

Project Update: July 2022

1. Literature studies

As part of this project, we reviewed previous publications on the endangered species, *Cyrtomium hemionitis* Christ. These references are:

- IUCN website (<https://www.iucnredlist.org/species/46610/11069698>)
- Wu Sugong et al. 2005
- Flora of China (books) and website: http://www.efloras.org/flora_page.aspx?flora_id=2
- <https://plants.jstor.org/search>
- Phan Ke Loc (2010), Pham Hoang Ho (2001).

Wu Sugong et al. 2005, reported a new record for Vietnam, *Cyrtomium hemionitis* was first discovered in Hang Kia- Pa Ko Nature Reserve, Pa Co community, Mai Chau District, Hoa Binh province. So, this time, we would like to look for *C. hemionitis* in the production area announced in 2005.

Result: Obtained information such as distribution, altitude, and coordinates, (Pa Co community at 20°44'33" N, 104°53'54" E, 1100-1250m in *Pinus kwangtungensis* forest) with such information, we have a solid basis for searching the plants.

2. The diversity survey and conservation status assessment of endangered, rare species of Dryopteridaceae in Ha Giang and Hoa Binh province.

a. Materials and tools for field collection:

- Newspaper, bags, absorbent paper: Bags are for caring specimens; newspaper, and absorbent paper are as the absorbing moisture materials.
- Specimen wood frame: to press specimens in the drying specimen process.
- Scissors, knives, hoes to cut branches.
- Etiket and field description notebook.
- Alcohol (if needed), silica gel.
- Electrical heaters, cloth, etc.
- Ropes, pencils and markers.
- Personal tools and equipment: Backpacks, field clothes, shoes and socks that anti-leech, mosquito, hats, flashlights, tents, hammocks, medicines, foods and cooking set.

b. Location:

In addition to being proven to occur in Pa Co community, Hoa Binh Province in 2005, *Cyrtomium hemionitis* was found only in Bat Dai Son Nature Reserve, Quan Ba District, Ha Giang province by our field trip in 2013 and the 1st Rufford Small Grant in 2021. In this project, we want to expand the research area to other districts of Ha Giang province, especially Dong Van Karst Plateau UNESCO Global Geopark. And the limestone mountains in Cao Bang and Hoa Binh provinces which have habitats similar to Bat Dai Son Nature Reserve.

Specific locations as below:

- Du Gia Special Use Forest management board, Bac Me District, Ha Giang Province, Vietnam (about 350 km from Ha Noi capital).
- Cao Vit gibbon-landscape conservation area in Trung Khanh District, Cao Bang Province (about 340 km from Ha Noi capital).
- Hang Kia- Pa Co Nature Reserve, Mai Chau District, Hoa Binh Province (about 165 km from Ha Noi capital).

c. *Setting up field crew:*

The crew consists of at least four members (crew leader and assistants with experience in species identification, locals, and rangers).

d. *Methods of interviewing local people and forest ranger staff*

Prepared a list of questions to ask local people and forest ranger staffs that helps the field trip can get the best results. Here are some important questions: Is there a high limestone peak here? How high is it? What about the humidity and fog at the top of the mountain? We also showed photos of A and asked if anyone had seen it, etc.

e. *Conduct the fieldwork:*

After choosing the right route (caves and limestone mountains), hire local guides who are familiar with these mountains to prepare food and all the ingredients for the day hike. Because on-field trips us always spend the whole day in the forests.

Specimen requirements: the specimens are collected with all parts of rhizomes, petioles, branches and spores (except in a few special cases where the specimens may only need some parts). Depending on the conditions, the specimens can be dried by heaters or preserving by alcohol. This is an important content in the process of collecting samples in the field. In fact, as soon as the specimen was collected, it was already started to make the specimens, because the specimen needed to be pressed relatively well temporarily, to make better specimens later. We use two basic and common methods to preserve specimens from the field:

- Dry the specimen with blotters (blotter) and use heaters (hot fans) to dry.
- Some specimens will be temporarily preserved in alcohol during the field study and dried after finishing the field trips.

3. The results

Ha Giang province:

After the Quan Ba District, this time we selected mountainous districts, such as, Yen Minh, Bac Me, and Vi Xuyen in Ha Giang Province to study *Cyrtomium hemionitis*. These districts have limestone Mountains that are very similar to Quan Ba and are over 1000 m high. However, *C. hemionitis* was found in the Yen Minh District, not elsewhere in the surveys this year in Ha Giang. This means that the 1st Rufford Small Grant and this study (2nd Rufford Small Grant) reported two more newly discovered populations of *Cyrtomium hemionitis* in Ha Giang.

Hoa Binh and Cao Bang province:

In an effort to find the new distribution of *C. hemionitis*, we selected the Trung Khanh District in Cao Bang Province (northern Vietnam) and the Mai Chau District in Hoa Binh Province. These are also limestone areas, so we will investigate them in the next step. We set the path by the number of coordinates sensu Wu et al. in 2005, and fortunately, found *C. hemionitis* near the location given by Wu in 2005.

On eight survey routes in Ha Giang, Cao Bang and Hoa Binh province, we collected 82 specimens of Dryopteridaceae and more than 200 other ferns and morphological, ecological, and conservation status information. Forests where we visited are still very beautiful and diverse, we met many species of *Cyrtomium*, *Polystichum*, in Dryopteridaceae but *C. hemionitis* is very rare there.

About 82 specimens of Dryopteridaceae and more than 200 other ferns were collected from eight research routes in Ha Giang, Cao Bang and Hoa Binh province, along with morphological, ecological and conservation status information. The forests we visited were still very beautiful and diverse, and we have seen many members of genera *Cyrtomium*, *Polystichum*, in the Dryopteridaceae family, but *C. hemionitis* is very rare. In general, karst and cave areas are extremely vulnerable and fragmented of habitat, resulting in habitat loss and degradation under adverse conditions.

During the field trips, we also discovered some endangered ferns due to their habitats and narrow distribution, which are only a few mature individuals, were seen in the locality although a few field investigations have been conducted by Vietnamese colleagues since 2013. Based on current information and following the IUCN Guidelines (IUCN, 2022), these species should be classified as Vulnerable, Endangered or Critically Endangered C2a (i, ii).

The specimens are dried and currently deposited in Vietnam National Museum of Nature, Vietnam Academy of Science and Technology to serve the research, classification and identification and education.

Below are some field photos focusing on the habitats and endangered (EN) *Cyrtomium hemionitis* at the elevation of 1100 m or more.







13 THG, 2022, 10:15:40
22°53'N 105°14'12"E
Đường 176
Bac Me
Hà Giang
Altitude: 1311.6m
Speed: 0.0km/h



