

Annual Scientific Meet

Botanical Survey of India

13 – 16th February, 2017

David L. Biate

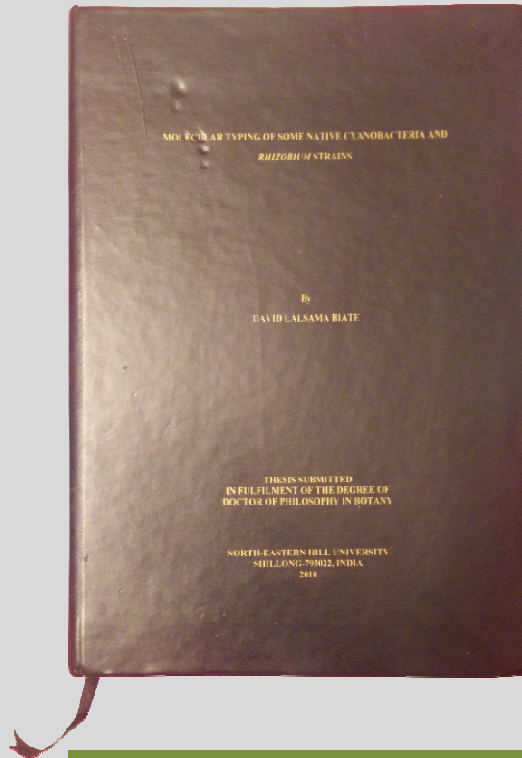
Scientist – B

Botanical Survey of India

Sikkim Himalayan Regional Centre, Gangtok



Ph.D Thesis



Ph.D Title:

Molecular typing of some native cyanobacteria and *Rhizobium* strains

Awarded: 2012

University: North Eastern Hill University, Shillong

Research Scholar: DBT sponsored project - “Development of molecular markers for typing of native and transgenic cyanobacteria and *Rhizobium* strains” at NEHU (2002 – 2005)

Research Associate at the Indian Agricultural Research Institute, New Delhi under the under the DBT-Research Associate Programme of the Department of Biotechnology, Govt. of India (2012 – 2015).

Annual Action Plan Project

Joined BSI : 28-08-2015

Project: Flora of Sikkim: Family Onagraceae

Executing Scientist: Dr. David Lalsama Biate and Dr. D.K. Agrawala

Date of Initiation: October 2015

Target date of completion: March 2017



Literature Survey



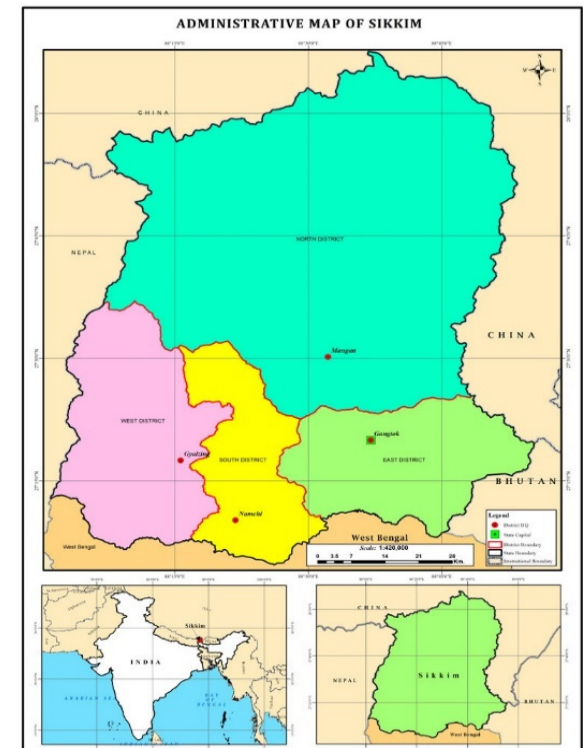
Herbarium Study



Field Tours



Manuscript

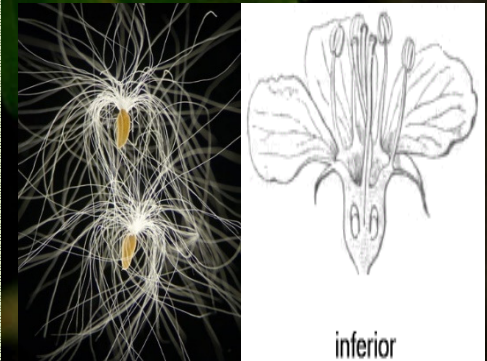
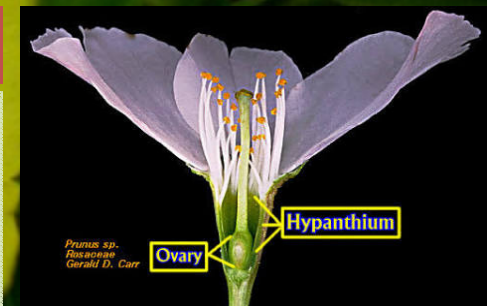



