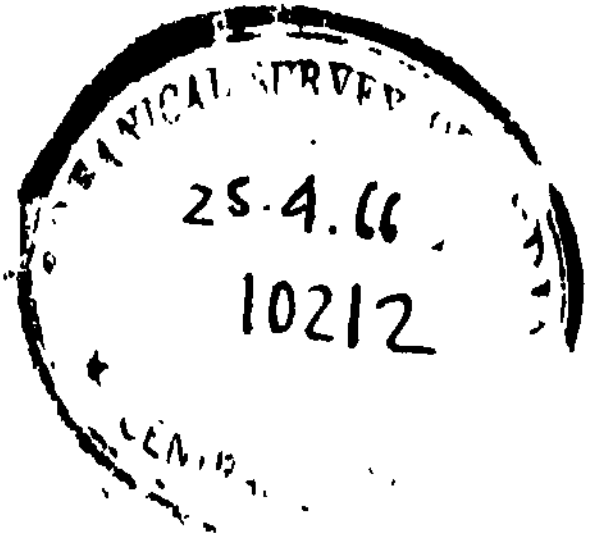
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Report of the Director of the Botanical Sum* of In^ «* the year 1900-1910.

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1. Eastern India.—BENGAL.—During July and August 1900 Mr. W. W. Smith ^;A.CumtoroftheHerl)arium, and Mr J>.W-^^Wy Curator of the Lloyd,^tanic Gardens, Darieeling, were deputed ^ ^ J g ciplore the little known north-west oor^r of Sikkim that c e n s e s ^llcys of th,- Zemu and Lhonakh riven with their tributaries including aboul their workweil and returned with acme 6,000 • -£ « * ^ ^ n t o f tw. ** «pedes new to science. Mr. Smith has prepaid a je ew speci ^ tha| «J *" and it, botanical result*, with description* of u# n^ ^ ^ ^ *™ a W?* >* the Records of the Botanical Sj^Jj"J^ributi*! by the late> !!»*£* for it. Collections from the outer luDj *«£ f ^ of the Cinchona *•& Pantling and by Mr. G. B.Shaw, B.Sc, F.C.S.. *»» "apartment, and by Mr. fc. B. Cooper.

iP(J^I TEllK BENGAL A»D AMAM.-Jn this V«>™* Z^ worked for part of the year in the Terai of the Jalpaiguri district. neotsaarily "Hrtncted to the agency of native oollectoni. Trained Upcws ^^ ^^

thft J ^ r - 1 * ^ acccasions of material, that ™" J * 0 ^ *filing* the year, the flora of Burma come* to be worked up, were wee* 1,000 excellently «r. J. H. Lace, Chief Conservator of Forests P ^ ^ J T very inadeqiiatdy Pn«erved specimens that contained many specie*. P^^butionH Uiat include represented in the Calcutta Herbarium. I ^ n t f f i . W. MacGnw. species lurSlei10 ^deacribed were also receive*! f roc ^ J ?-* Deputy Conser-I.MA.,Southern Shan States, and from.the Wgfjf of fc Southern vatori^Mr. G. B. 8. Cubittof Bhamo, Mr. H. W. A. J «» M. BuchatlRn of Shan 8totes, Mr. A. Rodger of the Ruby Minos, and Mr^ ^^ iBdchlnl> Myitkyina. To all thoac officers the Botanical ^^ tion of over l(XH> From the Burma-Yunnan frontier a particularly ftnC^V'. bounical explora-sheeU was obtained from Mr. G.ForrSt, well known for h» ^ wons in China. thc y^, to

2- Western India.—The most important ^ntT^uti^h^ during been furnishi'd OUT knowledge of the vegetation of the Bombay 1 wwdency. n first ^ ^ ^ <)f *>J Mr. W. A. Talbot, F.L.8., late Conicrvator of rorcst-s ™ *inc*\udinn t>M whose illustrated *Flora of the Boiv^y Pretidency* lias appo""*. orders from *RimutuxHoce** to fiow^a?. Orchids of the

