

Annual Scientific Meet 2017
CNH, Howrah

Partha P. Ghoshal



FLORA OF BETLA NATIONAL PARK, JHARKHAND

पार्क के अंदर पैदल जाना मना



Title of the Project: Flora of Betla National Park, Latehar, Jharkhand.



Name and Designation :

Partha Pratim Ghoshal,
Botanist



**Institution where the Project
will be implemented:**

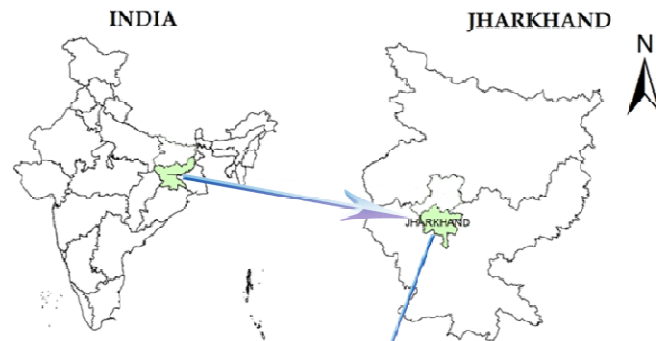
Central National Herbarium,
Botanical Survey of India,
Howrah.



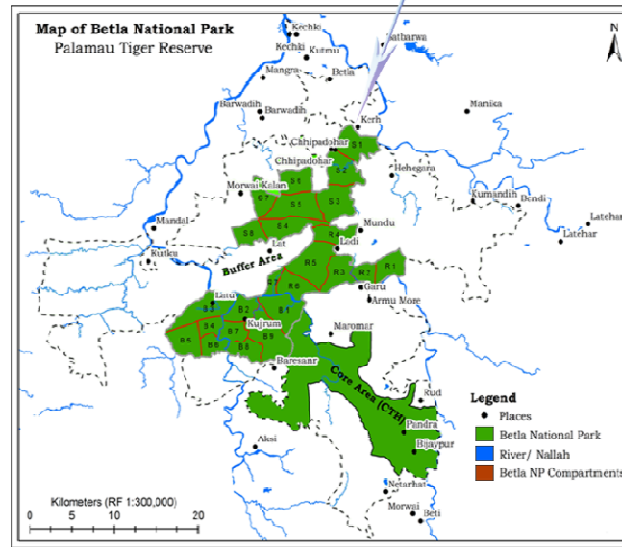
Duration of the project: 4 Years (April, 2015 to March, 2019)

LOCATION

LOCATION MAP OF BETLA NATIONAL PARK



BETLA NATIONAL PARK



Bison Elephant Tiger Leopard Antelope

A brief summary of the project area

Established:	9 th August, 1989
Location:	Chota Nagpur Plateau of the Latehar district of Jharkhand
Co-ordinates:	23°27' - 23°51'N latitude and 82°52' - 84°26'E longitude
Area:	225.37 sq. km
Main rivers:	Koel and Auranga
Surroundings:	Neterhat hill ranges in the South, Auranga river in the North, Latehar - Sarju Road in the East and Chattishgarh in the West.
Forest types:	1. Moist Tropical Deciduous Forest 2. Dry Tropical Deciduous Forest a. Dry mixed deciduous forest b. Dry Sal

Time Schedule of the project giving annual targets:

THE PROJECT HAS BEEN INITIATED FROM SEPTEMBER 2015 AIMING FOLLOWING NUMBER OF FIELD AND HERBARIUM TOURS TO BE CONDUCTED AND TARGET TIME FOR MANUSCRIPT SUBMISSION IS MARCH 2019

Year wise target	Q1	Q2	Q3	Q4	Remarks
April 2015 to March 2016	Study of relevant literature published earlier on this area and specimens housed in CAL	One field tour of 15 days	Identification of the collected specimens	One field tour of 15 days	2 field tours have been undertaken as per schedule
April 2016 to March 2017	One field tour of 15 days	Identification of the collected specimens	One field tour of 15 days	Identification of the collected specimens	2 field tours have been undertaken as per schedule
April 2017 to March 2018	Identification of the collected specimens	One field tour of 15 days	Identification of the collected specimens	One field tour of 15 days	Yet to be completed
April 2018 to March 2019	Identification of the collected specimens	One field tour of 15 days	Identification of the collected specimens	Identification of the collected specimens and manuscripts to be finalized.	Yet to be completed

