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Notes on the freshwater algae of Mount A-li

by

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During May 1948, the writer made a trip to Mount A-li (Arisan) or Mount Sylvia of Formosa with the special purpose of collecting and studying the vegetation. Particular emphasis was paid on the lower plants and among the others, a collection of algae was made. In the following year, Mr. C. Y. Chao and K. C. Fan also collected some algae from the mountain. These different collections are the basis of this study.

Mount A-li, situated near the middle-south of Formosa, is the most famous mountain of the Island. It is one of the peaks of central mountain system and attains to a height of 4000 meters. The area is densely wooded and is one of the most well known forested regions of eastern Asia. There is a railway ascending the mountain from the City of Chia-Yi (嘉義) to the headquarter of the National Forest on the Mountain.

Because of its easy accessibility, each year thousands of sight-seers visit the mountain especially during the Spring when cherry blossoms are in full bloom. As the train ascends the mountain, gradual changes of the vegetation are readily and distinctly revealed. Beginning from the tropical vegetation on the plains, subtropical broadleaved forests, temperate mixed broad-leaved and evergreen coniferous forests, then pure coniferous forests and finally alpine scrubs and meadows display successively. It is a wonderful place for plant ecological observations that is scarcely available elsewhere.

The freshwater algal flora of Formosa is practically unknown. Although Japanese botanists made extensive studies on the marine algae of Formosa, very little has been done on the freshwater algae. This paper is the first of reports on the survey of the freshwater algae of the island initiated by the writer. Lack of adequate literature makes such studies exceedingly difficult. Without doubt many species as yet unknown to science await discovery.

The present study identifies 54 species and varieties, 17 of them are belonging to Cyanophyta, 31 Chlorophyta, 4 Euglenophyta, 1 Pyrrophyta, and 1 Chrysophyta. Along the railway, in inhabited areas, stagnant water bodies are

sometimes found. In these bodies, blue-green algae naturally abound. Such plants as *Oscillatoria nigra*, *Phormidium innudatum* and *Lyngbya aeruginosa-coerulea*, are common. In clear uncontaminated pools filamentous green algae like *Oedogonium inconspicuum* and *Oed. pisanum* var. *gracilis* and desmids like *Staurastrum turgescens* are found.

However, most of the algae are collected from running waters which are naturally common on mountains. These are either multicellular algae attached to rocks or unicellular forms with gelatinous mass or mixed with other plants such as larger algae or mosses. Among the attached ones, these are filamentous ones like *Ulothrix subtilis* of the green algae and *Calothrix perictina* and *Phormidium antarcticum* of the blue-green. *Nostoc punctiforme* forms masses on rocks in running water and *Prasiola japonica* forms sheets in similar situation with its thallus-like bodies.

Desmids mixing with mosses and other plants attached to rocks in clear running waters are quite numerous. There are many species belonging to such genera as *Closterium*, *Cosmarium* and *Staurastrum*. Diatoms are also numerous, but these are not being identified at present.

Aside from these purely aquatic algae, an aerial alga, *Trentepohlia aurea*, is noted. It forms a brownish green mass on damp earth, rocks or barks, and is very common. The very moist climate of the regions is especially favorable for the development of aerial algae and further collecting surely bring out more such forms.

COLLECTIONS MADE

- Sample No. 1. Mixed with mosses on Rock with flowing water along the left side of the road from Mount A-li (阿里山) to Er Yu Shan (兒玉山), May 15, 1948.
- Sample No. 2. On wet rock along road side from Mount A-li to Er Yu Shan. May 15, 1948.
- Sample No. 3. On rock under running water at Water Reservoir (水源地) between Wan Shou Shan (萬壽山) and Cho Shan (祝山). May 15, 1948.
- Sample No. 4. On rock under a small creek near Sen Mo (神木).
- Sample No. 5. In stagnant water on the side of railway from sen Mo (神木) to Mount A-li. May 15, 1948.
- Sample No. 6. A small pool on the road side from Wan Shou Shan to Cho Shan. May 15, 1948.

