

DAVIS EXPEDITION FUND

REPORT ON EXPEDITION/PROJECT

Expedition/Project Title: Field work as part of PhD project 'Taxonomy and Phylogeny of the complex thalloid liverwort genus *Athalamia* and the family Cleveaceae'

Travel Dates: June/July 2008

Location: Switzerland

Group Member(s): Sumudu Rubasinghe

Group Leader: Dr. David Long

Aims: Collection of specimens for the PhD project: Taxonomy and Phylogeny of the complex thalloid liverwort genus *Athalamia* and the family Cleveaceae

OUTCOME (not less than 300 words):-

See attached report

Final Report for the Davis Expedition Fund

Field work as part of PhD project 'Taxonomy and Phylogeny of the complex thalloid liverwort genus *Athalamia* and the family Cleveaceae'

Sumudu Rubasinghe - October 2008

Introduction

Cleveaceae is a family of complex thalloid liverworts in the phylum Marchantiophyta, (class Marchantiopsida, sub class Marchantiidae). The family is morphologically well defined by the presence of simple epidermal pores with thickened radial walls, ventral scales of thallus with a single, tapering, ill-defined appendage, air chambers of thallus without assimilatory filaments, capsule wall with well defined annular bands and its irregular dehiscence. Three genera are currently accepted in the family: *Athalamia* Falc. (12-15 species), *Sauteria* (Nees) Nees (2-6 species), *Peltolepis* Lindb.(1-2 species). *Athalamia* is the type genus of the family as well as the largest genus of the family. All the three currently accepted genera are found in the northern hemisphere except for two poorly known southern hemispheric taxa. The monophyly of the family is strongly supported by recent molecular studies (Forrest et al., 2006) but there are problems regarding definition and evolution of genera within the family. No monographs have been published which makes the identification of genera and species difficult. Many local 'endemics' have been described which may not be distinct. No subgenera or sections of *Athalamia* been defined and relationships and classification of species of *Athalamia* is not known.

Objectives

The overall objectives of the study is to construct the phylogeny of *Athalamia* and its two sister-genera *Sauteria* and *Peltolepis* using morphological and molecular characters. This takes the form of a taxonomic revision which incorporates species biogeography, ecology, infrageneric classification, generic relationships and speciation. The project will combine the alpha taxonomic approach with more specialist techniques of SEM and molecular phylogenetics.

DNA extraction is proved to be very difficult from dried herbarium specimens and also herbarium specimens of liverworts are difficult to work with since they do not show all important characters due to drying. Study in the field is very important for following reasons;

- (i) some characters are lost in drying e.g. colour, smell, oil cells
- (ii) variation in characters, e.g. size cannot be easily studied except in the field
- (iii) photography of living plant is very important
- (iv) ecology can be studied only in field
- (v) can look in field for fertile material with ripe spores for SEM work

All three genera of the family; *Athalamia*, *Sauteria* and *Peltolepis* are recorded in Switzerland (Mayland, 1924) which therefore is a good country for a field excursion. Figure 1 shows published maps of recorded sites of the three genera in Switzerland. The main aims of the trip to Switzerland were to collect herbarium, silica gel dried specimens and fresh material of *Athalamia*, *Sauteria* and *Peltolepis* for my PhD project.