Tours undertaken: 4
Duration: 54 days
Total field nos. collected: 651
Total no of specimens collected: 1500
Total number of photographs taken pertaining to plants habitat, habit, close ups of different parts of the plant: 2500
Total nos. of identified species: 101



SOME INTERESTING PLANTS

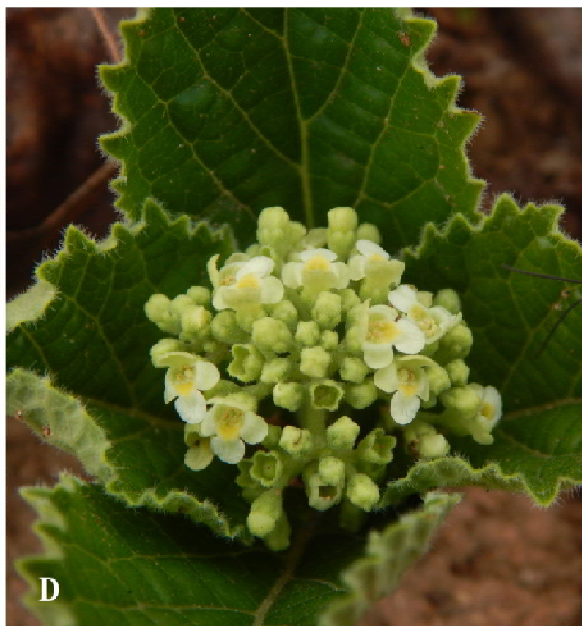
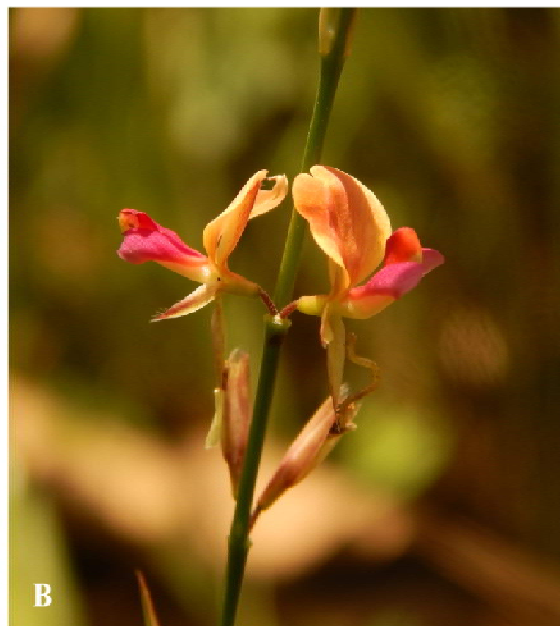


PLATE 1: A. *ACMELLA RADICANS* (JACQ.) R.K.JANSEN; B. *ALYSICARPUS ROXBURGHIANUS* THOTH. & A. PRAMANIK; C. *NEPETA HINDOSTANA* (B.HEYNE EX ROTH) HAINES;
D. *PREMNA HERBACEA* ROXB.; E. *BEGONIA PICTA* SM.; F. *CENTELLA ASIATICA* (L.) URB.

SOME WATER LOVING ONES



PLATE 2: A. *NELUMBO NUCIFERA* GAERTN.; B. *NYMPHAEA RUBRA* ROXB. EX ANDREWS; C. *LUDWIGIA OCTOVALVIS* (JACQ.) P.B.RAVEN; D. *OTTELIA ALISMOIDES* (L.) PERS.; E. *NYMPHOIDES HYDROPHYLLA* (LOUR.) KUNTZE; F. *NYMPHOIDES INDICA* (L.) KUNTZE

GPS readings of surveyed areas of Betla National Park, Jharkhand during 4th field tour