- Sample No. 7. In stagnant water near the railway station of Mount A-li. May 15, 1948.
- Sample No. 8. In small creek north of the railway station of Mount A-li. May 15, 1948.
- Sample No. 9. In pool east of the Alpine Museum of Mount A-li. May 15, 1948.
- Sample No. 10. On rock under running water in a small valley at Tai Kou Shan (對高山). May 16, 1948.
- Sample No. 11. In stagnant water in a small valley at Tai Kou Shan. May 16, 1948.
- Sample No. 12. A small pool on the South side of Tai Kou Shan, May 16, 1948.
- Sample No. 13. On damp earth along the slope of Tai Kou Shan, May 16, 1948.
- Sample No. 14. On damp earth along the road side, Tai Kou Shan May 16, 1948.
- Sample No. 20. Numerous, forming a gelatinous mass on rock with flowing water along the road side from Mount A-li to Cho Shan. March 1949.
- Sample No. 21. In a pool in the frond of the Museum, March 1949.
- Sample No. 22. On rock with flowing water Er Yu Shan.
- Sample No. 23. In a small pool on the road side from railway station to the Alpine Museum. March 1949.
- Sample No. 34. A stagnant water on the road side from Sen-mo (神木) to the railway station of Mount A-li. March 1949.
- Sample No. 35. In a small pool South of railway station of Mount A-li.

LIST OF SPECIES

Gloeocapsa Kützinger 1843; emend. Naegeli, 1849.

1. *Gloeocapsa* *gigas* W. & G. S. West. Cells 9-15 mic., colony 45-110 mic. in diameter.
Sample No. 20.
2. *G. conglomerata* Kuetzing. Cells 9-12 mic., Colony 22-25 mic. in diameter.
Sample No. 20.

Merismopedia Meyen 1839.

3. *Merismopedia punctata* Meyen. Cells 3-5 mic.
Sample No. 2, 12.

Eucapsis Clements & Shantz, 1909.

4. *Eucapsis alpina* Clements & Shantz. Cells 3.5 in diameter, slightly smaller than the type.
Sample No. 8.

Coelosphaerium Naegeli, 1849.

5. *Coelosphaerium dubium* Grunow. Cells 5-7 mic., Colony 50-300 mic in diameter.
Sample No. 12.

Dactylococcopsis Hansgirg, 1888.

6. *Dactylococcopsis raphidioides* Hansg. form. Cells 47 mic. in length, 2.5 mic. in broad.
Sample No. 1.

Nostoc Vaucher, 1803.

7. *Nostoc punctiforme* (Kützting) Hariot. Trichome 5 mic. broad, heterocyst 6 mic. in diameter.
Sample No. 1.

Anabaena Bory, 1822.

8. *Anabaena spiroides* Klebahn. Cells 6.5-8 mic., heterocyst. 7 mic.
Sample No. 21.

Calothrix Agardh, 1824.

9. *Calothrix parietina* (Naegeli) Thuret. Trichome 9-10 mic. in diameter, heterocyst 7 mic in diameter.
Sample No. 1.

Oscillatoria Vaucher, 1803.

10. *Oscillatoria nigra* Vaucher. Trichome 6.8-8 mic. in diameter, cells 6 mic. in length.
Sample No. 5.
11. *O. simplicissima* Gom. Trichome 7-8 mic. in diameter, cells 3.5 mic. in length.
Sample No. 3.

Phormidium Kützting, 1843.

12. *Phormidium foveolarum* (Montazine) Gomont. Trichomes about 1.5 mic. in diameter, variously twisted constricted at joints; cells 1-2 mic. in length.
Sample No. 1.
13. *P. antarcticum* W. et. G. S. West. Cells up to 2.5 mic. broad. Our specimens

are slightly broader than the type.

