



Dr R.K. Gupta
Scientist-E & HoO
CENTRAL NATIONAL HERBARIUM
BOTANICAL SURVEY OF INDIA
HOWRAH-711103

ANNUAL RESEARCH PROGRAMMES ON FLORA OF INDIA

Name of Project, Executing official(s) & tenure	Achievements
<p>Flora of India, Vol. 16 Salvadoraceae, Apocynaceae</p> <p>Dr Anand Kumar, Botanist 2019 – 2020 (Realloted July 2020 to December, 2020)</p>	<p>Completed the allotted work. The family Salvadoraceae includes 2 genera, 4 species and 2 varieties while Apocynaceae includes 39 genera and 91 species, 5 varieties. Additionally, Apocynaceae comprises 9 cultivated genera, 20 cultivated species and 2 doubtful species. The updated manuscript has been submitted to the team leader, Dr S.S. Dash, Scientist-E.</p>
<p>Flora of India, Vol.19 Scrophullariaceae, (in part), Orobanchaceae</p> <p>Dr O.N. Maurya, Scientist-D & Dr Anand Kumar, Botanist 2019 – 2020 (Extended up to September, 2020)</p>	<p>The updated manuscript (200 taxa) was submitted to the team leader, Dr Arti Garg, Scientist-E. Photos and illustrations were also submitted to the team leader.</p> <p>P.S.: The updated manuscript of this volume was already submitted to the Publication section, Hqrs. by the team leader, Dr Arti Garg, Scientist-E & HoO, CRC along with illustrations and photos.</p>

<p align="center">Name of Project, Executing official(s) & tenure</p>	<p align="center">Achievements</p>
<p>Flora of India, Vol. 20 Gesneriaceae, Bignoniaceae, Pedaliaceae and Acanthaceae 108 Genera and ca. 646 species Late Dr P. Lakshminarasimhan, Scientist E (Retd); Dr W. Arisdason, Scientist-D; Dr K. Karthigeyan, Scientist-E; Dr Gopal Krishna, Bot. Asstt. 2018 – December 2019 (Extended up to September, 2020)</p>	<p>Gesneriaceae is represented by 27 genera, 144 species, 1 subspecies (wild) and 5 varieties, besides 14 cultivated species in 9 genera. The completed manuscript has been submitted to the team leader by Dr Gopal Krishna.</p> <p>The manuscript of subtribe Justiciinae (Acanthaceae) has been submitted by Dr K. Karthigeyan, Scientist-E</p>
<p>Flora of India, Vol. 21 Verbenaceae, Symphrometaceae, Avicenniaceae, Lamiaceae and Plantaginaceae 73 genera and ca 500 species Dr V. Sampath Kumar, Scientist E; Dr Gopal Krishna, Botanical Assistant; Dr Anant Kumar, Botanical Assistant 2019 – 2020 (Extended up to October, 2020)</p>	<p>The completed manuscript of families (Verbenaceae, Avicenniaceae, Symphoremataceae) has been submitted to team leader Dr V.S. Kumar, Scientist É' in March 2021 by Dr Gopal Krishna. Verbenaceae consists of 20 genera, 104 species and 2 varieties, besides 29 cultivated taxa in 13 genera; Symphoremataceae includes 3 genera, 4 species and 1 variety; Avicenniaceae includes 1 genus and 3 species.</p>

Name of Project, Executing official(s) & tenure

Achievements

Flora of India, Vol. 24
Fagaceae

Dr Vinay Ranjan, Scientist-E
2019 – 2020 (Extended up to
December, 2020)

Completed allotted work (**Fagaceae: 5 genera, 52 species**). The completed manuscript has been submitted to team leader along with 15 plant photographs and 07 illustrations.

Flora of India, Vol. 25 & 26
(Hydrocharitaceae to Orchidaceae)

Dr. Avishek Bhattacharjee, Scientist-C
April, 2019 to December, 2020

Completed the work allotted [**31 genera, 238 taxa**: Hydrocharitaceae (11 genera, 25 taxa), Orchidaceae: Subfamily Orchidoideae (13 genera, 72 taxa), Subfamily Epidendroideae (7 genera 141 taxa); **plus** additional work with team leader on **2 genera** and **36 taxa**] and **submitted** the final report to the team leader along with 106 photographs, 52 dissection-photoplates and 49 illustrations.