Date	GPS #	Field No	Lat. & Long.	Elevation (in m)	Tentative Identification	Habit/family	Pop.
10.12.2016	103	78554	N 23°37.982' E 084°04.528'	386	Zingiber sp.	Zingiberaceae	6
10.12.2016	105	78566	N 23°38.015' E 084°04.611'	403	Lagerstroemia sp.	Lythraceae	2
10.12.2016	107	78543	N 23°37.916' E 084°04.449'	399	<i>Spermacoce</i> sp.	Rubiaceae	15
10.12.2016	110	78567	N 23°38.544' E 084°06.278'	395	<i>Mollugo</i> sp.	Aizoaceae	6
10.12.2016	113	78540	N 23°38.158' E 084°05.055'	344	Flemingia sp.	Fabaceae	40
11.12.2016	115	78556	N 23°36.553' E 084°04.589'	435	Crotalaria	Fabaceae	7
12.12.2016	119	78599	N 23°35.232' E 084°05.961'	461	<i>Oberonia</i> sp.	Orchidaceae	50
13.12.2016	120	78623	N 23°36.577' E 084°08.160'	450	yellow flower	Asteraceae	40

Plants introduced to IBG

- Two interesting plants, one in vegetative and other in leafless fruiting condition have been handed over to AJCBIBG for introduction and proper identification



Zingiber sp.



Crinum sp.

Projects:

1. Flora of Bihar
2. Flora of Jharkhand

- Theaceae, Clusiaceae, Dipterocarpaceae; subtribes Erythrinae, Diocleinae and Glycininae under tribe Phaseolae belonging to the family Fabaceae submitted.
- Asteraceae of Bihar & Jharkhand has been arranged tribe wise and distributed amongst Scientists (33 species belonging to tribes: Eupatorieae, Heliantheae and Cardueae).
- Completed description of 25 spp. so far.

Project:
Ethnobiology of Buxa tiger reserve
(2000-2003):



Glycyrrhiza glabra Cultivated as medicinal plant

Report had been Submitted along
with relevant photographs in 2004

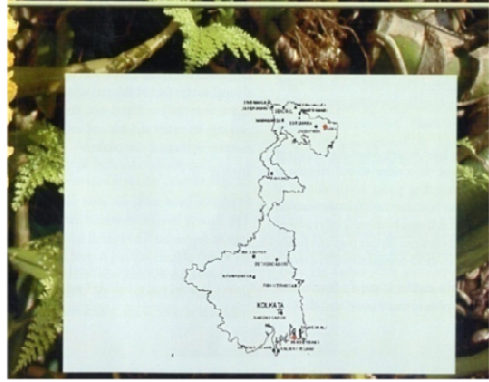


Project:

Floral diversity of Tiger reserves in India
(Buxa tiger reserve) (2004-2005):



- Buxa Tiger Reserve
- Sunderban Tiger Reserve



Phaius venosus



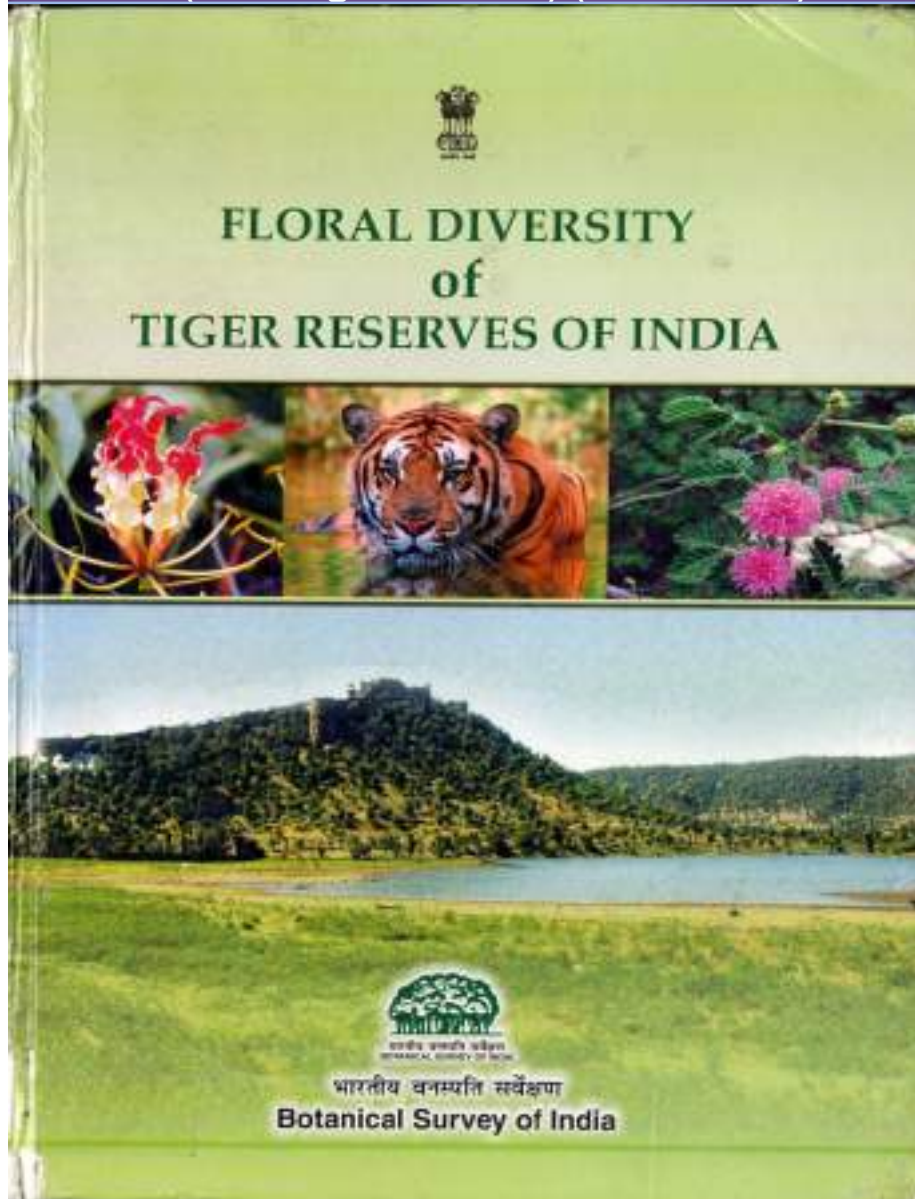
Dendrobium formosum (Courtesy: K. J. Choudhary)



