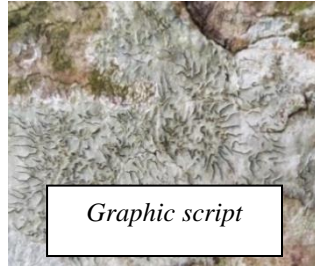
3 Results and Discussion

Table 1. Types of Lichens in Universities in North Sumatra Region

	Species Name	Amount	Thallus Type	Family
1	<i>Cryptothecia striata</i>	290	<i>Crustose</i>	<i>Arthoniaceae</i>
2	<i>Graphic script</i>	192	<i>Crustose</i>	<i>Graphidaceae</i>
3	<i>Parmelia caperata</i>	99	<i>Foliose</i>	<i>Parmeliaceae</i>
4	<i>Dirinaria applanata</i>	561	<i>Foliose</i>	<i>Caliciaceae</i>
5	<i>Parmeliopsis ambigua</i>	70	<i>Foliose</i>	<i>Parmeliaceae</i>
6	<i>Cryptothecia scripta</i>	21	<i>Crustose</i>	<i>Arthoniaceae</i>
7	<i>Arthonia radiata</i>	13	<i>Crustose</i>	<i>Arthoniaceae</i>
8	<i>Lepraria incana</i>	32	<i>Crustose</i>	<i>Streocaulaceae</i>
9	<i>Pectenium plumbeum</i>	5	<i>Foliose</i>	<i>Parmeliaceae</i>
10	<i>Ochrolechia subviridis</i>	3	<i>Crustose</i>	<i>Pertusariaceae</i>
11	<i>Cryptothecia granulatus</i>	4	<i>Crustose</i>	<i>Arthoniaceae</i>
12	<i>Lecanora symmicta</i>	56	<i>Crustose</i>	<i>Lecanoraceae</i>
13	<i>Lepraria lobbyficans</i>	29	<i>Crustose</i>	<i>Streocaulaceae</i>
14	<i>Flavoparmelia baltimorensis</i>	125	<i>Foliose</i>	<i>Parmeliaceae</i>
15	<i>Arthonia patellata</i>	94	<i>Foliose</i>	<i>Arthoniaceae</i>
16	<i>Ochrolechia tartarea</i>	3	<i>Crustose</i>	<i>Ochrolechiaceae</i>
17	<i>Lecanora strobilina</i>	73	<i>Crustose</i>	<i>Lecanoraceae</i>
18	<i>Viridothelium virens</i>	21	<i>Crustose</i>	<i>Trypeteliaceae</i>
19	<i>Flavopuctelia soledica</i>	7	<i>Foliose</i>	<i>Parmeliaceae</i>
20	<i>Lecidella elachroma</i>	4	<i>Crustose</i>	<i>Lecanoraceae</i>
21	<i>Hypogymnia Physodes</i>	8	<i>Foliose</i>	<i>Hypogymniaceae</i>
22	<i>Rinodina roboris</i>	15	<i>Crustose</i>	<i>Physciaceae</i>
23	<i>Xanthoparmelia conspersa</i>	6	<i>Foliose</i>	<i>Parmeliaceae</i>