Sample No. 1.

14. *P. autumnale* (Agardh) Gomont. Trichome 5 mic. in diameter, cells 3 mic. in length.

Sample No. 2.

15. *P. inundatum* Kuetzing. Trichome 3.4 mic. in diameter, cells 3.6 mic. in length.

Sample No. 2, 3, 4, 7, 22.

16. *P. interruptum* Kuetzing. Trichome 5-5.5 mic. in diameter, cells 2.5-3 mic. in length.

Sample No. 20.

Lyngbya C. Agardh, 1824.

17. *Lyngbya aerugineo-coerulea* (Kuetzing) Gomont. Trichome 4.5-5 mic. in diameter, cells 3 mic. in length.

Sample No. 5.

Pandorina Bory, 1824.

18. *Pandorina morum* Bory. Cells 4-18 mic. in diameter, 16 celled Colony 15-56 mic. in diameter.

Sample No. 21.

Eudorina Ehrenberg, 1832.

19. *Eudorina elegans* Ehrenberg. Cells 7-14 mic. in diameter; colonies 45-100 mic. in diameter.

Sample No. 21.

Hydrodictyon Roth, 1800.

20. *Hydrodictyon reticulatum* (L.) Lagerh.

Sample No. 23.

Pediastrum Meyen, 1829.

21. *Pediastrum Boryanum* (Turpin) Meneghini. Cells 8-30 mic. in diameter, 16-celled coenobia 50-120 mic.

Sample No. 9, 23.

22. *P. duplex* Meyen. Cells 9-15 mic. in diameter, 16-celled coenobia 40-60 mic. in diameter.

Sample No. 23.

23. *P. simplex* Meyen. 8-celled coenobia 50-75 mic. in diameter.

Sample No. 9.

24. *P. simplex* var. *duodenarium* (Bailey) Rabenhorst. 16-celled coenobia 57-001 mic. in diameter.
Sample No. 12, 21.

Westella de Wildeman, 1897.

25. *Westella botryoides* (W. West) de Wildeman. Celle 4-10 mic.
Sample No. 12.

Dictyosphaerium Naegeli, 1849.

26. *Dictyosphaerium pulchellum* Wood. Cells 2.5-8 mic., colony 30-75 mic.
Sample No. 12.

Oocystis Naegeli, 1845.

27. *Oocystis pusilla* Hansgirg. Cells 4.5-7.5 mic. broad, 8-14 mic. long.
Sample No. 11, 23.

Ankistrodesmus Corda, 1838; emend. Ralfs, 1848.

28. *Ankistrodesmus falcatus* (Corda) Ralfs. Cells 1.5-3 mic. broad, 20-70 mic. long, distance between apices 38 mic.
Sample No. 12, 21.
29. *A. falcatus* var. *fasiculatus* G. M. Smith. Cells 2.5-5 mic. broad, 55-70 mic. long, diameter of 16 celled colony 65-180 mic.
Sample No. 12.

Selenastrum Reinsch, 1867

30. *Selenastrum gracile* Reinsch. Cells 3-5 mic. broad, 15-30 mic. long, distance between apices 8-20 mic.
Sample No. 9, 12.

Tetraedron Kützing, 1845.

31. *Tetraedron minimum* (A. Brawn) Hansg. Cells 6-15 mic. in diameter, 4-7 mic. thick.
Sample No. 9, 11.

Scenedesmus Mayen, 1829.

32. *Scenedesmus bijuga* (Turpin) Lagerheim. Cells 3.5-7 mic. broad, 7-18 mic. long, 4-celled coenobia 7-18 mic. broad, 14-25 mic. long.
Sample No. 23.
33. *S. dimorphus* (Turpin) Kützing. Cells 1.8-4 mic. broad, 7-18 mic. long, 4-celled coenobia 7-18 mic. broad, 15-20 mic. long.
Sample No. 23.

