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WESTERN CIRCLE OF THE BOTANICAL SURVEY OE INDIA

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The Headquarters of the Western Circle of the reorganized Botanical Survey of India is located at Poona in a picturesque site (Law College Buildings) at the foot of a hill with a well laid out garden in front. The Western Circle comprises of the States of Rajasthan, Cutch, Saurashtra, Bombay, Mysore, Kerala, parts of Madhya Pradesh and Madras and Laccadive and Minicoy Islands.

BRIEF EARLY HISTORY OF EXPLORATION WORK IN WESTERN INDIA

There is no satisfactory record of the earliest explorers in western India. Fragmentary information gathered from tour notes, travel diaries and records of merchant ships are the only records of earliest works. Rheede's *Hortus Indicus Malabaricus* is the oldest and the monumental work on the Botany of Western India. It has 794 plates. It was published from 1678-1703. J. Burmann later published *Flora Malabarica* in 1769. F. Buchanan published an account of his journey from Madras through Mysore, Kanara and Malabar in 1807. Olof Toren (1718-53), Anton Pantaleon Hove (1787), Alexander Gibson (1800-1867), John Sutherland Law (1810-85) made some kind of plant collections along the coast between Bombay and Gujerat and accounts of his tours in Gujerat, Kathiawar and Konkan were published in 1855. John Graham (1805-39) who was serving in postal department at Bombay showed keen interest in plants and was appointed as in charge of the Botanic Gardens at Bombay. Graham conceived the idea of writing an account of plants of Bombay. He was helped by Joseph Nimmo (1819) a botanist working as a clerk at Surat, Charles Lush (1797-1845) a surgeon, but a lover of plants from Poona and by Dr. Heddle. This list of plants of Bombay was published by the Agri-horticultural Society in 1838. The list consisted of plants in the vicinity of Bombay only. Law contributed his collections from Thana to this list. Sykes (1790-1872) made collections near Poona and gave them to the Linnean Society Herbarium. Victor Jacquemont collected plants specimens in 1832 at Poona and Bombay. His collections went to Paris. Gibson made collections in Khandesh and Poona. Gibson published probably this first Forest Flora of Bombay—*The Handbook to the Forests of Bombay Presidency* in 1869. Nicol Alexander Dalzell (1817-78) who was an officer in customs department used to botanise in his free time. Dalzell and Gibson made additions and corrections in Graham's catalogue and published a flora of Bombay in 1858.

Gibson later on published a supplement to Dalzell and Gibson's flora based on collections of Nairne.

John Ellerton Stocks (1822-54) made collections in Sind. He took his collections to Kew. Eyre Champion de Crespigny (1821-96) succeeded Gibson and Dalzell in the post of in charge of Forests of Bombay. His collections were sent to Manchester. David Ritchie (1809-60) made collections in several parts of India such as Sind, Mahratta country, etc. His collections were kept in Edinburgh Herbarium. Herbert John Giraud (1842) and B. K. Kamphoven (1945) also made collections near and round Bombay. The collections of the latter are at Copenhegen and Kiel. In 1862 G. C. M. Birdwood published a catalogue of the economic products of the Presidency of Bombay. Gell compiled the local names of plants in western India and published in 1863, a note book for use in the jungles of Western India. Arjun (1878) published a catalogue of Bombay drugs including a list of medicinal plants of Bombay. Dymock and Gadgil published (1883) a glossary of vernacular names of principal plants and drugs of Bombay. Dymock also published the vegetable materia medica of Western India in 1885.

W. Gray wrote on Botany of Bombay Presidency in the Gazetteer of the Bombay Presidency Vol. XXV in 1886. Lisboa wrote an article on the useful plants of Bombay. G. H. D. Wilson and J. G. Macrae published list of Gujerat trees in the same Gazetteer.

Another important account of the "Flowering Plants of the Western India" is by Nairne, published in 1894. This is a small book with very brief description of plants. Nairne also published account of his lectures to students of Botany in Western India and an elementary botany on the Bombay Presidency in Journal of the Bombay Natural History Society Vol. IV.