Mr. G. A. Gammie, P.L.S., continues his account tf»V on of tiic gpeciw ..ombay Presidency, his latest contribution being »d £*V£ Bbttl•Tf S.J.. has of *Yawl** occurring in Western India. The Reverend *«""* on the We8teTn Gh^ts "^ ^ u i ^ the floraof Pan^^iV^^Tlndia continues to be near Mahableshwar. The moss flora of this side of wa» wu •tadied by Mr. L. J. 8edgwick, I.C.8. t of Bombay,

Mr. W. Burns, B.Sc., Economic Botanist to the G o j ^ " ^ ^ the plait has collected in the Dharwar and Broach Districts and ha* siu has given atUn-life of certain limited areas in relation to environment, uo the Presidency, tion to the genera *Mangi/era* and *Tamarix* as they occur in ^ chicny Hia aasistantfl toured through various districts »d mjje^o of grasses. About 1,000 sheeto were added to the local nerbarium ^ ^^ i ^ 8%5°ttth©ni IndUL-For help in collecting and ijn^^j»Wg d dunn?? the ledge of 8outh Indian plants, the Botanical Survey has been *unto*THCQ rf ^^^^ year as heretofore to Mr. C. E. C. Fischer. ^P u % \ ^ X Herbarium have Counbatore, throngh whose energy many gap- 'm &e Cttlciltto U been filled up. f ^ t j 000

k 44 North-Western India.—From Nepal ^ ^ ^ S ^ t S ! ^ ^ •heeU made by Mr. I. H., Burkill, M.A., F.L.8., **V°*r^^ theKuma a di* ducu,mostiy from the district around Katmandu. *™Si orflertor- under tnct a collection of about 600 specimens was made by nawve Q n m c * the supemaioii of Mr. N. GUiTFLS., Supcrintendent or ™

Gardens there. Mr. A. R. Tucker, late of the Revenue and Agricultural Department, presented over 300 specimens of plants from the neighbourhood of Simla, Colonel C. J. Bamber, I.M.S., P.L.S., has continued his work on the Plants of the Punjab, North-West Frontier Province and Kashmir. Mr. J. P. Duthie, B.A., P.L.S., has during the year finished his material for Volume II of *The Flora of the Upper Gangetic Plain.* Mr. James Marten has devoted attention to the plants in and about Muwoorie and has published a list of them with their times of flowering and other information.

6. Publications.—No official publication appeared during the year, not for lack of material but simply because the press has not been able to issue the work on hand during the year. There are in the press the following: *The Species of the Genus Damonorops* by Signor Beccari, which will form Volume XII or part of Volume XII of the *Annals of the Botanic Garden,* and will be a work with about 100 double plates after the manner of the previous volume on the species of the genus *Calamus,* referred to in last year's report; *Notes from a Botanical Tour to Nepal* by Mr. I.H. Burkill forming No. 4 of Volume IV of the *Records of the Botanical Survey,* and embodying an account of the botanical results of the author's tour to Nepal in 1907; *Catalogue of Non-herbaceous Phanerogams cultivated in the Royal Botanic Garden, Calcutta, Part? I (numerical) 1st Fasciculus,* by the writer of this report, forming No. 1 of Volume V of the Records, and furnishing an index to the first 4,000 plants in the Garden; the complete material for Volume II of *The Flora of the Upper Gangetic Plain* by Mr. J. P. Duthie. There are ready for the press *A Botanical Tour in the Zemu and Llonakh Valleys of Sikkim,* and *Nova stirpes Indiae* both by Mr. W. W. Smith, M.A., Curator of the Herbarium, the former being a detailed account of the tour referred to in the first paragraph of this report, the latter being descriptions of new species from various parts of India; aim 2nd Fasciculus of the Catalogue referred to already. A list of all publications bearing on the Botany of India is appended to this report.

A more detailed account of botanical work in India or concerned with India than is consistent with the scope of this report will be submitted later on in connection with the Board of Scientific Advice.

8. Financial and Staff.-The Imperial and Provincial grants were spent in full. The Director was in charge of the department throughout the year.

A. T. GAGE, *M.B., Major, I.M.S.,*
Director, Botanical Survey of India.

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• Easai d'une clarification des *Oratory I on* atiatique*. *(Notnl. Syatem, 1909,14.)*

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CALCUTTA · PRINTED AT GOVT. PRINTING, INDIA, 8, HASTINGS STREET.