Published 1 book-chapter, 2 papers and 7 abstracts



<p style="text-align: center;">Name of Project, Executing official(s) & tenure</p>	<p style="text-align: center;">Achievements</p>
<p>Flora of India, Vol. 27 Liliaceae, Asphodelaceae</p> <p>Dr Rajib Gogoi, Scientist-E & Dr Mahua Pal, Botanist March 2019 to December 2020</p>	<p>Prepared the manuscript of Liliaceae (7 genera, 39 species and 5 varieties) and Asphodelaceae (5 genera, 7 species and 2 cultivated species and 1 cultivated variety) and submitted to the team leader, Dr. Rajib Gogoi, Scientist-E.</p>
<p>Flora of India, Vol. 28</p> <p>Dr Vinay Ranjan, Scientist-E April 2020 – September 2020</p>	<p>Completed the allotted work (Xyridaceae: 1 genus, 6 species; Typhaceae: 2 genera, 11 species; Ruppiaceae: 1 genus, 2 species) along with key to the species and the completed manuscript has been submitted to the team leader.</p>

ANNUAL RESEARCH PROGRAMMES OTHER THAN FLORA OF INDIA

Project 1: Algal Flora of Purbasthali Wetland, Bardhaman, West Bengal

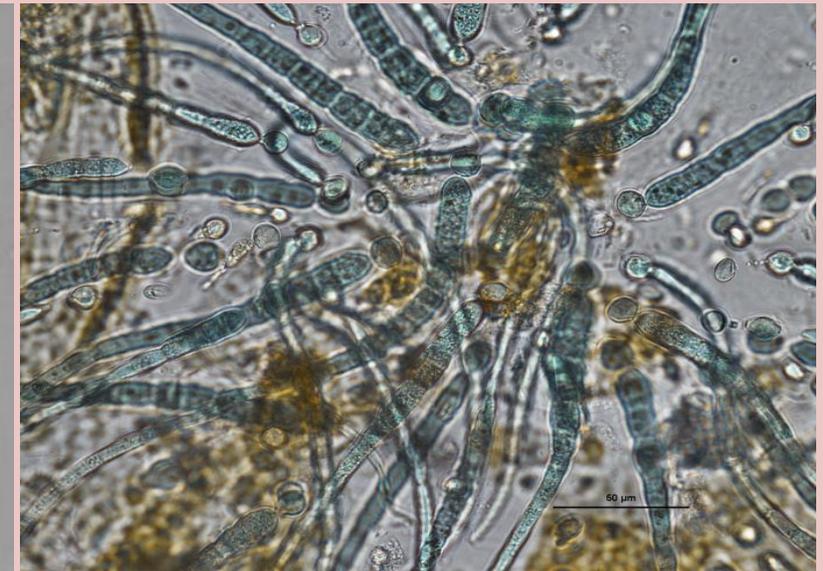
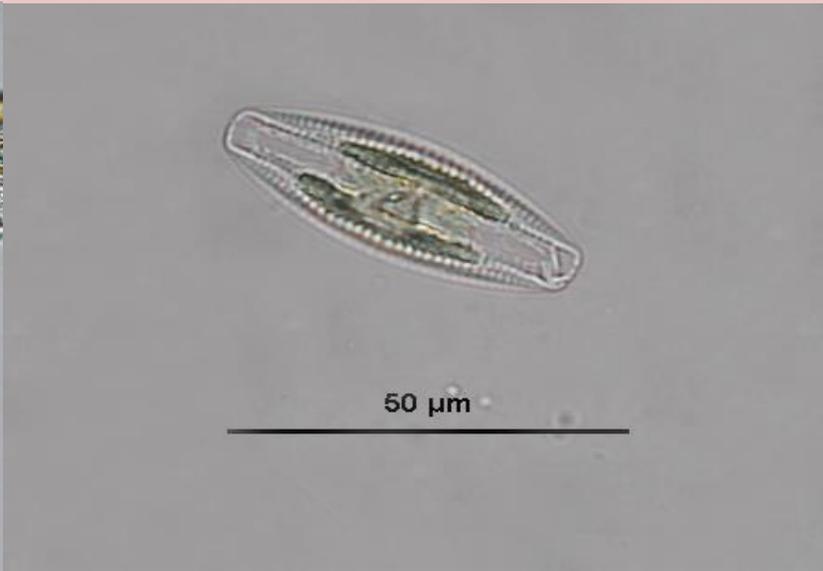
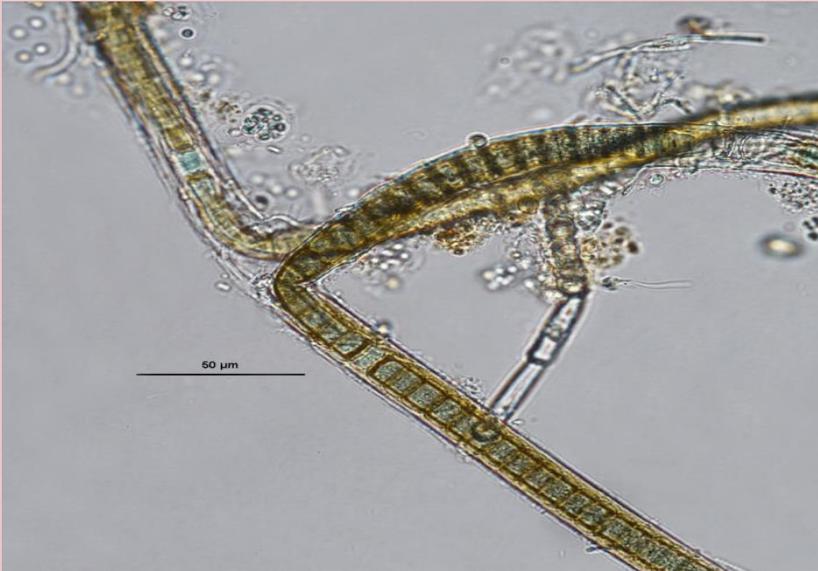
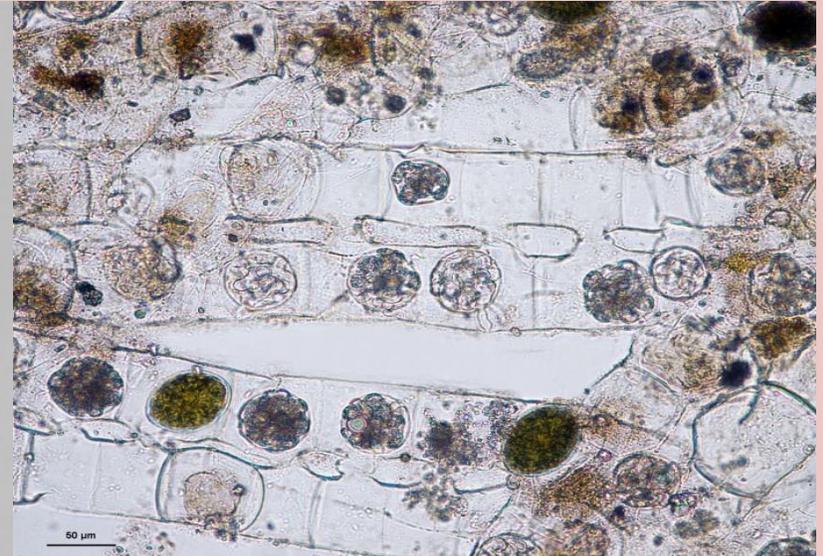
Dr. R.K. Gupta, Scientist E