After the publication of Hooker's Flora of British India, Cooke's Flora of Presidency of Bombay, published from 1901 to 1908 is the only comprehensive account of the vegetation of Bombay. Cooke had however not collected in all areas of the Bombay State because roads and means of transport were very bad and the species described by Cooke do not give detailed

View of the Law College Building where the Western Circle of the Botanical Survey of India was originally situated.

notes on distribution. Woodrow published a series of papers on Flora of Western India. Birdwood published lists of plants of Matheran and Mahabaleshwar. Cooke also wrote short papers on these areas. After the publication of Cooke's work, the only important work on the vegetation of Bombay was by Talbot, who published in 1902 *The trees, shrubs and woody climbers of Bombay State* and in 1909 *The Forest Flora of the Bombay Presidency and Sindh.* Talbot obviously confined his Flora to the Forest species i.e. trees, shrubs and woody climbers. Talbot's Floras were based on the collections now lodged in Poona Herbarium. W. F. Biscoe published (1910) a list of trees and shrubs of Indore.

Isaacs published a sort of text book for students. Some families of the Bombay flora are described by Blatter, McCann between 1926-35.

Studies on Flora of Bombay were started by Rev. Fr. H. Santapau and his students at Bombay. This group of workers has, however, chiefly confined themselves to the Bombay and Salsette Islands and their vicinity. Santapau has published *Flora of Khandala* and *Flora of Purandhar* which describe the plants of about ten square miles each. He also published a list of plants of the Dangs areas. B. A. Razi, S. P. Agharkar and V. D. Vartak have published some work on Poona and its vincinity.

Grasses and grassland ecology of Western India has been studied by Lisboa, Blatter and McCann, Bor, G. A. Kapadia (1950), K. Rangachari and C. Tadulingam. The most important work on grasses of Western India—the book of Blatter and McCann was largely based on collections of Poona herbarium and a number of Gramineae sheets bear annotations in hand of McCann, Bhide, etc.

Ecological studies in Bombay State have been made by Burns, Kulkarni, Godbole, Bharucha and Nawalkar and their students. They have published a number of papers on the vegetation of Bombay mangroves, Matheran and Mahabaleshwar. G. S. Puri and his associates have published a number of papers on ecological aspects of Indian vegetation, also pertaining to western India.

One of the earliest records of collections of ferns from Bombay is of Dr. A. H. Leeth, whose collections are reported to be in Manchester. In 1883, Beddome published an account of Indian ferns. Pteriodophytes of Bombay were studied first in detail by Blatter, who published an account of ferns of Bombay State in 1908. This work was later extended by Blatter and Almeda in 1922. T. S. Mahabale and his associates have been doing work on the Pteridophytic flora of Bombay since last 20 years and have published a number of papers on various Genera. Gupta is working on Botany and Ecology of Marsilea.

V. F. Brotherus published an account of Bryophytes of Southern India in Records of the Botanical Survey of India I, No. 12. H. N. Dixon published an account of mosses of Western Ghats and Sedgwick wrote the first list of mosses from Western India. Mosses of Bombay were later studied by Blatter in 1929.

The Algal Flora was studied by Boergessen. Biswas published a general review of the Marine Algae of Western Coast in 1945. Gandhi has published some papers on the Diatoms. Algae are now being studied by Gonsalves and her associates. Butler had studied the fungi of India. The fungal flora has also been studied by Mundkur, Kamat and M. J. Thirumalchar and their co-workers.