Report of the Director of the Botanical Surrey of India fi» the year 191041.

1. **Eastern** India-r-The Director ia Ifts capacity as 8upcrint«.j the Royal Botanic Garden, Calcutta, has continued his work of «ataW?« at * trees and shrubs cultivated therein*. Up to 10,000 numbers hare S^*• checked, leading orer 8,000 still to "da During the rainy season of To! A Y** W. W. Smith, Curator of the Herbarium, studied in the field the venur **• the south-east corner of Sikkim in the same way as he had done the W^on oj corner of that state in the previous year. On this occasion his 01 * ° * ranged along the Sikkim side of the Cho-La ridge that separates Bikki ration the Chumbi Valley and extended practically from Lingtu and Gyi-mi k*0111 the Thanka-La. The weather conditions in contrast to what was expo *° in the Llonakh uplands in the previous year were very bad, but m spiu «?ac^ drawback Mr. Smith collected about 6,000 specimens and first-hand mat* tua for an account of the vegetation of this area that will appear in the Record rials the Botanical Survey in due course. The routes followed in 1909 and 19n? a* shown in the map illustrating No. 5 of Volume IV of the Records which *** about to be issued. The collection from the Cho-La in addition to condn^ to a more accurate knowledge of the vegetation generally of the an ? yielded over a doien species new to science. Towards the end of the year TU Burkilf, Reporter on Economic Products, in the course of his tours underta r. in that capacity along the Nepal frontier also made collections and rec^nJ observations on the vegetation of the area traversed by him alon* the fnw tu trade route. Mr. H, H. Haines, Conservator of Forests, has during the ycer issued the fruit of his botanical observations and collections made in the car of his several years service in Cbota-Nai,'pur in the shape of an exceUent course Forest Flora of that Division and of Gangpur and thr Santhal-Farganahs. This forms a valuable contribution to a systematic knowledge of the vegetation of *tie* ngal.

Although the Botanical Survey as a Department was not able during the year to work direct in Burma it has largely benefited, as hitherto, by the practical in West in the vegetation of that province displayed by several officers of other department* of Government stationed there. Captain R. ^ Mac-Gregor of the Indian Medical Service has contributed from the Southern Shan 8tates a very interesting collection of about 1›dij) spraini-M amonRt which are several novelties. MessK A. Rodger, G. S tubilt and H. W. A. Watson all Deputy Consen-ators of ForesU, have sent uiaterials[from various p^ oj Burma. The first about 400 Bpeciinens fro">.*he Kuby MmeDlstrict, the second over 200 specimens from the Bhamo Division and Uio third a collection from the neighbourhood of Taungeyi.

* Western India-Mr. Burn*, Economic Botanist to the Bombay Gorernmen?, his studied the types of vwtation oc^arrmg on the w ^ near Bassein and has published his observation Mr Burns has aho prcN•nt<?d the survey with a small but interesting collection of ^cimens from th, H^ bay side. lie and his assistants have also eoUectod in ^ i r a› Foona, T|laQa Kolaba, Dharwar, Belgaum, SholaDur and SaUra• ^ f . ; ^ ^ o v e r ^ »heets to the local Herbarium. The W has »™^£™f»* hr the ac^mentoftheherbariuni-nu^b^ over 10,... Mr. T - C oreats, retired. . Gammie has published discr o! ... Sarcolabium. Sarcanthus. Cleisostoma, Po..nia, Spiranthes, Zeux Mr. L. J. Sedgwi ... ... ace, and has published a second list of species fou ...