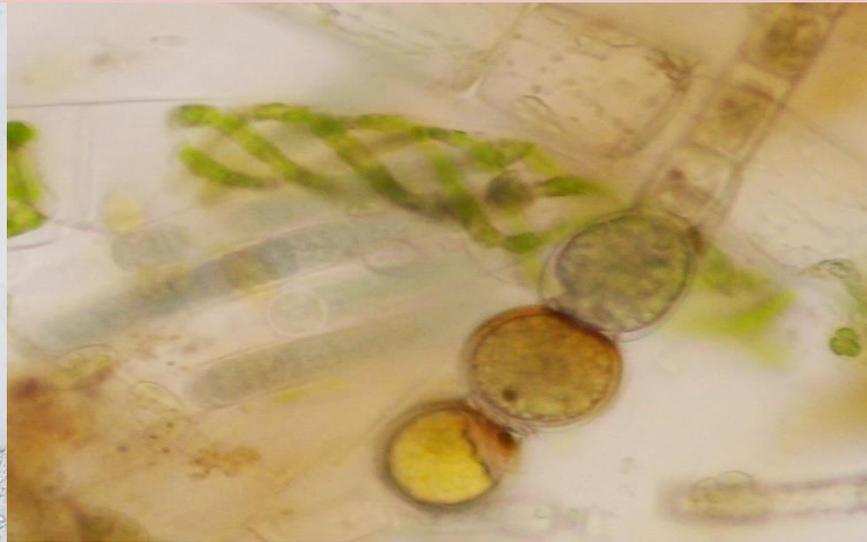
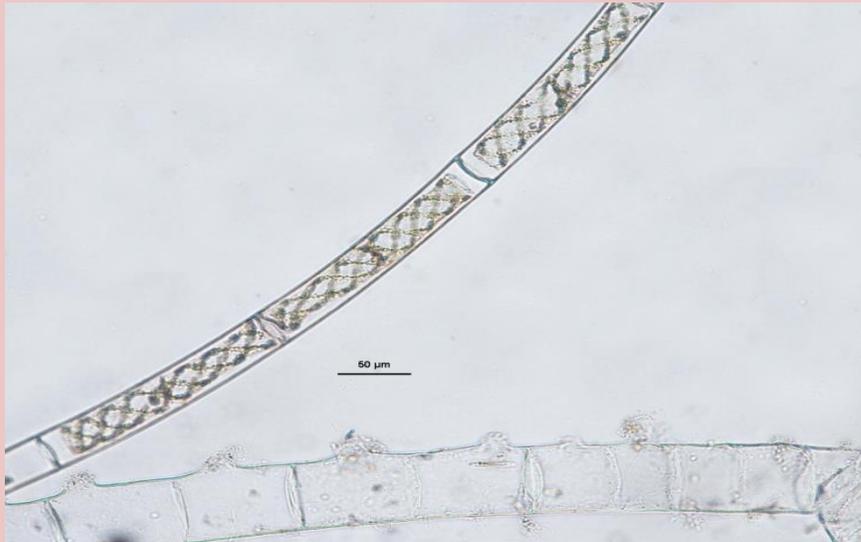
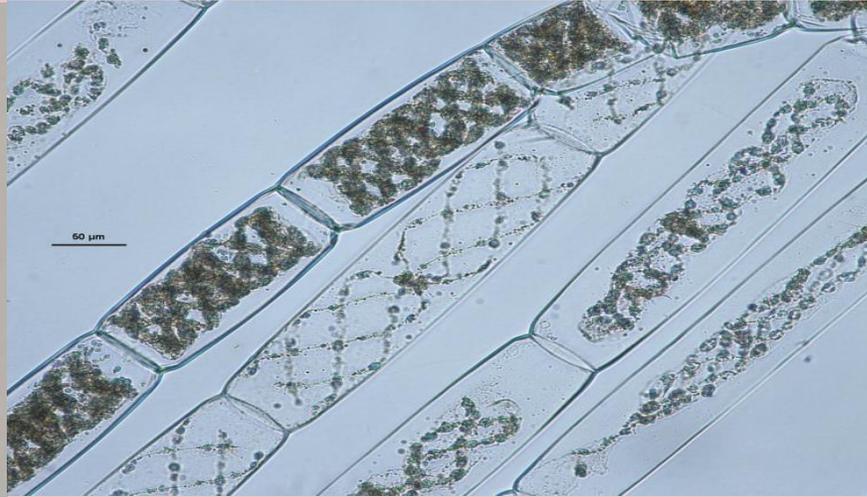
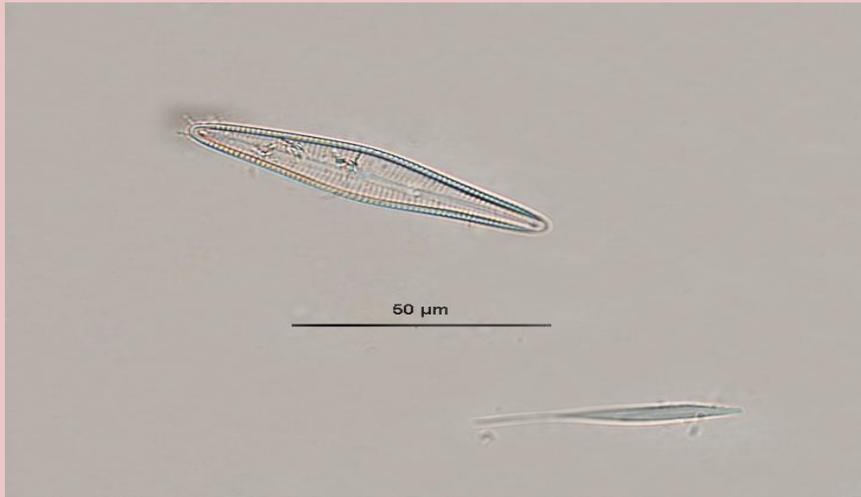
2020–2023