Tree fern *Cyathea*

Project:

Floral diversity of Tiger reserves in India (Buxa tiger reserve) (2004-2005):



WEST BENGAL

Buxa Tiger Reserve

By Ghoshal
Botanical Survey of India, Howrah

Buxa Tiger Reserve (BTR) is situated in Alipuhar Subdivision of Jalpaiguri District, West Bengal. It was constituted on 15th of February 1983 and became the 15th Tiger Reserve. The name of this Reserve is acquired from the historical Buxa fort that was used for detection during freedom movement of India as a most rigorous prison even so Cellular jail. The area of the Reserve encompasses 799.87 sq. km, having a Sanctuary of 269 sq km and a National Park of 530.88 sq km of natural forest. It comprises of the entire forest Buxa Forest Division (702.44 sq km) and a part of Cooch Behar Forest Division (38.43 sq km) in Jalpaiguri district. The Reserve lies between latitude 26°29' and 26°51' N and longitude 89°22' and 89° 58' E. It stretches up to a length of 30 km from west to east. About 35 km area from north to south, which lies inside the sanctuary, covered as buffer zone. The reserve is bounded by the international boundary of Bhutan in the North, Coochbihar district in the south, with Assam on the eastern side by the river Sookosh and on western side by Coochbihar Forest division in Jalpaiguri district.

Geology & Soil

The area of Buxa Tiger Reserve lies at the foothills of Himalayan Range. It consists of the Himalayan formation of Cherted gneiss as an altitude of 1800 ft., the great boundary fault (Gardwhar) lies just on south of it. Followed by shistose hills and then followed by highly dissected Bhabar tract and finally south of 22nd mile, the ill-drained clayey Terai tract.

The soil of the region is mainly composed of alluvium with deposits of coarse gravel near the hills.

sandy clay and sand along the course of rivers and fine sand consolidating into clay in rest of the Reserve. The beds of the Buxa hills consist of sandstone, quartzite and dolomite.

Climate

A damp warm climate is met within Jalpaiguri district that usually favours the formation of wet evergreen forests. Which are found only in some patches, while tropical semi evergreen forests, moist hill forests, Buxa hills semi-evergreen forests and the Savanna forest are other types met within the reserve area.

Temperature

The area lies in the moist tropical zone. The average day temperature varies from 12°C to 21°C from November to February, between 27°C to 32°C from May to September, between 24°C to 27°C for the rest of the year. The highest recorded temperature was 39°C (102.5°F) in 1899 and lowest was 2°C (36°F) in 1987 (the cooling plan of Buxa Division). There is an appreciable variation in day and night temperature throughout the year. Sometimes winter nights are too severe. From July to September, the dawn and early evenings are misty and hot and indeed oppressive, however nights are always calm.