3. **Southern India.**—The most important contribution from this area ras ... Meebold who on his own account made an extensive our ... of 1910 through the States of Cochin and Travancore. dr. Meebold h. e n r the collect ons j £ the Botai ... rden by over 2,000 aheerK-among*t <^™ff££ Conservator of ForesU. ... the above oentioned states. Hr. C. E. C. Fischer, i^p»7

before, contributed largely, over 1,000 specimens having been receired from him during the year Dr. C. A. Barbar, Madrai Government Botanist, pnnented over 800 sheets. Daring the year Dr. Barber had made a study of the natural order *Lorantliacem* while on leave.

f· Horth-West India.—4eYeral more parti of Colonel J. C. Bamber'» descri^iTe key to the Flora of the Punjab, North-West Frontier Province and Kash smir, have been issued during the year. Collections were made in the L '"tod Provinces' Himalayas by Indian collectors working—as during last year ^-undcr the care of Mr. N. Gill of the Kumaon Government garden. Lieutenant S. M. Top pin, R. G A., has contributed a small collection of llalakand "peci mens collecti-d by himself,

•V Publications.—Of the publications referred to in last year's Report ** tain? m the press, Signor Beccari's lar^e work on the species of the genus •"^*Monofopt* is about to iswe, while Mr. BurkilTs *Notet from a Journey to Xepnl* and the first fasciculus of the writer's *Catalogue of the non-herbaceous Phn»*rogam* cultivated in the Boyal Botanic Garden, Calcutta,* forming Jppe^JivHy No. fc of Volume IV and No. 1 of Volume V of the Records of the Zfotiital 8uney have been published. Mr. Smith's account of his tour in the Zemu and Llonakh valleys of Sikkim and descriptions of now species and the writer's wcond fasciculus of the Garden Catalogue just referred to are about to issue as No. 5 of Volume IV and No. 2 of Volume V respectively. The account of the determinations of prickly pears now wild in India by Mr. I. H. Burkill is now in type as No. 6 of Volume IV of the Records, while a third fasciculus of the Garden catalogue in ready for the press. Both Messrs. Burkill and Smith nave published several other papers on botanical subjects in non-official periodicals. Th-su are mentioned in the list ofpublished papers appended to this report. Th« second volume of Mr. Dutkic's Flora of the ipper Gangetic Plain including discriptions of species in the natural orders from *Plumbaginacece* to *Plnntagine** ha* been issued. Mr. R. J. D. Graham, Economic Botanist Central Provinces, has published a *List of wild plant* found on the Naannl «»d Te/in kheri Farms.*

6 Finance and Staff—From 1st of April 1910 the provincial grants in tli« (inrernmentH of Bengal, Eastern Bengal and Assam, and Burma were «^ntil the Survey was placed on a more satisfactory footing. Two Indian u«i<.tAnts for systematic work, a photographer and clerk were sanctioned wiiile Ro,000 were allotted for exploration, travelling allowances and contin-JJTICK*. Messrs. 8. C. Banerjiand M. S. Raniaswami were app*)inted assistants on probation for three years from 1st April 1010. Both have worked with cnnitiiriulabli- assiduity during the year and their help is much appreciated. The other nionilwn of the staff have also worked well. All the officers of the Survey wen* in charge of their respective posts throughout the year. The muiirct allotment for exploration and contingencies * as spent in full • but tliiTp was a saving if Rl,l!)5 under travellini? allowances. 'From Jnnuarv'lQll HM» Dr|iartmcnt ot Economic Product* was transferred to the Botanical Survey (J> ·IIHIUCTIM? Report of fhr Offiti.itmi? Rejwrttir on Economic Product ueaiir,^ Wltn tnr work of *hl%* D,.part_ment has been forwarded to Government *Exoratr'ir so thnt no n'f»n«ndL' is made to it here. A considerable amount of systematic bt>tanical work concerned with India has been done ntra-departmentally a?.d a <<onsidcrablr nttinlw of papers puMished in connection with such The . ii_ni,u_of thi, departmental report do not permit of appropriate reference btinu made to such work here but a mow detailed account of botanical wi york -enmlly done in or with reference to India will he presented later to the Buftrd of dcA-ntific .\.lrict'.

A.T GAGK, J/«/oi\ /.J/..V.,
Director, Botanical Surw, of India.

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Beptaiof the Botanical Survey of India for the year 19U-1918.