Rajasthan

One of the earliest works in the Botany of Rajasthan was by King in 1879, who published a sketch of the Flora of Rajputana. The vegetation of Rajasthan did not attract much attention from Botanists after that till about 1918 when Blatter and Hallberg published a series of papers on the Flora of the Indian Desert, chiefly of the areas of Jodhpur and Jaisalmer. In 1952, S. P. Agarkar, G. S. Puri and K. Biswas and R. S. Rao briefly described the ecology of Rajasthan desert. Recently Shanti Sarup and his students have published a number of papers on Botany and Ecology of Jodhpur and other small areas in Rajasthan. Some work has also been done on the plants of Pilani and its neighbourhood by B. V. Ratnam, Mulay and T. S. Bakshi. Now the Desert Afforestation Research Station at Jodhpur is also engaged in Botanical and Ecological studies of the Desert. Thus it will be seen that the account of the vegetation of Rajasthan is not complete

Cutch and Saurashtra

Blatter published an account of the flora of Cutch in 1910. This is the only work pertaining to the Flora of Cutch and so far no detailed studies have been made. J. Indraji Thakkar and Gokuldas Bhamdai published in Gujerati accounts of plants growing in Cutch and Saurashtra. They put more stress on economic plants. The Flora of Northern Gujerat was studied and described by Saxton and Sedgwick in 1918. Some aspects of Saurashtra Flora were studied recently by M. B. Raizada and H. Santapau, who have published a list of plants of Saurashtra and a Flora of the Gir forests. Barda Hills were studied earlier by J. Indraji Thakkar in 1910. It will be seen from the above that a comprehensive flora of Cutch and Saurashtra also does not exist so far.

Mysore

In 1894 Cameron published an account of the forest trees of Mysore and Coorg. Mysore State as such, has almost been neglected from the point of view of Taxonomic studies and the only recent floristic works pertaining to this area are the publications by B. A. Razi, H. C. Govindu and C. S. Venkatesh.

Kerala and Madras

Two early works on the Flora and forests of Kerala are by Bourdillon and Rama Rao. There have not been any recent studies on this flora. Gamble's flora of Madras published during the years 1915-1936 includes some areas of the Western Circle.

Fyson's Flora of the Nilgiri and Pulney Hill Tops, 1915 and South Indian Hill Stations published in 1932 pertained to small areas of the Hill tracts. These short Floras are however useful because they are illustrated. Short papers on new records, new species and nomenclature have been published by Talbot, Blatter and Hallberg, McCam, Fischer and Santapau and their co-workers.

The Western Circle of the Botanical Survey of India launched upon an exhaustive exploration programme. The work was started in March 1956, and considerable progress has since been achieved in various items.

The more important activities were concerned with (1) the Botanical explorations of areas falling within the jurisdiction of the Western Circle, (2) vegetational and ecological field surveys, (3) revision of the existing published accounts of Floras, (4) setting up of natural reserves and museums, and (5) instructions in systematic field-botany to University students and other interested persons. Botanical explorations were conducted in Kanara, Mysore, Kerala, Bombay, Cutch, Saurashtra, Rajputana, and among the under explored areas Khandesh. Coastal areas have also been explored specially for Mangrove vegetation. In the Museum, carpological collections of fruits, seeds, barks, fungi, lichens, timbers, etc. have been deposited. Charts, maps and murals add to the popularity of the Museum of the Circle. The various explorations have yielded considerable collections, the herbarium specimens prepared of which have been added on to the herbarium of the Circle.

HERBARIUM

The Western Circle received from the Bombay State the Herbarium of the old Botanical Survey of India. The Herbarium of the Western Zone of the old Botanical Survey of India at Bombay was being managed by the Government Botanist at Bombay. Dr. Theodore Cooke of the Science College was appointed Honorary Director of the Botanical Survey of Western India. Dr. Cooke and Prof. Woodrow undertook a survey of the Bombay Presidency. Their collections and the library were kept at the Ganeshkhind Botanical Gardens, Poona (where the present Poona University is located). Cooke and Woodrow were helped by a number of Indian co-workers and assistants such as Shri Kanitkar (1891), Ranade (1893) and Bhide (1898), Cooke made collections in Mahabaleswar and Matheran and published notes on their Flora. In 1896, Cooke retired from service and returned to London. He continued to work on the collections of Bombay Presidency for sometime in the Kew Herbarium, and embodied his studies at Kew in his Flora of the Bombay Presidency. Woodrow succeeded Cooke as the Director and published some of the unpublished notes and work done jointly or separately by the two in the Bombay area. Woodrow published notes on his journey from Poona to Nagotna, some new records, and then a list of Bombay Plants. In 1899, there were about 1400 species in their collections making a total of about 5000 sheets. This entire collection was unfortunately destroyed by fire in May 1902, and this valuable collection was lost. It is feared that a number of type specimens must have been destroyed in this accident. Dr. Cooke however had with him one duplicate set of his collections of Bombay flora and presented that to the herbarium. This generous gift, therefore formed the nucleus of the Poona herbarium. This herbarium was then located in the Agriculture College, Poona in the care of the Economic Botanist to Bombay Government.

