

The Royal Botanic Garden, Calcutta.*

THE Royal Botanic Garden, Calcutta, was founded in 1787. Lt.-Col. Robert Kyd, Col. of the East India Company's Engineers and of the Bengal Infantry, Secretary to the Military Board in Calcutta, proposed to the Government in Calcutta to establish a botanic garden on the 1st June 1786. The East India Company was still a Trading Company and this proposal to form a botanic garden was recommended to Sir John Macpherson, Governor of the Company's Settlements in Bengal, on the ground that by its means, might be introduced cultivation of Teak and Malayan specimens into a province near one of the Company's chief centres. Kyd was an ardent horticulturist and was a man of great energy and shrewdness. He held a position of considerable influence in those days. His suggestion was promptly taken up by the Government of Bengal. Without further delay they secured with the subsequent approval of the Court of Directors in England, the present site recommended by Kyd covering 300 acres. The Garden was henceforth the property of the Hon'ble Company but under the control of the Governor-General in Council. It is thus known locally as "Company Bagan". When the Hon'ble East India Company was dissolved, all its rights, duties and privileges were assumed by the Crown and the Garden became Her Majesty's Botanic

Botany of the galaxy of brilliant botanists who followed Roxburgh; the names and the years of their services are given below:

Dr. Francis Buchanan (afterwards Sir Buchanan Hamilton)	.. 1814-1816
„ Nathaniel Wallich	.. 1817-1846
„ William Griffith (<i>Offg.</i>)	.. 1846-1848
„ McCllland (<i>Offg.</i>)	.. 1848
„ Hugh Falconer	.. 1848-1855
„ Thomas Thomson	.. 1855-1861
„ C. B. Clarke (<i>Offg.</i>)	.. 1869-1871
Sir George King	.. 1871-1897
Sir David Prain	.. 1897-1903
Col. A. T. Gage	.. 1906-1923
Mr. C. C. Calder	.. 1923 to date.

As it is often asked what economic purpose the Garden serves, a brief mention of the part played by this beneficent department of the Government may be of value.

No small part of the benefits conferred on the country by the Garden in its early days was the demonstration by practical experiment that certain natural products, many of them of a most desirable kind, cannot be grown in Bengal; much money and bootless effort being thus saved to the country. The cultivation of the teak tree, for the sake of its timber, then so invaluable for ship-building, was also begun on a large scale and was continued for 35 years, by which time it became clear that, although the tree to all outward appearance grows well on the muddy soil of the Gangetic Delta, its stems become hollow near the base, and is incapable of yielding sound timber of large scantling. The introduction of exotic timber trees also received early attention; and in the Garden there still remain a few of the original mahogany trees introduced in these early years. The introduction of tea was one of the items put down in Col. Kyd's original programme; and in the final establishment of what has now become one of the most important industries in Northern India, the Garden bore a most important part. Potato-growing was initiated by the agency of this Garden. The cultivation of the quinine yielding cinchonas of the Andes was originated and carried to a successful issue in the plantation and factory in the Darjeeling District, and the Government Hospitals and Dispensaries have for years been and still are being supplied from this source. In the improvement of Indian cotton, and in the introduction both of that and of jute to the markets of Europe, the Garden authorities worked cordially hand in hand with the Agri-Horticultural Society of India; with what success it is unnecessary to point out. By the introduction of some of the best kinds of sugarcane from the West Indies, and the dissemination of these to all parts of the country, a considerable improvement was effected both in the quality and quantity of sugar crop of the country. In this matter also the Agri-Horticultural Society worked hand in hand with the Garden authorities. Very soon, after the establishment of the Society just mentioned, a considerable piece of land in the Garden was made over to it rent-free, and on this land the Society conducted the greater part of its operations for 40 years. In fact, it was not until the year 1872 that the Society's garden was transferred to its present site in Alipore. It



The Palm Avenue, Botanical Garden, Calcutta

Garden. Apparently on the constitution of the Province of Bengal in 1834, the control of the Garden passed on to the local Government. The epithet Royal came to be applied to it after the Queen's Proclamation of 1857.

The whole of the area with the exception of 27 acres which was given up to Bishop Middleton for an English College still continues under cultivation as Botanic Garden. This Bishop's College was subsequently converted into the neighbouring Bengal Engineering College.

William Roxburgh who is rightly called "the father of Indian Botany" succeeded Col. Kyd, the Hony. Superintendent, in 1793 as the first official superintendent. Roxburgh's *Flora Indica* and his *Icones*, formed the basis of all subsequent works on Indian Botany. In the course of this short contribution, it would not be possible to narrate the monumental works on Indian

* The 150th anniversary of the foundation of the Royal Botanic Garden was celebrated on the 6th January 1938.

is unnecessary to discuss in detail the numerous experiments in the cultivation of economic plants which have been and are still being conducted in the garden since its beginning. A few of the products tried may simply be mentioned. Chief among these are flax, hemp, reha or ramie, tobacco, henbane, vanilla, coffee, India-rubber, Japanese mulberry, cardamoms, tapioca and cacao. As regards horticulture, it may suffice to say that a large proportion of the kinds of exotic plants now found in private gardens in India have been introduced into the country through the agency of this Garden, and that the improved methods of cultivation were to a great extent initiated here.