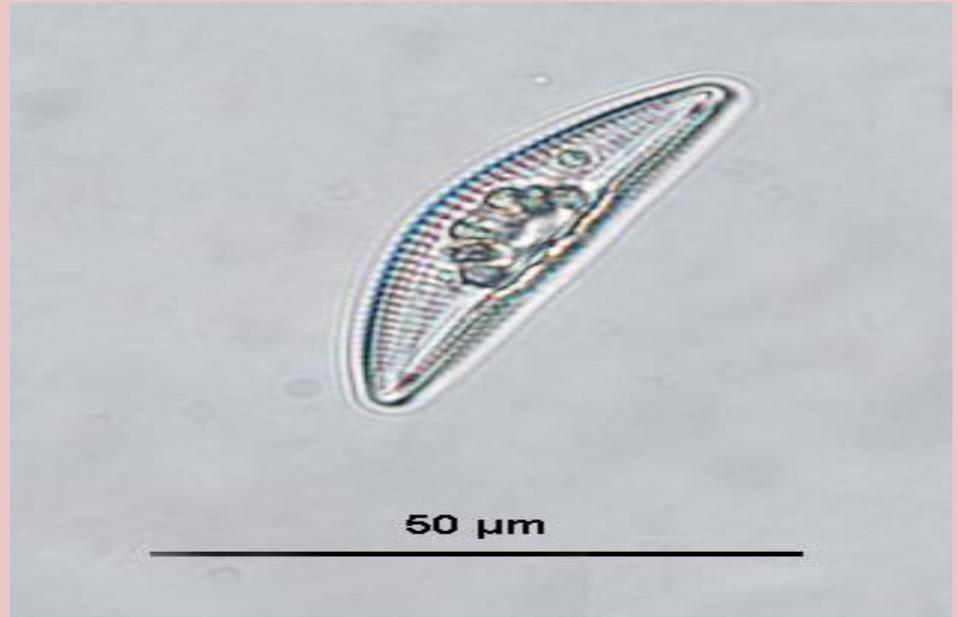
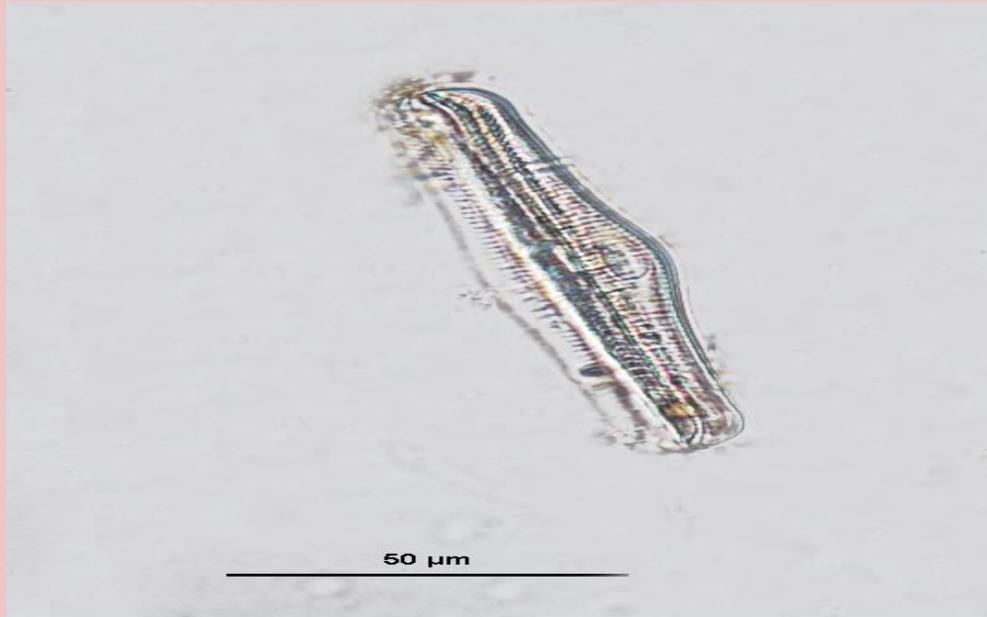