I. Systematic—*Eastern India.—The* work of cataloguing the trees and shrubs oi the Royal liotanic Garden, Calcutta, has a«ain tin> year taken up a considerable part of the Director's time. Towards the end of the year many species which were founH difficult to determine from comparison with the Sibpur Herbarium material were collected and taken to Kew where they will be worked out. The volume referred to in the opening paragraph of last year's report has been issued and this means an addition ot about 3.500 extra plants catalogued Eastern and Southern 1 ndia have practically monopolised as regards field work the energies of the Botanical Survey staff. In January and February 1913, the Director toured in tlie district .M .Burma and was thus able personally to supplement the excellent work of rorest and other Government officer; and private individuals who have tarn the mainstay of botanieal research in this province. The parts explored lie in North Arracan and the Toungoo district of Lower Burma. In North Arracan Major bage explored the district east of l'aletwa lying between the Kaladan and M_w Rivers, chiefly in the neighbourhood* of Kyaukpaudaung. In L.mer Burma he botamsed at Thandaung north-east of Tounguo. As the collevtions have gone to Europe it is impossible as yet to say much of how they will turn out, but as the idea was that of intensive collection Iroma hmHe,I area rather than extensive collection within a wider held it might be justihabfe to predict the existence of interesting it not new species. N>me hundrvds of sheets were obtained and the weather proved favourable, allowing of their collection and preservation under the best possible conditions. Iroin Burma Mr. J. H. Lace, Conservator of Forests, sent a small but very interesting collection made by Captain Abbey and himself During the year he has also published a .' List of trees, shrubs and principal climbers, etc.. recorded from Burma" The list which supplies vernacular names follows the arrangement of the Flora of the British India except that the species are arranged alphabetically under each genus. It should prove a most useful porket guide to field workers who have already reached the stage ot being able to identify fax lilies Mr 1) Hooper, Economic Botanist to the Botanical Minrrv. has contributed about 600 sheets which he had obtoined at various tunes in the Eastern Himalaya, Bengal, Burma, Assam and Southern India, etc. Mr. C. G. Rogers, Conservator of Forests, Burma, has continued to support hnuwcal work and a small though interesting collection of about 43 sheets has been sent for identification and record. During the year Mr. Lace has contributed some 200 sheets to the Herbarium. Mr. Jacob, who has been deputed from Assam as Forest officer to Bhutan, has sent an excellently preserved set consisting of about 200 sheets from this little known region. A small collection of mosses found at Mungpoo by Miss Warrack during the hot weather and rains of 1912 has also been presented to the Herbarium, and Mr. Caw. Curator of the Llovd Botanic Garden, Darjeeling. who has done excellent work in helping on "the Survey of the Eastern Himalaya, has «nt about 500 specimens and a similar number of specimens has been presented hy Mr B. J. Gould, I C.S., British Trade Agent at C.yantse The largest donation of the year has been from the Regius Keeper, Royal Botanic Garden, hdinhunjh, who has sent over 7,000 specimens which formerly formed part of W'ight's Herbarium, These arrived in a good state of preservation and are being mounted and laid in. The collection has been drawn from all parts of India and IU value is greater in that it includes a number of "co-types. * Our knowledge of the botany of Eastern India has been enriched by the publication in the Kew Bulletin of several new and interesting specie*. Mr. W. G. Craib and Mr. J. S. Gamble have been the chief contributors to this work. The species described have been collected mostly in Burma and the Shan States, hut Siam, the Malav Peninsula and the Eastern Himalaya have also yielded many noteworthy additions. As regards Herbarium work the following collections have been studied :—

(1) Mr. MeeboleVs collections in Mergui. Thaton and Salween in Lower Burma made in 1911-12. Nearly 2.000 sp.'cimens were worked Obt and listed for Mr, Meebold. The main features of this

collection were the conspicuous preponderance of the Malayan element in the flora, the occurrence of well marked endemic forms of typical Malayan species and the scarcity of Upper Burmese plant*.

(2) Captain Topping' Kampti Long Mission collections made in 1911-12. About 800 sheet* underwent examination. The families Leguminoss, Rubiaooe and Acanthacee seem to be well represented in the district.

(3) A small collection of plants made by Mr. Meebold at Mungpoo in the beginning of 1912 was worked out and several gaps in the Sikkim Local Herbarium filled.