The Garden containing about 13,000 species under cultivation, offers enormous opportunity for the study of the tropical flora. These are arranged regionally over the whole area which are divided into 25 working divisions.

The Garden with the Herbarium and Library offers valuable materials for study of Indian plants in detail and tropical flora in general both in its dried and living state.

Thus in the long history of the Garden its usefulness has been for the benefit of India as a whole—not merely for Bengal. The scientific

results obtained and the monumental publications of the *Annals* of the Royal Botanic Garden, Calcutta, are of world-wide interest. The collections of the herbarium are incomparably the most valuable scientific collections of their kind in Asia and one of the most valuable in the world. The Herbarium with the library is fittingly situated in the Garden. The collections of the Herbarium dates from Roxburgh's time. The approximate number of sheets in the Herbarium is estimated to be about two and a half million. These are arranged according to Bentham and Hooker's *Genera Plantarum*. All the precious collections of India, Burma and a fair number of plants of those of Asia outside India, Europe and Australia, also a few of Africa and America are housed in the Herbarium. The provincial floras are stocked in almirahs situated in the northern wing. The southern wing is mainly occupied by the Library. The Library contains nearly 2,500 volumes and some of the oldest botanical periodicals, the full set of the irreplaceable Roxburgh's *Icones*. The present Herbarium building is damp-proof and fire-proof and was erected specially for the purpose by the late Sir George King in 1883 for housing securely the irreplaceable collections.

The Chemistry of Sesquiterpene Ketones.*

ALTHOUGH the terpenes have been extensively studied during the last fifty years it is only within the last decade that the sesquiterpenes and their derivatives received the attention of chemists. With the exception of dorenone described by Semmler in 1917, no sesquiterpene ketones were known to occur in volatile oils till 1932 and their isolation opened up an interesting field of research. Eremophilones from the wood oil of *Eremophila mitchelli* were the first series of sesquiterpene ketones to be isolated¹ and were found to belong to the eudalin group. Eremophilone forms an epoxide with alkaline H_2O_2 and gives a hydroxymethylene derivative thus showing the presence of the grouping $-CH_2-CO-CH:CH$. An isopropenyl side chain was indicated in eremophilone and in hydroxydihydro-eremophilone and an isopropylidene in hydroxy-eremophilone. The naphthalene hydrocarbon obtained by treating eremophilone with Grignard's reagent and selenium was found to be not 1:3-dimethyl-7-isopropyl-naphthalene as per eudalene structures thus throwing a doubt on the presence of the angular methyl group. The new structures adopted are allied to the ionones and resin acids and are under investigation. Shortly afterwards in 1934, St. Pfau and Plattner² described two ketones α -atlantone and β -atlantone occurring in Atlascedar wood oil. Their presence in the oil had been overlooked previously since α -atlantone is hydrolysed readily by alkali. The formula assigned to these are based on degradation of atlantones to α -acetyl-dipentene and 4-methyl- Δ^3 -tetrahydro-acetophenone. The presence of a small quantity of γ -atlantone was also con-

cluded by formation of 9-acetyl-terpinolene with potash.

Closely related to these two ketones but of an aromatic type are the sesquiterpene ketones turmerone and *ar*-turmerone present in admixture in the oil obtained from the tubers of *Curcuma longa* which have been worked out with great ingenuity by Rupe, Clar, St. Pfau and Plattner.³ Recently, B. Sanjiva Rao has isolated from the oil present in the tubers of *Cyperus rotundus*, a sesquiterpene ketone α -cyperone which like eremophilone is a derivative of eudalene. It is stereoisomeric with β -cyperone, the two ketones differing from each other in the disposition of the angular methyl and isopropenyl groups and related to each other as menthone and isomenthone. Cyperones have recently been synthesised at Oxford by Prof. Robinson and at Bangor. The very elegant method, so very characteristic of Oxford laboratories, in recent years gave an optically active α -cyperone.⁴ Although the synthetic cyperones differed somewhat from the natural products, there appeared to be little doubt that the products had identical structure. The importance of the synthesis lies in the fact that it definitely establishes for the first time the presence of the angular methyl group in cyperones and in compounds of the eudalene type. This is of significance in connection with the eremophilones already referred to.

Though the analytical chemist's methods and weapons have reached a stage of perfection that it cannot be said with the same force, as was said some years ago, that a proof of a particular structure lay in its synthesis in the laboratory. There is no doubt however synthesis plays its own part in some doubtful cases as the above. With compounds of increasing complexity, the

* Synopsis of an address delivered by Professor J. L. Simonsen, D.Sc, F.R.S., at the Indian Institute of Science on 13th January 1938.

¹ Bradfield, Penfold and Simonsen, *J.C.S.*, 1933, 2744.

² *Helv. Chim. Acta.*, 1934, 17, 129.

³ *Ibid.*, 1934, 17, 372.

⁴ Adamson, McQuillin, Robert Robinson and J. L. Simonsen, *J.C.S.*, 1937, 1576.