Onagraceae A.L. Jussieu – The Evening Primrose

- Widely distributed in temperate and subtropical areas
- 17 genera and ca. 650 species
- Scientifically important family
- *Oenothera biennis* - among the earliest plant models in genetics and cytogenetics and it played an important role in the modern synthesis of evolutionary biology

Important characters of the family

- Annuals, perennials, herbs, or shrubs, rarely trees (*Ludwigia anastomosans*, 10m)
- Leaves simple (alternate, opposite or **whorled** *E. alpestre*/Oenothera)
- Flowers actinomorphic (sometimes zygomorphic-*Gaura*)
- Ovary inferior
- Pollen grains almost always united by viscin threads
- Hypanthium/floral tube mostly present (**absent in Chamerion**)
- Style 1



Activity	Target for 2015-2017	Achievement
<p>Flora of Sikkim: Family Onagraceae</p> 	<p>Qtr.3: Literature consultation and collection of preliminary data.</p> <p>Qtr.4: Study of herbarium specimens at BSHC.</p> <p>Qtr.1. Study of specimens at BSHC and compilation of information collected.</p> <p>Qtr.2. One herbarium consultation tour to CNH for study of Onagraceae specimens collected from Sikkim; two local field tours for study of fresh specimens.</p> <p>Qtr.3. Compilation of information and writing of manuscript.</p> <p>Qtr.4. Finalization and submission of manuscript.</p>	<ol style="list-style-type: none"> 1. A comprehensive checklist of Onagraceae of Sikkim was prepared. 32/58 4/4 2. Flowering calendar of Onagraceae of Sikkim was also prepared after comprehensive literature survey and verification of herbarium specimens. Ludwigia=Sep-Mar /Ooen,Epil,Cir=May-Oct 3. More than 400 digital images of herbarium specimens of Onagraceae present at CAL, ARUN and ASSAM were obtained for studies. 4. Herbarium specimens of Onagraceae present at BSHC and CAL were studied and described. 5. Flowers from dried herbarium sheets and live plants were worked out and photographs captured digitally. 6. Three local field tour to Kabi, Tamje, Karponang, Memaichu, Yakla and surrounding areas of Sikkim were undertaken. 7. A total of 19 field numbers of specimens of Onagraceae were collected. 17 taxa identified from 58 specimens. 8. 6 taxa of Onagraceae were brought live to BSI, SHRC and introduced in the campus garden for <i>ex-situ</i> conservation. 9. Preparation of manuscript underway.

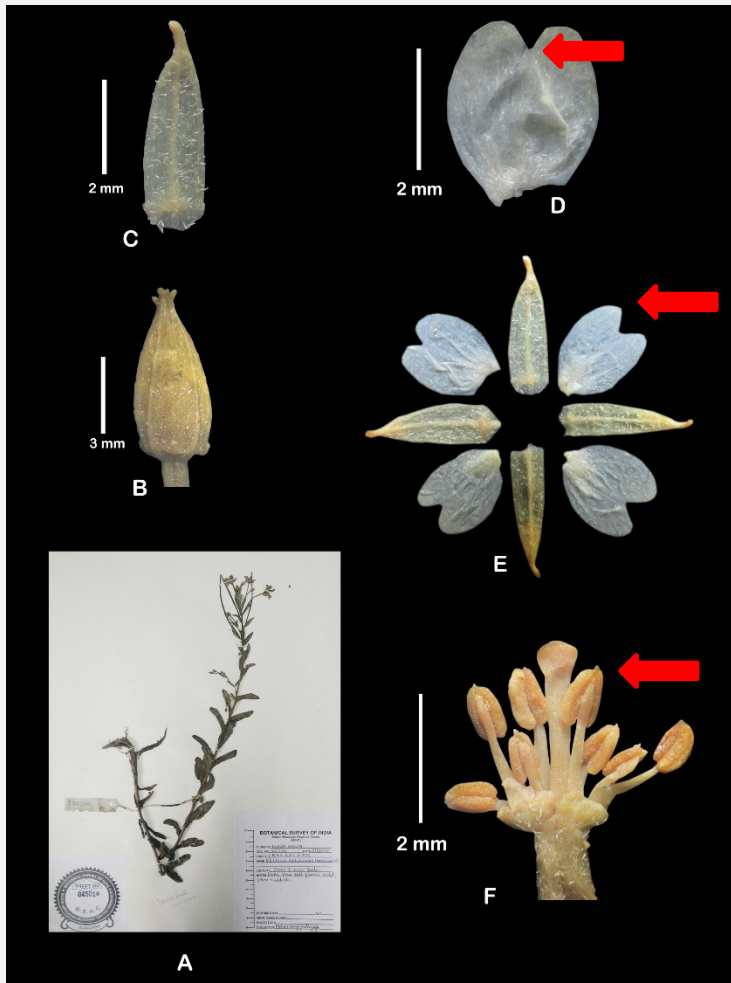
Morphological characterization of Sikkim Himalayan angiosperm

