Chapter 5
Materials & Methods
METHODOLOGY

(a) Field and Herbarium Method: The present taxonomic account on pteridophytes of Mehao Wildlife Sanctuary in Arunachal Pradesh based on extensive and systematic field survey and regular collection of pteridophytic samples from the various localities (explored/unexplored) of including various habitats of the area. These areas were thoroughly visited and scanned periodically during 2001-2006. Details of field tour with name of area/locality, date of collection, altitude and collection number is given below in Table-5:

1. Field Survey: Following aspects were studied.
1. Geographical features of the study area.
2. Its climate, geology, topography and soil types.
4. Study of floristic diversity and vegetation type.

Details of fieldwork: The source of materials for this work was the extensive and intensive field collections of specimens made from the study area during the period 2001-2006. Major Field explorations were made after the rainy season in month of September 2001 to November 2006. First Field trip were made once in month of October-November, during first year (2002), And second field trip were made in the month of October-November, (2006), during forth year. During this period more than 600 field numbers were collected. Terrestrial, Epiphytic, Climbing and Lithophytic species usually possesses creeping rhizome which have collected along with vegetative and fertile leaves. Commonly associated and the host trees were also noted.
Table-5: Tour description in brief:

<table>
<thead>
<tr>
<th>Area/ Locality</th>
<th>Date</th>
<th>Altitude</th>
<th>Collection No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shalley lake</td>
<td>31.10.2002</td>
<td>400m</td>
<td>35</td>
</tr>
<tr>
<td>Mayodia (M.)</td>
<td>01.11.2002</td>
<td>2655m</td>
<td>36-73</td>
</tr>
<tr>
<td>M-65 point</td>
<td>01.11.2002</td>
<td>2655m</td>
<td>36-73</td>
</tr>
<tr>
<td>M-Tiwari Gaon</td>
<td>01.11.2002</td>
<td>1300m</td>
<td>74-113</td>
</tr>
<tr>
<td>M-Shalley lake</td>
<td>03.11.2002</td>
<td>2655m</td>
<td>214-244</td>
</tr>
<tr>
<td>M-Uphills</td>
<td>04.11.2002</td>
<td>2350m</td>
<td>269-300</td>
</tr>
<tr>
<td>Near Shalley lake</td>
<td>06.11.2002</td>
<td>500m</td>
<td>302-312</td>
</tr>
<tr>
<td>Abango-Anda Camp</td>
<td>08.11.2002</td>
<td>800m</td>
<td>313-315</td>
</tr>
<tr>
<td>Near Mehao Lake</td>
<td>12.11.2002</td>
<td>750m</td>
<td>319-346</td>
</tr>
<tr>
<td>Mehao Lake</td>
<td>13.11.2002</td>
<td>1000m</td>
<td>347-431</td>
</tr>
<tr>
<td>M-Abango</td>
<td>16.11.2002</td>
<td>1550m</td>
<td>434-450</td>
</tr>
<tr>
<td>Deopani</td>
<td>17.11.2002</td>
<td>1300m</td>
<td>451-452</td>
</tr>
</tbody>
</table>

(b) Preparation of herbarium specimens:

During the period of field survey and collection, a slip of field number has tagged in each collected specimens. Relevant field notes were made on the spot noting down interesting and diagnostic features (habit and habit, size of fronds, colour of scales if present, nature of rhizome, position of sori) of the plant, name of the locality; data of collection, physiological and ecological features of the surveyed area like (altitude, soil type, humidity, temperature etc.)

Fungus or insects due to presence of phenolic acid in their frond do usually not damage the pteridophytes, therefore they may be easily preserve and maintain.

In general collection, pressing and preparation of herbarium specimens follow the recommended procedures of Jain & Rao, 1976.

The specimens were passed in blotting sheets and kept for 24 hours. The blotters must be exchanged daily usually in the sun, as the specimens were dried. The rhizome was shaken or washed free of soil before the plant was pressed. The fronds have been placed on the sheet so that both the adaxial and abaxial surface is visible.

The dried specimens were poisoned in saturated solution of Mercuric chloride <31>
and alcohol in to 1:9 ratio. The poisoned specimens were again kept for overnight in between blotting sheets for complete drying and finally such specimens and ready for mounting on herbarium sheets. Thick stem, stripes, fronds and rhizome were often tied to the sheet with white thread and the knot on the underside the sheet covered with gummed paper tape so that it can not catch on another specimen. A slip field number with field including various data, like name the family, date of collection, locality, altitude, feature, distribution, name of the collector etc. was passed below on the right corner of the herbarium sheets. The herbarium sheets have been deposited in the Herbarium of Botanical Survey India, Central Circle, Allahabad (U.P.) and Herbarium of Botany Department, Dr. Hari Singh Gaur Vishwavidyalaya, Sagar.

(c) Identification:

Each and every specimen were critically identified with help of available literature, study of plant parts like scales, spores, hairs and veins under microscope and they were later determined in various Indian herbaria. All the identified species have classified and arranged according to Pichii-Sermolli's (1977) system of classification and Kramer et al (1990). Genera within families, species within the genus are alphabetically listed.