Rainfall

Southeast monsoon is the main source of rainfall. The Reserve receives maximum rainfall from April to June to September. The rainfall is very high during the month of June, July and August. It declines from early September and disappears during the first week of October. December is the driest month with minimum rainfall. While, March receives maximum

Table II - Ten Dominant Families

Family	Species in BTR
Orchidaceae	144
Leguminosae(<i>s.l.</i>)	111
Euphorbiaceae	58
Rubiaceae	52
Poaceae	43
Cyperaceae	29
Lauraceae	27
Moraceae	27
Asteraceae	25
Meliaceae	24

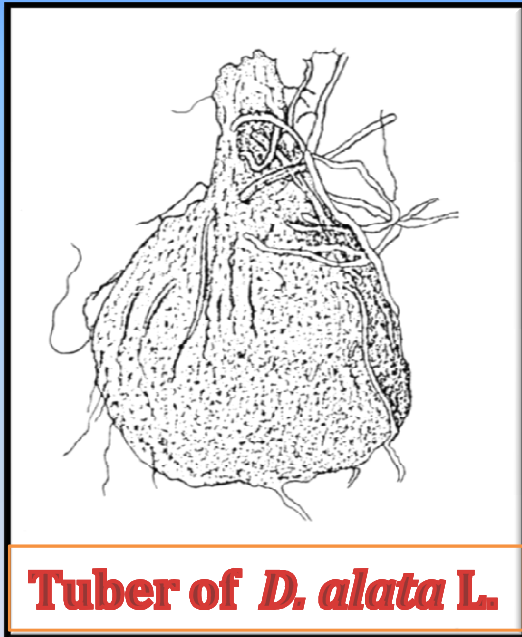
List of Dominant Genera

Name of the genera	Species in BTR
Dendrobium	25
Ficus	21
Bulbophyllum	16
Crotalaria	14
Desmodium	12
Cymbidium	9
Glochidion	8
Elatostemma	8
Eria	8
Grewia	8

Project:

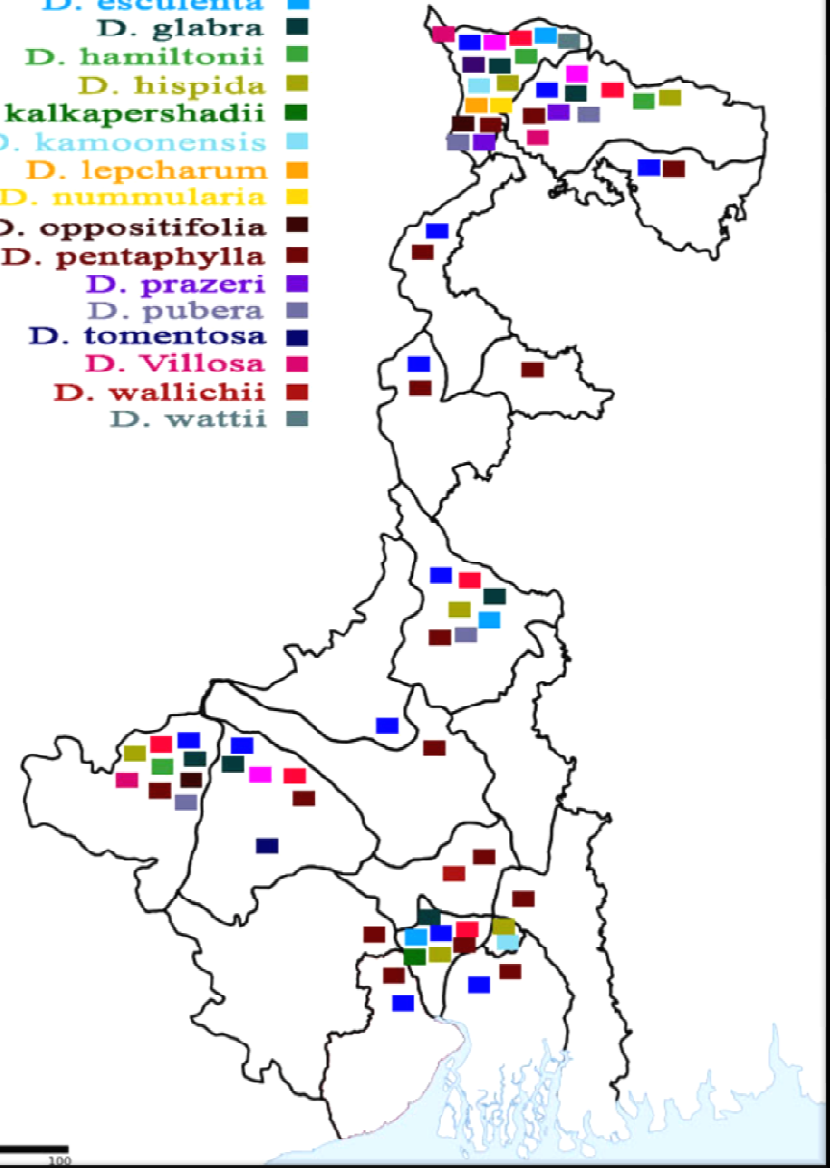
Flora of West Bengal: DIOSCOREACEAE,
LORANTHACEAE & SANTALACEAE(2007-
2009- extended up to 2011):