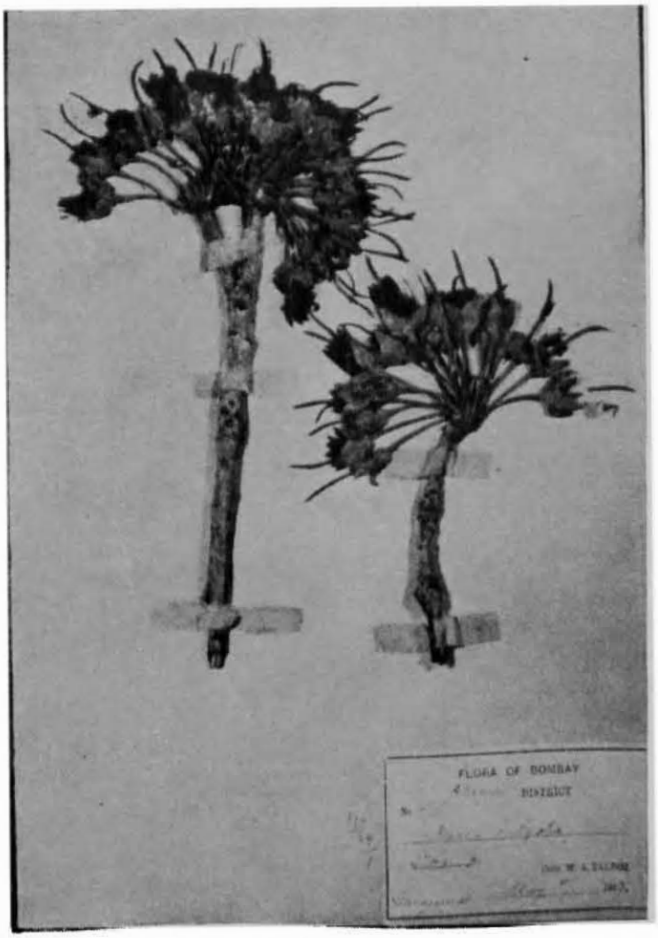
Woodrow was succeeded by Gammie. Gammie made large collections from the Bombay State and from the Himalayas, Kashmir to Assam. Gammie thus expanded the sphere of the utility of this herbarium much beyond Bombay State. A number of workers such as Patwardhan (1908), Paranjpye (1909), Burns (1916), Narayana (1922), Godbole (1929) and Garade, contributed considerable number of specimens to the herbarium. Paranjpye added about 500 specimens collected by him from Mesopotomia. Chibber's collections including a large number of specimens from Sind also were added. Ryan who was an Officer in the Bombay Forest Department made collections in Thana district and gave his collections to the herbarium in 1908.

Specimens from other parts of India and from countries outside India were added by exchange. The herbarium of the Royal (now Indian) Botanic Gardens, Sibpur, Calcutta and the Saharanpur herbarium sent some specimens to the Poona herbarium. Specimens received in exchange included collections of Albert, Gage, Mokim, Prain, Scortechini, Chatterjee, King, Fischer, and Willis from Burma, Calcutta, Assam, Malaya, Ceylon etc.