34. *S. quadricauda* (Turpin) de Brebisson. Cells 2-13 mic. broad 5-33 mic. long, 4-celled coenobia 5-33 mic. broad, 8-50 mic. long, spines 7-25 mic. long.
Sample No. 24.

35. *S. opoliensis* P. Richter, Cells 5-8 mic. broad, 17-26 mic. long 4-celled coenobia 17-25 mic. broad, 20-30 mic. long, spines 20-35 mic. long.
Sample No. 24.

Actinastrum Lagerheim, 1882.

36. *Actinastrum Hantzschii* Lagerheim. Cells 3-4 mic. broad, 20-26 mic. long coenobia up to 50 mic. in diameter.
Sample No. 9.

Micractinium Fresenius, 1856.

37. *Micractinium pusillum* Fresen. Cells 3-6 mic. in diameter, setae 20-28 mic. in length.
Sample No. 9, 25.

Oedogonium Link, 1820.

38. *Oedogonium inconspicuum* Hirm. Cells 5 mic. broad, 20 mic. long, oogone 14 x 16.8 mic., without dwarf male.
Sample No. 9.
39. *O. pisanum* var. *gracilis* Trans. & Tiff. Cells 8 mic. broad, 34 mic. long, oogone 20 mic. broad, 50 mic. long, oospore 17 x 23.5 mic.
Sample No. 9.

Ulothrix Kützing, 1833.

40. *Ulothrix subtilis* Kutz. Cells 5-6 mic. broad, 3-7 mic. long.
Sample No. 2.

Trentepohlia Martius, 1817.

41. *Trentepohlia aurea* (L) Mart. Cells 14 mic. broad, 3.4 mic. long.
Sample No. 14.

Prasiola Agardh. 1821.

42. *Prasiola formosana* Okada.
Sample No. 10.

Closterium Nitzsch, 1817.

43. *Closterium Leibleinii* Kutz. Breadth of cell 17-37 mic., distance between apices 107-202 mic., diameter of zygospore 40-50 mic.
Sample No. 9.

44. *C. moniliferum* (Bory) Ehrend. Breadth 32-35 mic., distance between apices 222-240 mic., breadth of apices 8-10 mic.
Sample No. 23.

Cosmarium Corda, 1834.

45. *Cosmarium fontigenum* Nordst. Cells 20 mic. broad, 27-28 mic. long; isthmus 10 mic.
Sample No. 1.
46. *C. undulatum* Corda. Cells 20 mic. broad, 17 mic. long; isthmus 7 mic.
Sample No. 2.
47. *G. Venustum* (De Breb) Arch. Cells 17 mic. broad, 23.5 mic. long; isthmus 10 mic.
Sample No. 2.

Staurastrum Meyen, 1829.

48. *Staurastrum turgescens* De. Not. Cells 26 mic. broad, 31 mic. long; isthmus 11 mic. broad.
Sample No. 9.

Euglena Ehrenberg, 1838.

49. *Euglena veridis* Ehr. Cells 35-65 mic. long, 10-20 mic. broad.
Sample No. 11, 24.
50. *E. acus* Ehr, Cells 140-237 mic. long, 8-15 mic. broad.
Sample No. 24, 25.

Phacus Dujardin, 1841.

51. *Phacus longicauda* (Ehr) Duj. Cells 35-40 mic. broad, 80-110 mic. long.
Sample No. 7, 11.

Trachelomonas Ehrenberg, 1833.

52. *Trachelomonas volvocina* Ehr. Cells 16-18 mic. broad, 18-20 mic. long.
Sample No. 25.

Peridinium Ehrenberg, 1830.

53. *Peridinium apiculatum* (Ehr.) Lindemann.
Sample No. 21.

Tribonema Derbes & Solier, 1856.

54. *Tribonema bombycinum* (Agardh) Derb. & Sol.
Sample No. 25.

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