Completed & Mss. submitted



Distribution of different spp. of Dioscorea in W. Bengal

- D. alata* ■
- D. belophylla* ■
- D. bulbifera* ■
- D. deltoidea* ■
- D. esculenta* ■
- D. glabra* ■
- D. hamiltonii* ■
- D. hispida* ■
- D. kalkapershadii* ■
- D. kamoonsensis* ■
- D. lepcharum* ■
- D. nummularia* ■
- D. oppositifolia* ■
- D. pentaphylla* ■
- D. prazeri* ■
- D. pubera* ■
- D. tomentosa* ■
- D. villosa* ■
- D. wallichii* ■
- D. wattii* ■





A



B



C



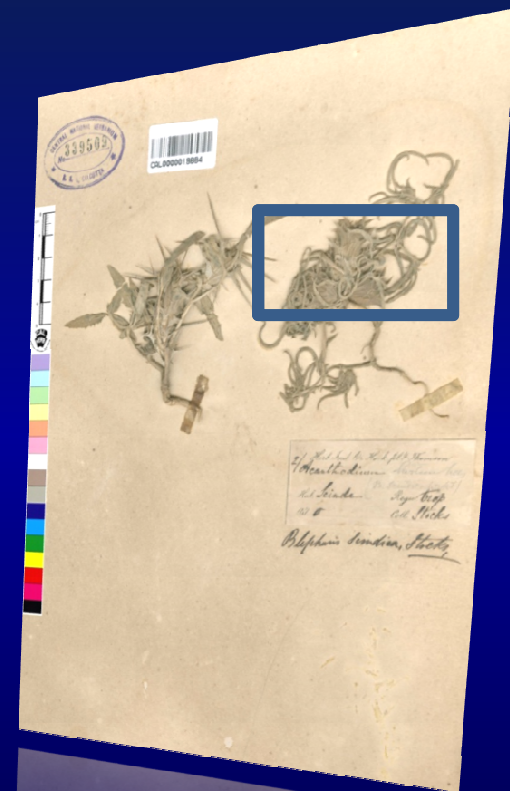
D

(A-B) Tribal man selling *Dioscorea* tuber as vegetable in village market. (C-D) Tribals selling medicinal herbs in local village market.

Digitization of herbarium specimens at the Central National Herbarium (CAL)



High-Resolution Images of Type Specimens and Supporting Materials



24 bit colour, 600 dpi, TIFF format
Original scans – multiple versions of files

High resolution

8 X what can be seen with the naked eye



Primary works at DH

- **Tagged Barcode on the Type sheets available in Dicot and Monocot type Section, scanned images with a definite set up, edited the images using Photoshop CS4, compression and conversion done in different sizes and formats (viz. tiff & jpeg): 14,036**
Preparation of label data and data entry in database: 14,200
- **Tagged Barcode on the Type sheets available in Dicot and Monocot type Section, scanned images with a definite set up, edited the images using Photoshop CS4, compression and conversion done in different sizes and formats (viz. tiff & jpeg): : 881**
- **Names of the type at CAL: 97 species (147 scanning & type data for all names)**