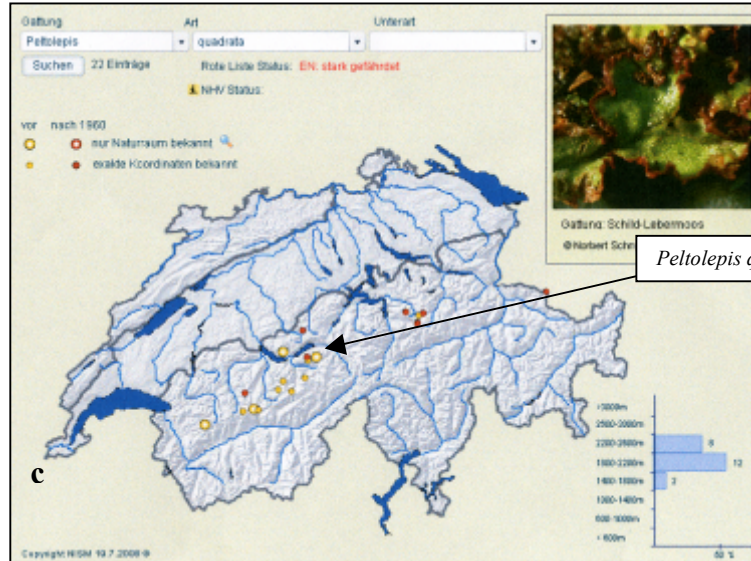
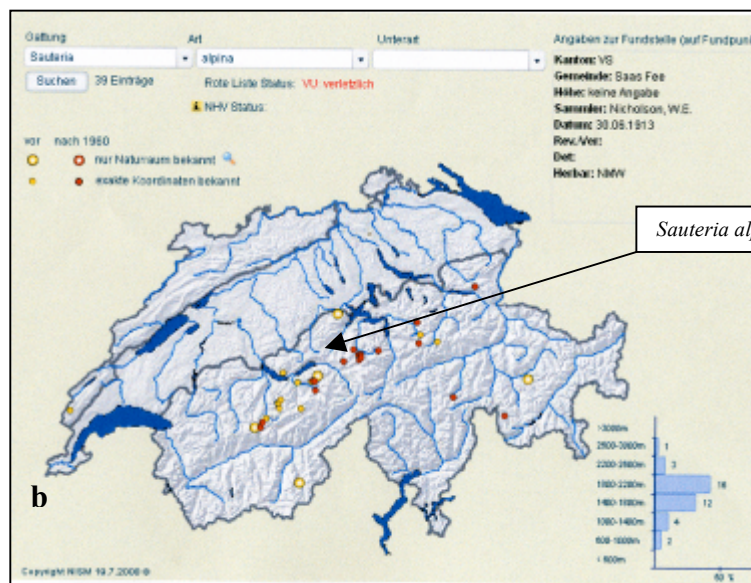
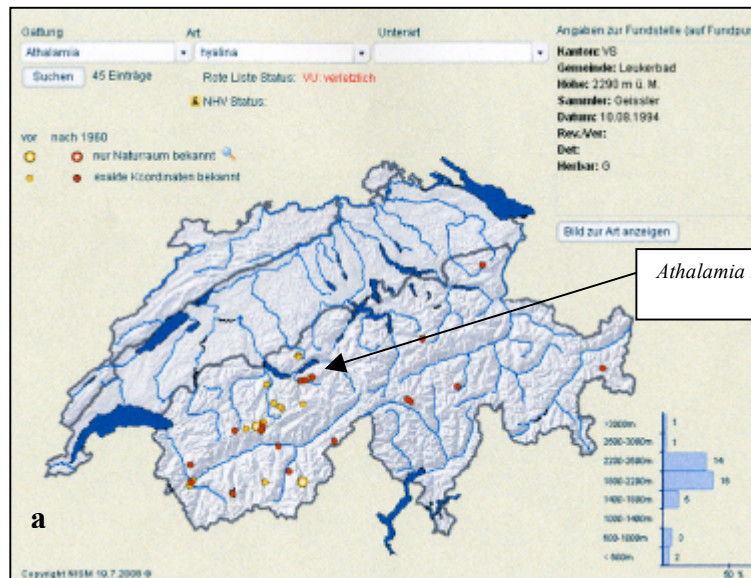


Figure 1. Recorded sites of; a) *Athalamia hyalina* b) *Sauteria alpina* and c) *Peltolepis quadrata*; Canton: Valais, Leukerbad (From <http://www.nism.unizh.ch/map/map.php>, 2008)

Itinerary

1. Arrival in Geneva 26th June 2008; explore Dranse Valley above LaCroix and Forest ridge above LaDranse Valley, Chemin above Martigny (Switzerland, Canton Valais)
2. Drive to La Tourche and explore L'Ivouette Valley, below La Tourche (Switzerland, Canton Vaud) – 27th
3. Explore L'Ivouette Valley, below La Tourche and between Les Martinaux and La Tourche, above Morcles (Switzerland, Canton Vaud) – 28th June 2008
4. Explore Valley south west of Lac d'Emosson, below Les Perrons – 29th June 2008
5. Fieldwork Tzoumaz, south of Riddes, Forêt des Etablons above Les Esserts, south of Riddes and Savoleyres ridge near Croix de Coeur, below Creusis – 30th June 2008
6. Explore Gemmi, slopes of Schafberg above Daubensee – 1st July 2008
7. Explore Arvenwald, Schwarz Bach Valley south of Sunnbüel and east facing slopes north of Daubensee – 2nd July 2008
8. Explore Gemmi, east facing slopes north of Daubensee and north facing slopes at Gemmipass – 3rd July 2008
9. Depart Geneva and arrive in Edinburgh - 4th July 2008

Results

Collection sites visited were: Glacier des Martinets (2000 – 2200m), Martigny area, Savoleyres (1600 – 2200m), Leukerbad, Gemmi Pass (1250 – 2200m), Daubensee. Species collected were: *Athalamia hyalina* was collected from Canton Vaud (above Morcles – 2196m), and Canton Valais (Gemmi – 2306m) (Fig. 2). *Sauteria alpina* and *Peltolepis quadrata* were collected from Canton Valais (Gemmi – 2296m) (Fig. 3). No specimens were found in Martigny area and Savoleyres. The species collected and their habitat description is given in Table 1.