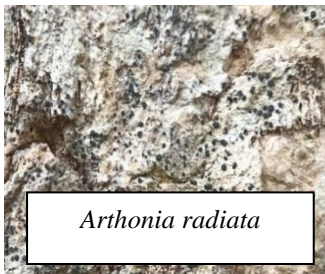
Cryptothecia striata



Graphic script



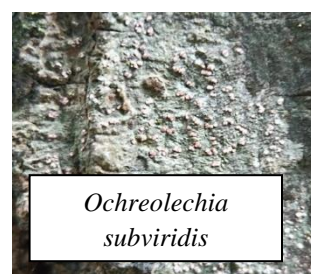
Cryptothecia scripta



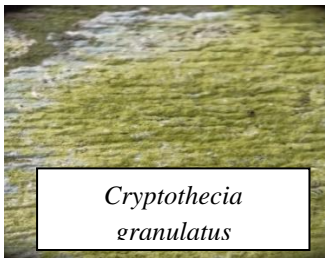
Arthonia radiata



Lepraria incana



Ochrolechia subviridis



Cryptothecia granulatus



Lecanora symmicta



Lepraria lobbyficans



Ochrolechia tartarea



Lecanora strobilina



Viridothelium virens



Lecidella elachroma



Rinodina roboris



Parmeliopsis ambigua

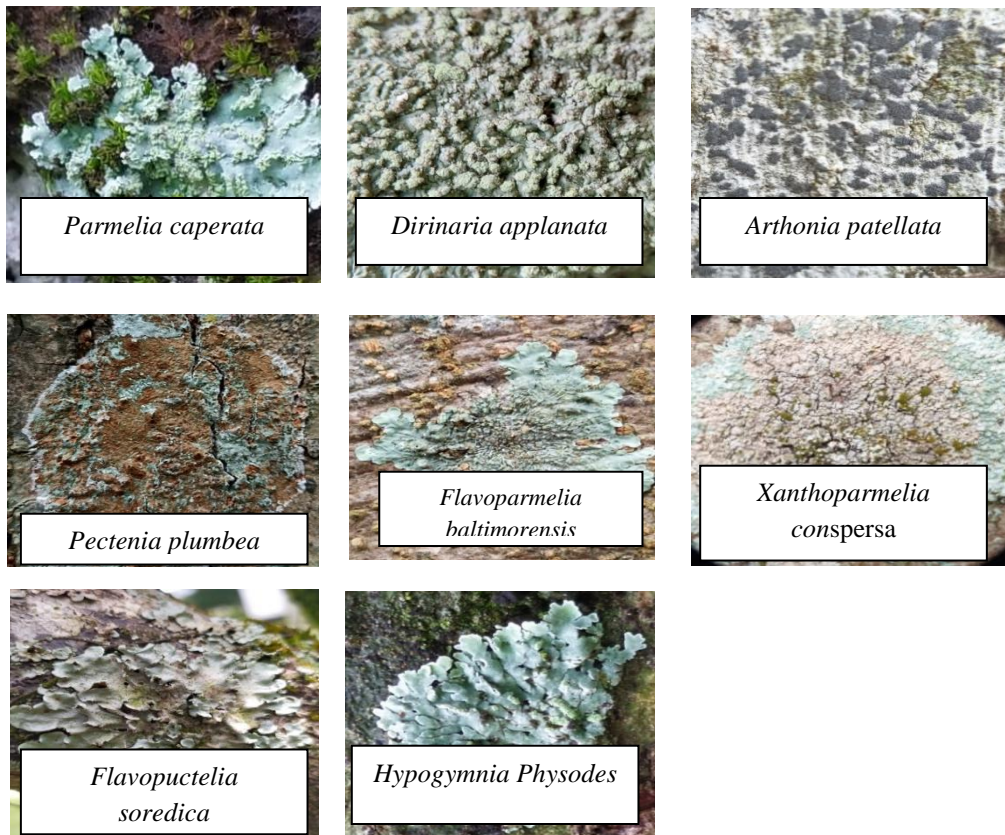


Fig. 1. Crustose Type

Based on Table 1, it is found that the types of lichens carried out at the University of North Sumatra Region obtained 23 species consisting of 2 different types of thallus, namely Crustose and Foliose. Of the 23 species of lichens in universities in North Sumatra, there are 11 families consisting of Arthoniaceae, Graphidaceae, Parmeliaceae, Caliciaceae, Streocaulaceae, Hypogymniaceae, Pertusariaceae, Lecanoraceae, Ochrolechiaceae, Trypeteliaceae and Physciaceae. This type of crustose is a species that is very much (dominant) compared to other types. This is predicted because the average lichen environment found in universities in the North Sumatra area is a tree. Where this type of crustose is a type that is attached to the substrate through medullary hyphae so that it will become more stable and have stronger attachments compared to other types. (5) Lichens crustose has a thallus that is small, thin and flat, and is always attached closely to the substrate. For this type of thallus Foliose is not tightly attached to the substrate. This makes it difficult for this type of lichen to be removed from the substrate without destroying the substrate. (6) This type of crustose thallus is very efficient compared to other types of thallus. This species has a homoimerus thallus tissue type, namely the condition of phycobiont (algae) located

near its hyphae. This type of crustose thallus can be safe from potential water shortages by surviving on its substrate.

The distribution pattern of lichens is caused by supportive ecological aspects. Such as aspects of temperature, humidity, light intensity and relationships with other aspects where there are still no measurable parameters that also affect the spread of lichens. For example, rainfall, the density of the parent plant canopy, wind direction and so on. Environmental factors are strongly influenced by the state of species diversity, one of which can affect the growth of lichens. (2) There are several factors that can affect an environment such as temperature, humidity, light intensity, and topography. Most often, lichen sticks to the bark of trees, so the bark becomes a substrate for the moss. The nature and condition of the plant directly affects the shape and condition of the growing thallus lichenes.

4 Conclusion

Based on the results of the study, it can be concluded that the types of lichens in universities in the North Sumatra region obtained species consisting of 2 different types of thallus, namely Crustose and Foliose. Of the 23 species of lichens in universities in North Sumatra, there are 11 families consisting of Arthoniaceae, Graphidaceae, Parmeliaceae, Caliciaceae, Streocaulaceae, Pertusariaceae, Lecanoraceae, Hypogymniaceae Ochrolechiaceae, Trypettheliaceae and Physciaceae.

Acknowledgments. The author would like to thank Wasis Wuyung Wisnu Brata, S.Pd., M.Pd at the Department of Biology, State University of Medan and Taufik Akbar Tanjung, S.Pd from the State University of Medan for the assistance in identifying specimens and all the University Area North Sumatra (Medan State University, North Sumatra University, Medan Area University and the Indonesian Palm Oil Institute).

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