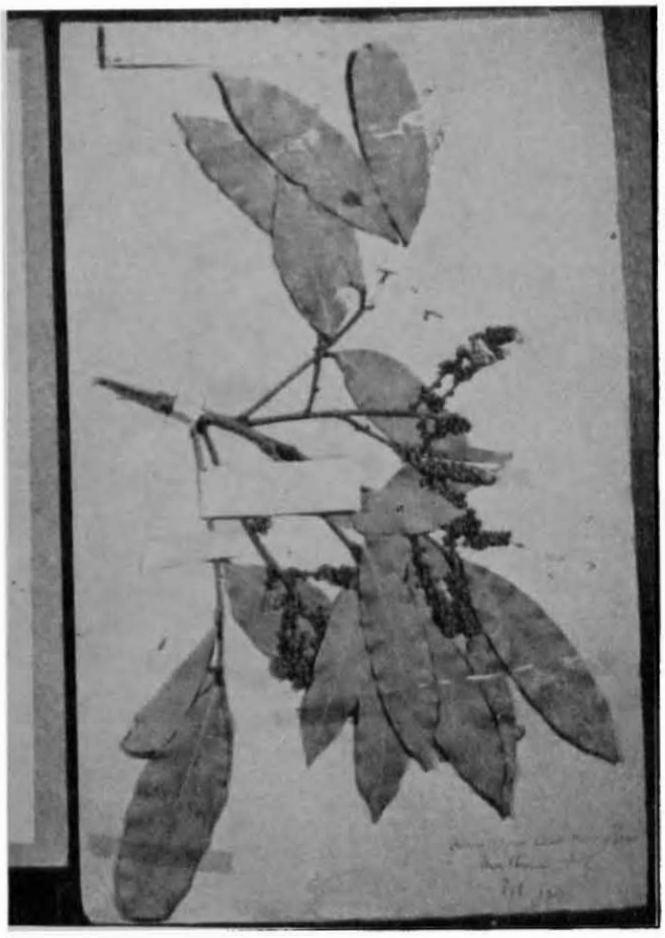
Talbot's collections chiefly of north Kanara which numbered about 10,000 were purchased and added to the herbarium in 1910.

The herbarium has got some type specimens too, e.g. *Eleiotis trifoliolata* Cooke, *Eremopogon paranjpyeanum* Bhide. These specimens are not marked as type but are from the type locality and names are written in author's own hand and also they are cited in original descriptions.

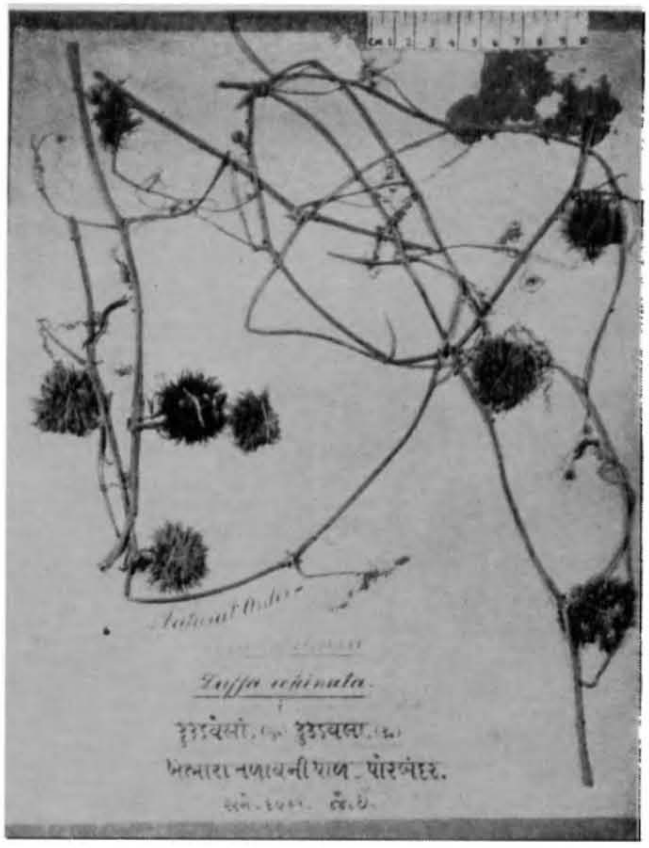
Cooke has referred at a number of places about his species and other species in his Flora to the specimens in Kew Herbarium. Therefore Cooke must have deposited some duplicates of his collections at least the type specimens in the Kew Herbarium. There are no specimens of some of Cooke's own species in the Poona