Identified, work out and digitally illustrated through macro- and microscopic photography the flowers of *Aeschynanthus novogracilus* W.T. Wang

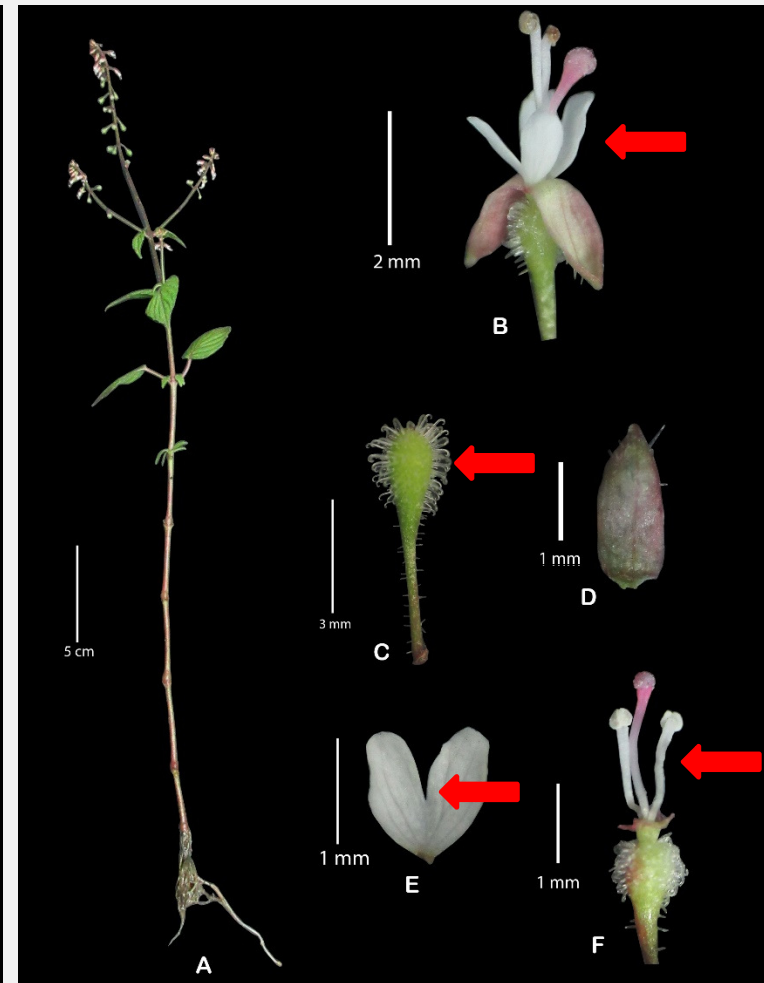
Ex-situ conservation

Germplasm of 6 Onagraceae & 15 orchids taxa were introduced in the Campus Garden for *ex-situ* conservation

Digital illustration



Epilobium wallichianum Hausskn.: (a) Habit. (b) Flower bud, close up view, (c) Sepal, abaxial view, (d) Petal, abaxial view, (e) Sepals and petals, spread out, (f) Carpel and Stamen, close up view. Source *M. Gangopadhyay* 36396 (BSHC)



Circaea repens Wallich ex Ascherson Magnus.: (a) Habit. (b) Complete flower, close up view, (c) Fruit, (d) Sepal, abaxial view, (e) Petal, abaxial view (f) Carpel and Stamen, close up view. Source *D.L. Biate* 36396 (BSHC)

Manuscript Template

Epilobium wallichianum Hausskn. in Oesterr. Bot. Z. 29:54. 1879; P. H. Raven in Bull. Brit. Mus. (Nat.Hist.), Bot. 2(2): 365. 1962; P. Hoch in Fl. Bhutan 2(1):319. 1991; Chen et al. Fl. China 13:419. 2007. *Epilobium duclouxii* H. Lévillé in Repert. Spec. Nov. Regni Veg. 6: 110 1908; *E. mairei* H. Lévillé in Repert. Spec. Nov. Regni Veg. 12: 283 1913; *E. souliei* H. Lévillé in Bull. Herb. Boissier II, 7: 588 1907; *E. sykesii* P. H. Raven in Bull. Brit. Mus. (Nat. Hist.) Bot. 2(2): 366 1962; *E. tanguticum* Haussknecht in Oesterr. Bot. Z. 29: 56 1879; *E. wallichianum* subsp. *souliei* (H. Lévillé) P. H. Raven in Bull. Brit. Mus. (Nat. Hist.) Bot. 2(2): 366 1962.