Other works at DH

- **Running and maintenance of Digital Herbarium unit that includes rack servers, L2, L3 switches, proxy server, VLAN etc. for all nodes that are under CNH and CBL also the maintenance of dedicated UPSs, computers and ACs.**
- **Providing digital images of the type and general herbarium sheets by scanning or from archive for different eminent scientists/research workers worldwide.**
- **Providing training on digitization to Officer/staff member/s as and when required.**
- **Attending Dignitaries from Ministry of Environment, Forest and Climate change, scientists and students from different universities and colleges and demonstrate the functionalities of Digital herbarium and methodology adapted in digitization of herbariums.**

Future Action Plan

1. Linking related materials – Protologue etc. that are available in BHL, Botanicus.org, bsi.gov.in.

2. No. & name of the collectors & their facsimile signature etc. (Pl. see *****) available at CAL.

a. Global Plant Initiative(GPI) Kew Handwriting of Botanists and Plant Collectors:
<http://gpi.myspecies.info/content/collectors>

b. Oxford Plant Systematic site Plant Collectors of World:
http://herbaria.plants.ox.ac.uk/herbaria_pages/OXF_collector.html#top_collect


3. Digitization of hall 1 (having ca. 0.4 million sheets under 98 families)

FASCIMILE SIGNATURE/S OF PLANT COLLECTORS FROM INDIA

Ridley, H.N.



Collector.



Collector.

Administrative/Other works:

- **Training and Internship:**

- Participated in two days training programme on “Hardware, Networking & Internet Security” at Institute of Government Accounts and Finance, Regional Research Centre, 15, R.N. Mukherjee Road, Kolkata.

- Participated in two days training programme on “Operational aspects of eFlora of India and Plant checklist database for B.S.I.” at CNH, Howrah.

- **Proposed sustainable development goals (SDGs) and targets(P.P. Ghoshal)**

On dissemination of data on minor forest products including non timber forest products etc may open doors to generate income for the people living adjacent to forest areas.- could be a step forward to address the goal 1 of the proposal.

The data on medicinal herbs that are available in a particular phytogeographical area and have good commercial value may be introduced in farming to boost the income of the local farmers.

The data on distribution of economically important plants or its wild relatives is very important for future food for all programme.

A large number of plants, which have been used as food and herbs in Thailand, were investigated for their antioxidant activity by using a β -carotene bleaching method. The contents of plant chemicals, such as vitamin C, vitamin E, carotenoids, tannin, and total phenolics, were also determined. The results showed that the highest antioxidant activity was found in the plant *Gymnema inodorum*, followed by *Piper sarmentosum* and *Mentha arvensis*, respectively. *G. inodorum* also contained the highest amount of vitamin E, and *M. arvensis* contained the highest amount of total xanthophylls. Correlations between the chemical content of each plant and the antioxidant index were observed. The results suggest that chemicals such as vitamin C, vitamin E, carotenoids, and phenolic compounds are the contributors to the antioxidant activity in the plants.

Bio-activity monitoring cell could be formulated. That unit will monitor the recent activities on plant. Outcomes of the activities would be compiled and identify the close relatives of plant species. It will act as a bridge between biochemists and taxonomists.

- Admin.:

- To act as a member of purchase committee.

- To act as a member of the committee for suggesting suitable ‘Deep freezer’ for decontamination of herbarium specimens at CAL.

- To act as a member of the committee for MIS for scientific cadre in BSI.

- To act as a member of the committee constituted for outsourcing of one technician on contract basis for operating S.E.M. quanta 200.

- To act as a member of the committee for calculating the book values of unrepairable materials of CNH for e-auctioning.

- To perform the day to day duties of DDO in the absence of regular DDOs.

▪No of projects carried out: 7

➤Number of books written/compiled/edited(As contributor): 1

➤Number of papers published: 15

➤Number New taxa, new combination/names and new reports (India as well as Regions/ States) published: 59; 1 new for Bangladesh.

• Publication List of P. P. Ghoshal (Upto 2016)

• **Book:**

- P. P. Ghoshal. 2008. Buxa Tiger Reserve. 534 – 553 in M. Sanjappa & P. Sing (Eds.) Floristic Diversity of Tiger Reserves in India.