ENVIROCHECK

Recognised by MoEF&CC, WBPCB & JSPCB
Accredited by NABL (ISO/IEC 17025:2017)
Certified by ISO 9001:2015, ISO 14001:2015 & ISO 45001 : 2018



TEST REPORT

Sample Supplied by	:	R. K. Gupta	Type of Industry	:	--
Address	:	BSI, CNH, Howrah	Sample supplied on	:	14.12.2020
			Date of Issue	:	23.12.2020
Type of sample	:	Water Sample	Sample Code	:	Purbasthali Lake
			Report No.	:	ENV/549/W/M/20-21

SL. NO.	PARAMETERS	UNIT	RESULTS
1.	pH value	-	6.67
2.	Total Dissolved Solids	mg/l	215.0
3.	Electrical Conductivity	µs/cm	320.0
4.	Nitrate	mg/l	2.53
5.	Nitrite	mg/l	<0.01
6.	Ammonia	mg/l	<0.1
7.	Total Phosphate	mg/l	1.23
8.	Dissolved Oxygen	mg/l	5.6
9.	COD	mg/l	48.0
10.	BOD [3 Day's at 27 °C]	mg/l	12.0
11.	Arsenic	mg/l	<0.01

Authorised Signatory :

DR. AJOY PAUL
Scientist

H.O. : 63/B, Rastraguru Avenue, Kolkata - 700028 (033-25792891/25497490, Fax : 033-25299141
Laboratory : 189,190&192 Rastraguru Avenue, Kolkata - 700028 (033-25792889
Email : info@envirocheck.org /envirocheck50@gmail.com / Website : www.envirocheck.org
Branch Office : Siliguri • Haldia • Durgapur • Dhanbad • Gangtok • Port Blair • Dehradun • New Delhi
Overseas : UAE • Qatar • Netherlands

Project 2: Angiospermic Flora of Neora Valley National Park, West Bengal

Dr Vinay Ranjan, Scientist E; Dr Gopal Krishna, Bot. Assistant; Dr Anant Kumar, Bot. Assistant

Target: April, 2016-March, 2021

Total area: 157 sq km

Total field tours conducted: 10 [15-20 days];