Herbs perennial, erect or ascending, with leafy basal soboles. Stems 17 – 70 cm tall, simple to well-branched, sparsely strigillose and glandular above, subglabrous below with 4 or 2 rarely raised strigillose lines from margins of petioles, usually 4-angled. Leaves subsessile, cauline blade oblong to subelliptic, sometimes subovate, 2 – 6 x 0.6 – 2.5 cm, margins and midvein sparsely strigillose, base subrounded or subcordate to broadly cuneate, apex obtuse or acute, serrulate. Inflorescence and flower nodding. Sepals 4. Petal 4, pink to rose purple, 5-10 mm, apical notched. Stigma capitate to broadly clavate, entire. Capsule 3-8 cm, sparsely strigillose and glandular, pedicel 1-2.5 cm. Seeds oblong – obovoid, 0.9 – 1 mm, papillose, tuft of dull white hair, easily detached.

Flowering & fruiting: July – September

Distribution: India: Sikkim: North, West, South and East District; Bhutan, Mynmar, Nepal, China.

Ecology: Moist places along rivers, streams, roads and bogs, and at forest edges, (1050–)1800–4000 m.

Specimens examined: Sikkim, East District, Karponang, 08.08.1980, P.K. Hajra 549 (BSHC); s. loc. 04.08.1984, B. Krishna & S. Singh 3066 (BSHC); Memaichu Lake area, 27.09.2003, A.S. Chauhan 27083 (BSHC); Memaichu Lake area, 27.09.2003, A.S. Chauhan 27087 (BSHC); s. loc.14.09.1992, P. Singh 13838 (BSHC); Rorathang, 25.07.1985, D.C. S. Raju 39499 (BSHC); Baba Mandir, 11.08.2005, A. Ansari 32119 (BSHC); South District, Tendong Reserve Forest, 17.08.1985, A.K. Verma 4204 (BSHC); Tendong Reserve Forest, August 1991, R. Gopalan 97529 (BSHC); North Sikkim, Near Yumthang Rest House, 26.07.1989, N.R. Mandal 10099 (BSHC); Shingba Rh. WLS, Shingba, 21.07.2013, C.S.Purohit 37427 (BSHC); Lachen to Log Bridge, 14.07.1986, D.C. S. Raju & S. Singh 5855 (BSHC); Lachen, 17.07.1997, S.S. Dash 19435 (BSHC); Lachen, 15.07.1997, S.S. Dash 19486 (BSHC); Dombeyang, 14.07.1987, D.C. S. Raju & S. Singh 7641 (BSHC); Zema I river side, 02.08.2011, M. Gangopadhaya 36396 (BSHC).

Salient findings

Thirty two species belonging to four genus of Onagraceae are documented in the present study

Genus	Species	New record for Sikkim
<i>Epilobium</i>	20	3* Asia
<i>Circaea</i>	4	-
<i>Ludwigia</i>	5	5
<i>Oenothera*</i>	3	3

- Majority of the species are found at elevation above 1500 msl.
- Family is distributed in all four district of Sikkim
- 10 species are new record for Sikkim & 1 record for Asia
- *Epilobium angustifolium*, and *E. conspersum* are treated under *Chamerion*, a subgenus of *Epilobium* in Flora of China
- *floral tube absent/present; flowers slightly zygomorphic/actinomorphic; petals entire/cleft or emarginated, stigma 4-lobe/entire or lobed*
- All species of *Oenothera* are cultivated

Administrative work

As DDO

- Discharged day to day duties as DDO
- Attended one day Training Programme on **Enhanced PFMS Portal** at Pay & Accounts Office, Nizam Palace Complex, Kolkata on 21.07.2016
- Attended a five day DDO Training on “**Service Matters**” at INGAF-Regional Training Centre, Kolkata from 05.09.2016 – 09.09.2016.
- Attended a one day Training Programme of CDDOS on **Budget and Expenditure Management System (BEMS) Web Application** hand hold training at New Delhi on 23.01.2017

As Library In-Charge

- Looked after the day to day activities of the library
- Completed physical verification of library. Report submitted to Scientist In-charge

Epilobium wallichianum Hausskn.



Thank You