• **Paper published:**

- Bandyopadhyay, S., R. N. Kayal, P. P. Ghoshal, M. K. Pathak, M. Bhaumik and S. Saha. 1996. Plea for the regulation of the commercial exploitation of old stems of *Bauhinia scandens* L. in India. *ENVIS Newsletter* 3: 14-15.
- Banerjee, L. K., R. N. Kayal, P. P. Ghoshal & S. Saha. 2000. Some minor forest products of Buxa Tiger Reserve – N. Bengal. *ENVIS Newsletter* 7: 10-11.
- Banerjee, L. K., R. N. Kayal, P. P. Ghoshal & S. Saha. 2000. A plea for conservation of *Persea glaucescens* (Nees) Long. – 'Kawla'. *ENVIS Newsletter* 7: 13.
- Kayal, R. N., Saha, S. & P. P. Ghoshal. 2003. A floristic accounts of Indian Medicinal plants (originated, cultivated, naturalized or introduced) used in Homeopathic drug preparation. *J. Econ. Taxon. Bot.* 27(1): 60-67.
- Ghoshal, Partha Pratim and Sabyasachi Saha. 2003. A plea for conservation of *Dendrobium aphyllum* (Roxb.) Fischer (Orchidaceae). *Bull. Bot. Surv. India* 45(1-4): 201-202.
- Srivastava, S. C. & P. P. Ghoshal. 2005. *Hemiorchis Rhodorrhachis* Schum. (Zingiberaceae)- A New Record For Bangladesh in *Bangladesh J. Plant Taxon.* 12(1):59-61.
- Ghoshal, P. P. Colour variation seen on the labellum of *Eria pubescens* (Hook.) Lindl. (Orchidaceae) in *J. Econ. Taxon. Bot.* 30(1): 201. 2006.
- Ghoshal, P.P. & S.C. Srivastava. 2007. Rediscovery of *Hemiorchis rhodorrhachis* Schum. (Zingiberaceae) – after gap of a century with extended distribution. *Bull. Bot. Surv. India.* 48.
- S.K. Basu, P.P. Ghoshal, S. Bandyopadhyay and Md. N. Aziz. 2009 (December). Comments on the Type Specimens of *Lindsaea Andamanica* (Lindsaeaceae) at Central National Herbarium (Cal), India. *Bangladesh J. Plant Taxon.* 16(2): 175-176.
- Soumen Kumar Basu, Partha Pratim Ghoshal, Subir Bandyopadhyay & Md. Nehal Aziz. April 2010. (109) Proposal to add a new paragraph to Recommendation 9A. *TAXON* 59 (2): 656–666.
- Mithilesh K. Pathak, Partha Pratim Ghoshal & Subir Bandyopadhyay. June 2010. (151) Proposal to add a new paragraph to Recommendation 31A. *TAXON* 59 (3): 983–988.
- S. Bandyopadhyay, P.P. Ghoshal and M.K. Pathak. 2012 (June). Fifty New Combinations in *Phanera* Lour. (Leguminosae: Caesalpinioideae) From Paletropical Region. *Bangladesh J. Plant Taxon.* 19(1): 55-61.
- Subir Bandyopadhyay & Partha Pratim Ghoshal. 2014 (Sept.). Two new combinations in *Lysiphyllum* (Leguminosae-Caesalpinioideae). *Phytotaxa* 178 (4): 298–300.
- Subir Bandyopadhyay and Partha Pratim Ghoshal. 2015(June). Seven new combinations in *Phanera* (Fabaceae: Caesalpinioideae: Cercideae). *Telopea* 18: 141–144.
- Subir Bandyopadhyay and Partha Pratim Ghoshal 2016.(Accepted). **ENUMERATION OF TYPE SPECIMENS OF NAMES IN BAUHINIA AND PHANERA (FABACEAE: CAESALPINIOIDEAE) AT CAL.** In *Bangladesh J. Plant Taxon.*

1.Mss submitted:

- Mss for the families Loranthaceae, Viscaeae, Santalaceae for Flora of West Bengal, submitted.
- Mss for the family Dioscoreaceae for Flora of West Bengal, submitted.
- Mss for Flora Bihar and Jharkhand: Vol: 1 Theaceae, Clusiaceae, Dipterocarpaceae; Erythrinae, Diocleinae and Glycininae under tribe Phaseolae belonging to the family Fabaceae submitted.

Proposal for Future Action Plan

❖ Primary aim will be completing all projects in due time.

□ After completing Floristics of BNP, there are ample scopes to evaluate the biodiversity of angiosperms in Palamau tiger reserve (PTR) area (BNP is part of the PTR).



THANK YOU