Expected no. of taxa: c. 800

Species recorded from literature: c. 650

Photographs depicted: c. 2450

Total Field number of collections: 1831

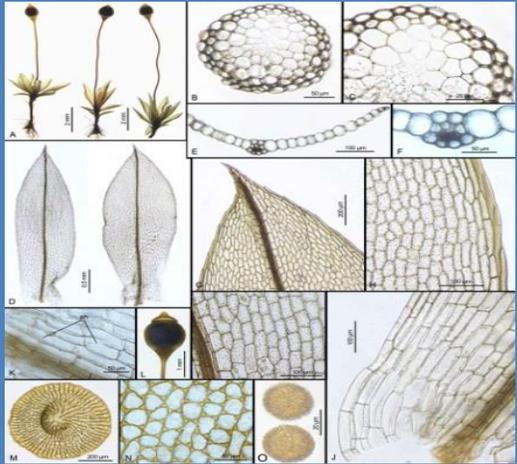
Total taxa identified: c. 700

Significant contributions so far: *Epipogium japonicum* Makino - addition to Indian flora; ***Elytranthe psilantha* (Hook.f.) Danser** - generic record to West Bengal flora; ***Cardamine circaeoides* Hook.f. & Thomson**, ***Codonopsis gracilis* Hook.f. & Thomson**, ***Decaisnea insignis* (Griff.) Hook. f. & Thomson**, ***Synotis rufinervis* (DC.) C.Jeffrey & Y.L. Chen** and ***Synotis vagans* (Wall. ex DC.) C. Jeffrey & Y.L. Chen** - addition to West Bengal flora (5)

Project 3: Bryoflora of Jharkhand

Dr. Devendra Singh, Scientist-D (2018-22)

Number of species identified	45
Number of species illustrated, microphotographed and described	<p>34 <i>Anthoceros punctatus</i>, <i>A. subtilis</i>, <i>Asterella wallichiana</i>, <i>Bryum coronatum</i>, <i>Cyathodium cavernarum</i>, <i>C. denticulatum</i>, <i>Cololejeunea latilobula</i>, <i>Entodontopsis tavoyensis</i>, <i>Erpodium mangiferae</i>, <i>Fissidens cranulatu</i>, <i>F. sylvaticus</i>, <i>Fossombronia himalayensis</i>, <i>Frullania ericoides</i>, <i>Heteroscyphus hyalinus</i>, <i>Hyophila involuta</i>, <i>H. nymaniana</i>, <i>Lejeunea aloba</i>, <i>L. devendrae</i>, <i>Lopholejeunea sikkimensis</i>, <i>Marchantia linearis</i>, <i>Notothylas anaporata</i>, <i>Plagiochasma appendiculatum</i>, <i>P. intermedium</i>, <i>Physcomitrium eurystomum</i>, <i>Reboulia hemisphaerica</i>, <i>Phaeoceros carolinianus</i>, <i>P. laevis</i>, <i>Riccia billardierei</i>, <i>R. curtisii</i>, <i>R. frostii</i>, <i>R. huebeneriana</i>, <i>Solenostoma tetragonum</i>, <i>Spruceanthus minutilobulus</i>, <i>Targionia hypophylla</i></p>
Species new to India	<i>Colura corynophora</i> (Nees, Lindenb. & Gottsche) Trevis.
Species new to Central India	05 <i>Atrichum undulatum</i> Mitt. var. <i>gracilisetum</i> Besch., <i>Anthoceros subtilis</i> , <i>Cyathodium denticulatum</i> Udar & S.C.Srivast., <i>Physcomitrium eurystomum</i> Sendtn., <i>Solmsiella biseriata</i> (Austin) Steere
Species new to Jharkhand	10
Publications	Books: 02 (in press); 01 submitted: research articles: 07
Species collected after 50 years	<i>Cyathodium denticulatum</i> Udar & S.C.Srivast.



Project 4: Revision of the genus *Gastrochilus* D. Don (Orchidaceae) in India

Dr Avishek Bhattacharjee, Scientist-C

❖ **Duration of the project:** April, 2018 to March, 2022

❖ **Achievements:** Finalized description, citation, and recorded distribution, phenology of 20 species [*Gastrochilus acaulis* (Lindl.) Kuntze, *G. affinis* (King & Pantl.) Schltr., *G. acutifolius*, *G. arunachalensis* A.N. Rao, *G. bellinus* (Rchb. f.) Kuntze, *G. calceolaris*, *G. dasypogon* (Sm.) Kuntze, *G. distichus*, *G. flabelliformis*, *G. garhwalensis* Z.H. Tsi, *G. inconspicuus*, *G. intermedius* (Griff. ex Lindl.) Kuntze, *G. linearifolius* Z.H. Tsi & Garay, *G. nilagiricus* Kuntze, *G. obliquus* (Lindl.) Kuntze, *G. platycalcaratus* (Rolfe) Schltr., *G. pseudodistichus* (King & Pantl.) Schltr., *G. rutilans* Seidenf., *G. sessanicus* A.N. Rao, *G. sonamii* Lucksom]; Prepared key to the species of the genus *Gastrochilus*. Typification related problem of *Gastrochilus affinis*, *G. bellinus*, *G. dasypogon* have been resolved. Prepared 'specimen examined' for *Gastrochilus acaulis*, *G. acutifolius*, *G. dasypogon*, *G. obliquus* and *G. pseudodistichus*.

❖ **Publication from the particular project:** 1 paper



❖ **Total publications:** 1 book-chapter, 21 papers (14 in SCI and in 15 Scopus journals), 7 abstracts.