Table 1. Species and specimens collected from Switzerland and their habitat description.

Species	Collector /Coll. No.	Location	Habitat description	Altitude/m	Date
<i>Athalamia hyalina</i> (Sommerf.) S. Hatt.	Rubasinghe & Long 3	Canton Vaud	North facing limestone valley; under damp boulder below snow patch	2196	27.06.08
<i>Athalamia hyalina</i> (Sommerf.) S. Hatt.	Rubasinghe & Long 4	Canton Valais	Rocky alpine limestone slopes; on damp soil under boulders	2306	01.07.08
<i>Athalamia hyalina</i> (Sommerf.) S. Hatt.	Rubasinghe & Long 5	Canton Valais	Rocky alpine limestone slopes; on damp soil under boulders	2306	01.07.08
<i>Sauteria alpina</i> (Nees)	Rubasinghe & Long 6	Canton Valais	Rocky limestone slopes; on damp soil under boulders	2296	01.07.08
<i>Peltolepis quadrata</i> (Saut.) Müll. Frib.	Rubasinghe & Long 7	Canton Valais	Rocky limestone slopes; in deep crevice under boulders	2210	01.07.08
<i>Peltolepis quadrata</i> (Saut.) Müll. Frib.	Rubasinghe & Long 8	Canton Valais	Rocky limestone slope; under huge shady boulder near snow bed	2196	02.07.08
<i>Peltolepis quadrata</i> (Saut.) Müll. Frib.	Rubasinghe & Long 9	Canton Valais	Rocky limestone slope; under shady boulder near snow bed	2196	02.07.08
<i>Peltolepis quadrata</i> (Saut.) Müll. Frib.	Rubasinghe & Long 10	Canton Valais	Steep limestone slopes; under rock overhang by snow patch	2162	02.07.08
<i>Sauteria alpina</i> (Nees)	Rubasinghe & Long 11	Canton Valais	Steep limestone slopes; damp crevices of limestone cliff	2199	02.07.08
<i>Peltolepis quadrata</i> (Saut.) Müll. Frib.	Rubasinghe & Long 12	Canton Valais	Steep limestone slopes; under damp boulder near snow bed	2169	02.07.08
<i>Sauteria alpina</i> (Nees)	Rubasinghe & Long 13	Canton Valais	Steep limestone slopes; under damp boulder near snow bed	2169	02.07.08
<i>Athalamia hyalina</i> (Sommerf.) S. Hatt.	Rubasinghe & Long 14	Canton Valais	Steep limestone slopes; under damp boulder near snow bed	2169	02.07.08
<i>Peltolepis quadrata</i> (Saut.) Müll. Frib.	Rubasinghe & Long 15	Canton Valais	Limestone terraces with pavement; in deep fissure	2279	03.07.08
<i>Athalamia hyalina</i> (Sommerf.) S. Hatt.	Rubasinghe & Long 16	Canton Valais	Limestone slope; under shady boulder	2249	03.07.08



Figure 2. *A. hyalina* (SR – 03): a and b) a photographs of North facing limestone valley in Canton Vaud below La Tourche above Morcles; c and e) Female plants with young carpocephala d and f) Male plants with antheridia



Figure 3. a) Rocky limestone slopes at Gemmi, Switzerland (2169m); b) Limestone terraces with pavement at Gemmi, Switzerland(2169m) c) *Sauteria alpina* (SR – 5) sterile plants d) *Sauteria alpina* (SR – 5) Female plants with young carpocephala e and f) *Peltolepis quadrata* (11- 08 SR), plants with androecia and carpocephala

Conclusions

The field excursion at Switzerland was extremely successful and all three genera of the family Cleveaceae were observed in the field, field notes were prepared and specimens were collected. DNA has already been extracted from collected material and subjected to phylogenetic analysis. Herbarium specimens prepared will be deposited in the Royal Botanic Garden Edinburgh.

Finances

A summary of the costs of the trip is as follows:

INCOME	Davis Expedition Fund	£1,270.00
	Oleg Polunin Memorial Fund	300.00
	TOTAL INCOME	1570.00
TOTAL EXPENDITURE	Air fare, share car hire & petrol, accommodation and food in field Cable car.	£1414.00
Balance returned to Davis Fund		£156.00

Acknowledgements

I am grateful to my supervisor Dr. David Long, for his invaluable guidance, and advice throughout. I am extremely thankful to Mr. Gordon Rothero for supporting me generously during the field trip. I extend my sincere thanks to Mrs. Eva Maier and Ms. Ariane Caillau for helping me and making it a very pleasant field trip.