A sheet from Talbot's collections, 1907.



A sheet from Cooke's collections, 1892.



A sheet from Indraji Thakkar's collections, 1905.

A sheet from Indraji Thakkar's collections, 1915.

Interior view of the Museum and the Herbarium.

Herbarium. This gives to doubt that these type sheets were perhaps destroyed in the original herbarium by fire, and Cooke had no duplicates of these in his personal set, which he gave to the Herbarium.

This herbarium was transferred to the Botanical Survey of India, Western Circle in 1956 through the courtesy of Principal L. S. S. Kumar, the then Economic Botanist to Government of Bombay and Dr. T. G. Shirname, the then Director of Agriculture. A number of these sheets were in very fragile conditions. Some have lost all leaves and flowers leaving bare twigs. Every effort is being made to repair and renovate these old sheets. Their mounting paper has become very brittle and in some cases it is falling to pieces. Such sheets have been renewed by supporting on new sheets. The fallen parts are being carefully pasted in position or kept in packets pasted on sheets. Sheets have been catalogued on index cards for easy reference. The new collections will also be catalogued on these index cards. The herbarium has over one hundred thousand sheets. The herbarium is arranged according to Bentham and Hooker's classification. The new collections have been kept separate from those of Cooke's and Talbot's. The Herbarium is frequently consulted by teachers, students and research workers of local and outside institutions. The specimens have also been made available to specialists all over India for study and examination. The Herbarium now is one of the best Indian Herbaria maintained on modern lines.

Library

The library of the Western Circle has a number of important books needed for our daily work. Also a large number of books have been ordered and are soon expected. There are about 500 books pertaining chiefly to systematic botany, ecology and allied sciences.

The library regularly receives 10 Indian journals and 15 foreign journals. About 500 reprints of the important botanical and other papers have also been received as gfits or in exchange.

In addition to this, the personal library of Dr. G. S. Puri, which is one of the best collections of ecological books and reprints is also readily available for study to the workers in the Western Circle.

Public Relations

(*a*) *Medicinal Plants:* The survey parties of this office bring information of immense practical value on medicinal plants. Notes are made on the distribution, local names and uses of medicinal plants growing in virgin forests and in other areas in the Circle. Notes on important economic and medicinal plants are submitted to the Chief Botanist, from time to time.

(*b*) *Grasslands—Fodder grass resources:* Studies have been made on the various kinds of grasses growing in the Circle and data are being compiled to find out the value of the different grasslands as fodder resources.

(*c*) *Soil Conservation and land use planning:* Large scale cultivations of the Rosha grass (*Cymbopogon martinii*) and *Agave* and *Cassia* species are found to be useful for conserving the soil and for covering the eroded hill sides. Notes concerning these plants were submitted to the Chief Botanist. A number of State Governments have taken up the cultivation of these plants for soil conservation and for covering the eroded lands. All these plants are of economic importance.

(*d*) *Desert Control*: Observations were made on various plants that can be used for arresting the spread of desert conditions and after surveying Rajasthan desert, a detailed note was submitted to the Chief Botanist.

(*e*) *Public enquiries*: Public enquiries of varied nature are duly attended to. They include requests for dry specimens, fresh material for analysis, information on uses, distribution, cultivation, occurrence, nomenclature etc.

This circle is fast expanding and is becoming a centre for research and study in various branches of botany, chiefly systematic botany and ecology.