Project 5: Liverworts and Hornworts Flora of Darjeeling District, West Bengal

Dr Monalisa Dey, Scientist-C

Period: 2016-2021

Achievements

- **Identified 214 specimens belonging to 53 species.**
- **Prepared description of 40 species**, viz. *Acrolejeunea infuscata* (Mitt.) Jian Wang bis & Gradst., *Acrolejeunea recurvata* Mitt., *Bazzania himalayana* (Mitt.) Schiffn., *Bazzania ovistipula* (Steph.) Abeyw., *Bazzania tridens* (Reinw., Blume & Nees) Trevis., *Cheilolejeunea trapezia* (Nees) Kachroo & R.M.Schust., *Cololejeunea latilobula* (Herzog) Tixier, *Cololejeunea longiana* Grolle & Mizut., *Cololejeunea serrulata* Steph., *Cololejeunea trichomanis* (Gottsche) Steph., *Colura tenuicornis* (A.Evans) Steph., *Drepanolejeunea angustifolia* (Mitt.) Grolle, *Drepanolejeunea erecta* (Steph.) Mizut., *Drepanolejeunea fleischeri* (Steph.) Grolle & R.L.Zhu, *Drepanolejeunea herzogii* R.L.Zhu & M.L.So, *Drepanolejeunea yunnanensis* (P.C.Chen) Grolle & R.L.Zhu, *Frullania muscicola* Steph., *Frullania retusa* Mitt., *Frullania nepalensis* (Spreng.) Lehm. & Lindenb., *Heteroscyphus bescherellei* (Steph.) S.Hatt., *Heteroscyphus coalitus* (Hook.) Schiffn., *Lejeunea anisophylla* Mont., *Lejeunea curviloba* Steph., *Lepidozia reptans* (L.) Dumort., *Leptolejeunea subdentata* Schiffn. ex Herzog, *Lopholejeunea subfusca* (Nees) Schiffn., *Marchantia emarginata* Reinw., Blume & Nees, *Marchantia linearis* Lehm. & Lindenb., *Metacalypogeia alternifolia* (Nees) Grolle, *Metzgeria consanguinea* Schiffn., *Microlejeunea punctiformis* (Taylor) Steph., *Plagiochila flexuosa* Mitt., *Plagiochila fruticosa* Mitt., *Plagiochila khasiana* Mitt., *Plagiochila nepalensis* Lindenb., *Plagiochila parvifolia* Lindenb., *Radula auriculata* Steph., *Radula obscura* Mitt., *Radula pocsii* K.Yamada, *Radula stenocalyx* Mont.
- Studied two specimens: *Drepanolejeunea mawtmiana* Ajit P.Singh & V.Nath: A.P. Singh 208693B (isotype LWG); *Drepanolejeunea longifolia* Ajit P.Singh & V.Nath: S. Chandra 201213B (isotype LWG) obtained on loan from National Botanical Research Institute, Lucknow, India (LWG).
- **Status: The manuscript is being finalized and will be submitted in three months.**

Project 6: Editing of Flora of Bihar Vol. 1 (Ranunculaceae-Mimosaceae)
Dr Vinay Ranjan, Scientist-E, Dr Kumar Avinash Bharati, Scientist-C and Dr
Anand Kumar, Botanist
2020–2021

No. of families: **59**

No. of genera: **237**

No. of species: **499**

No. of subspecies: **1**

No. of varieties: **21**

Cultivated taxa: **106**

Editing completed for **627 taxa**
(including 106 cultivated taxa).
The completed manuscript will
be submitted in 2-3 months.

Project 7: Editing of Flora of Jharkhand Vol. 1 (Ranunculaceae-Mimosaceae)
Dr Vinay Ranjan, Scientist-E, Dr Kumar Avinash Bharati, Scientist C and Dr
Anand Kumar, Botanist
2020–2021

No. of families: **61**

No. of genera: **239**

No. of species: **501**

No. of subspecies: **1**

No. of varieties: **22**

Cultivated taxa: **106**

Editing completed for **630 taxa**
(including 106 cultivated taxa).
The completed manuscript will
be submitted in 2-3 months.

IT Works/Digitization

- Updation of BSI website (<https://bsi.gov.in/>).
- Data-entry of 21,558 taxa of angiosperms for e-Plant Checklist of India. It includes contains about 2.5 lakhs Botanical names including synonyms. Cloud named “Baadal” belonging to the ministry of HRD and maintained by IIT, Delhi has been allotted for hosting of eFlora of India and e-Plant Checklist of India.
- Preparation of “BSI archive” database on Economic plants, Textile design, Roxburgh paintings & other paintings, Natural dyes and Type specimens (21000 specimens).
- Scanning and editing of 14980 herbarium specimens, data entry of 4268 specimens.
- DVD backup of 26,535 image stored in 1120 DVDs, inventory for 1,11,991 images stored in 30 external HDD.
- All the above IT Works/Digitization were coordinated by Dr Kumar Avinash Bharati, Scientist-C.