(d) Consultation of herbarium specimen housed in various Indian herbaria (Specimen examined):

The specimens collected from various localities housed in various Indian herbaria viz. Botanical survey of India, Allahabad (BSA); Botanical Survey of India, Dehradun; Central National Herbarium, Hawrah (CAL); National Botanical Research Institute, Lucknow (NBRJ); Herbarium of Botany Department, Dr. Hari Singh Gaur Vishwavidyalaya Sagar; Herbarium of Botany Department, Allahabad University has critically studied; Botanical Survey of India, Eastern Circle, Shillong and BSI Field Station, Itanagar, Arunachal Pradesh studied and has critically listed along with botanical name, local name, family, accession number, date of collection, locality, altitude, specific features, distribution and name of the collector etc.

(e) Literature consultation

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During the period the pteridological literature related to the work were consulted and total 380 reference cards and 250 species cards were prepared.

(f) Laboratory herbarium investigation/treatment and preparation of Camera lucida diagrams:

In general the descriptions of species were made from collected specimens during the survey, herbarium specimens as well as from previous available literature. The taxonomic descriptions include habit, size of fronds, stipe, colour of scales if present, nature of rhizome, venation pattern and indusium, size, position of spore with morphology. In the present details of spores morphology and based on acetylated spores. Fresh spores mounted in glycerine jelly are used in addition to determine spore size, shape, colour, wall ornamentation and some other morphological features are observed with the compound microscope. Spore sizes mentioned are average based on ten reading in each plane of spores selected at random. Illustration based on voucher specimens no. for all the genera and some species includes line diagram showing habit of the plant and camera lucida diagrams of spores of some interesting species are provided.

In the present taxonomic treatment the classification system followed is after Kramer et al. (1990) keeping in view the systematic treatments of Pichi-Sermolli (1977, 1981). The genera within families, species within the genus have arranged alphabetically following Kramer et al (1990). Each and every species has provided taxonomical data with current nomenclature (in accordance with the rules of ICBN), basionym, important synonyms, original citation, recent literature, key to the families, genera and species, detailed distribution in India and Mahao wildlife sanctuary, ecology, foot notes, vernacular name whenever available, habit of each species, chromosome number, specimen examined and depicting illustrations of diagnostic characters to facilitate easy identification in the field and herbarium.

Distribution of the species in India and in Sanctuary is worked out from the literature, and is provided after the occurrence of each species in MWLS. The current status of living family, genera and species in form of number throughout the world, India and Sanctuary have provided on the basis of available literature.

Data in form of graphs showing Metrological records (rainfall, humidity and
temperature reading) for the period 2000-2006 of the study area are provide. The cytological data showing chromosome number of all the species whenever available have provided in the present account. Maps and photographs of the study areas and habit photographs of some interesting and useful species are also included. Photographs of herbarium sheets are also provided.

(g) **Documentation of Rare and Endangered taxa:** From conservation point of view, the endangered (E) and Rare (R) taxa of pteridophytes have made on the basis of field observation and herbarium consultation. A list of taxa along with their status recorded so far is prepared during the period. Distribution status of each species in term of abundance, scarce or otherwise was carefully noted.

(h) **Documentation of Endemic species:** A list of endemic taxa is prepared. Endemism indicates the importance and uniqueness of the flora of a region or the area. Study area is the microcentre of endemism. Some of the endemic species occurring in Arunachal Pradesh as well as in study area are provided in Chapter 12.

(i) **Conservation measure:** The causal factors leading to depletion of species and both type of conservation (ex-situ & in-situ) and multiplication measurements have proposed. Conservation prospective and conservation measures are also provided in the Chapter 10.

(j) **Information on traditional, indigenous, ethnomedicinal, ethnobotanical and other uses of pteridophytes:**

During the course of survey cum collection tour exclusively it has been observed that few species of pteridophytes are widely used and sold by local tribal communities for the various treatments like fever, epilepsy, leprosy, stomach pain, gastro-intestinal disorders eradication of worm in children and venereal disease. Collected information was verified by crosschecking with tribal living herbal medicine practitioners of various ethnic groups though interviews, discussions, personal contracts and keen observations. The detail of the plants (e.g. Local name, Parts used, Mode of use, Method of collection) were noted. In the present account of
the pteridophytes of MWLS are classified into various ecological categories on the basis of their habit and habitat.

The economically and medicinally useful species growing under the political boundaries of Mehao Wildlife Sanctuary are listed here. Vernacular name ethnobotanical use of species, except for a few most of these importances is recorded from literature.

(k) **New records:** List of new records from the area has provided.

(l) **Phytogeographical affinities of the pteridophytic flora of Mehao Wildlife Sanctuary:** The phytogeographical affinities of the pteridophytic flora were discussed with Himalayan species, Eastern ghats, Western ghats, Assam, Meghalaya, Nagaland and Southern India.
Diagrammatical representation of plants parts used in description.

Branching pattern of fronds.
Overall shapes: (A) linear; (B) lanceolate; (C) ovate; (D) deltoid; (E) rhombic; (F) falcate.

Margin: (A) entire (on a simple lanceolate frond); (B) undulate; (C) serrate; (D) crenate; (E) toothed.

Shapes of apex and base: (A) acuminate; (B) truncate; (C) cuneate; (D) cordate; (E) auricled.