Miscellaneous Work done by Dr K. Karthigeyan, Scientist-E

- Revised and submitted the manuscript on subtribe Justiciinae (Acanthaceae) for Flora of India vol. 20. Included 2 genera and 2 species in the revision of the family Gesneriaceae for the Flora of India and the keys were rewritten and submitted.
- Coordinated the field survey and conducted one tour to document the flora of East Kolkata wetlands a RAMSAR site. Published three chapters on various aspects of the Flora of East Kolkata Wetlands.
- Revised and updated the families Rubiaceae, Lentibulariaceae and Acanthaceae for the Flora of Andaman & Nicobar Islands.
- Acted as the PI of the project on "Assessment of Diversity and Distribution of Plants, Algae and Macrofungi in the Sundarbans Biosphere Reserve, India". Supervised one RA and two Field assistants. Prepared and submitted a consolidated annual report to SBR for release of Fund.
- As the PI for evaluating the project titled "Restoration of Mangroves in Sundarban through Afforestation, Integrated Mangrove-Shrimp Farming, Income Generation and Community Participation (2017-2020)" by 'Nature Environment and Wildlife Society (NEWS), completed all the field surveys and submitted a detailed Final report to the Director, BSI. The report is also uploaded in BSI website.
- Edited and submitted the flora of Andaman & Nicobar Islands (volume 2, Myrtaceae to Podocarpaceae) for publication to the Director, BSI along with 50 high resolution photos. Added descriptions of a total of 115 species, and the generic and species keys were changed accordingly.

- As the in charge of identification services, coordinated the Identification of the species sent from other departments. A total of 202 specimens were identified and identification certificates were issued.
- Coordinated the Documentation and data basing of all the paintings available at CAL. Prepared write-ups for the archival paintings housed at CAL.
- Coordinated the selection of 20 large paintings and 20 Roxburgh's paintings and preparation of write up to for exhibition at National Museum, New Delhi, as instructed by the Director, BSI to be sent to the Secretary, Ministry of Culture. Prepared condition note for all the 40 paintings and coordinated the packaging of the paintings. Prepared an introduction write up for the paintings for display in National Museum, New Delhi.
- Coordinated the physical verification of the images and large paintings at CNH and prepared and submitted a detailed report.
- As the in charge of Monocot herbarium, a total of dicot 50 specimens were identified and sent to respective herbarium halls. Coordinated and supervised remounting of 5490 herbarium specimens, cleaning and dusting and poisoning of 6209 specimens, stitching of 74 specimens from monocot herbarium. Coordinated incorporation of 7 type herbarium and 5063 general herbarium specimens.
- Published 04 research papers and 04 Book chapters; 03 research articles are accepted for publication

Publications

Research papers: 57

Research papers indexed in SCI: 28

Research papers indexed in SCOPUS: 36

Book Chapters: 11

Books: 3

GUPTA, R.K. AND S.K. DAS 2020. *Algae of India A checklist of Diatoms, vol. 4*. Botanical Survey of India, Kolkata

RANJAN, V. AND ANANT KUMAR 2020. *Flora of Gorumara National Park, West Bengal*. Botanical Survey of India, Kolkata

MAJUMDAR, S. AND M. DEY 2020. *A Handbook on Bryophytes with Special Reference to Type Specimens of Liverworts and Hornworts in Indian Herbaria*. ENVIS Resource Partner on Biodiversity, Botanical Survey of India, Kolkata.

Important Events

- Jointly organized the ‘Virtual Workshop on Herbarium Techniques’ on 23.12.2020 in Collaboration with the the Department of Botany, Bethune College, Kolkata & ENVIS Resource Partner on Biodiversity, Botanical Survey of India, Howrah .
- Organised online drawing competition and online poetry writing competitions on International Day for Biological Diversity, 2020.
- Fit India Freedom Run (run/ walk/ cycling) at CNH on 29th and 30th September, 2020; total 32 staff (including outsourcing staff) and scholars participated in this event.
- Fit India Plog (Running and Pick Litter) on 2nd October, 2020; total 27 staff (including outsourcing staff) participated in this event.
- Organised online slogan writing and drawing competitions for the school students on the eve of World Ozone Day (16th September 2020) in collaboration with ENVIS Resource Partner (ENVIS RP) of BSI.
- Organized webinar on “Revising the Generic Limits of *Coleus* and *Plectranthus* (Lamiaceae, Tribe Ocimeae)” on 12th March, 2021. The speaker was Dr Alan Paton.

Important Visitors

Shri Raghavendra Singh, Secretary, Ministry of Culture, Govt. of India, and New Delhi

Sri C. Sudhakar, IPS, Commissioner of Police, Howrah

Sri Ishan Verma from Evelyn Gardens, London with Mrs. Sandhya Rani and Ms Mitra

Revenue earned

Rs. 4700 (Rupees Four thousand seven hundred only) regarding identification/authentication of plant samples.

OPENING OF BSI PUBLICATION SALE COUNTER

Thank you