(4) A collection of 789 specimens made by Mr. I. H. Burkill and Mr. S. C. Banerji in the Khasia and Jaintia Hills in 1911 was worked out and yielded five new records for the locality.

(5) Out of 2,022 specimens of Phanerogams and Ferns collected by Mr. Burkill during the Abor Expedition of 1911-12,1,442 specimens were studied at Sibpur.

(6) A set of 160 sheets sent at various times from various parts of Burma by Messrs. J. H. Lace and C. G. Rogers, contained on examination some interesting additions.

Western India.— Apart from Mr. Hooper's donations mentioned elsewheie, little has been received from Western India, but a revision of the publications of the year shows that botanical work on this side of India is being well supported. Mr. G. A. Gammie has added materially to our knowledge of the orchids of the Bombay Presidency and an excellent revision of the * lora of Aden has been completed by Father E. J. Blatter, S.J., whose " Flora of Aden " is at present in the Press and will appear in parts in the Records oi the Botanical Survey of India. The same author continues to publish in the .Journal of the Bombay Natural History Society an exhaustive account of the Palms of British India and Ceylon, indigenous and introduced. The work is beaut ifuljy illustrated by photographs and drawings which greatly enhance its value.

Southern India.—During the year the Director was able to depute two of the limited Botanical Survey staff to this part of the Peninsula. In February 1913, Mr. Hooper, Economic Botanist, and Mr. Ramaswami, Assistant in the Botanical Survey, toured in the Tinnevelly district collecting and making copious notes on the flora. The expedition resulted in the acquisition of about 700 sheets and of these about 500 have already been studied. So far the most extensively represented natural order in the collection is Leguininos* with 52 species followed by Composite with 32, Convolvulaceae, Acanthacesr. Labiate and Filices with 25 each, Verbenacess with 18 and Kuphorbiacra and ['rticace/p with 13 each. The remaining natural orders contain fewer than 10 species each. Mr. C. E. C. Fischer, Deputy Conservator of Forests, has contributed over 600 specimens collected from Coirabatorp. Anainiahi and Halni hills. Among the sheets sent were a few which Ionn excellent examples of new species recently described by Mr. W. W. Smith from Southern India. The services of the Reverend St. Munch, 8.J., and !te\erend A Sauliere. S.J., both of the S. H. College, Shembaganur, h.ue been enlisted and both have ungrudgingly contributed large collections from the Madura district and have done much to help on the Survey in the Skuthera Peninsula. In all about 700 sheets have come to hand, but the limited staff of the Herbarium has not been able to cope with all the demands for floral analytics and a considerable number of the Madura plants still awaits identification.' From what has been accomplished, however, it becomes evident that the typical Deccan Flora is well represented in the districts explored.

\ortk Went India.—Field work in this division of the Peninsula has been chiefly kept up by Captain L. A. Watson and Lieutenant G. G. Everett, both of the «<th Punjabis. The former contributed about 150 sheets of HaluchisUn plants and the latter a small collection from the same area. As regards systematic work on North-West India plants gathered during U* year, a coUectioo of about 100 Sind specimens sent by Mr. Hole of (b

Forest Research Institute in Dehra Dun sutmlifd «»«>r*i «~\ ^
and many noteworthy spjcies, not p r e v i Z f r t o W w ^ o t ^ ^ ^
Tephrosta was thought to be new and was sent to Kew for fit <*«f™*4.
tion. Kew has sin£ declared it u> be ne£ Mr H M C&Z^ *}?"»»*
from BaluchisUn were also worked out, but as 'the'specinier^I
complete the collection was only a f t My S 5 <. SiSThJS JT ^ \> in.
•how that it possesses consideraole interest. The flora i« «2 Of-P*** *i 1
that of the adjacent Indus plain and the P e r s o n " M * ? *n'£
fltrongly reprinted. The collections made last year bv I^dv L ^nt in
K. S. Imam-ud-dm in Kulu and Pangi have also*been studied --leaiu| Mr

II. Economic—Mr. Hooper has examined 271 nanmles nt various pro-
ducts during the year and the following notes on the resultTof his investiga-
Uons are submitted.

Gzms, etc.—SarcocoUa gum is one of the most peculiar natural secretions
of plants. Exuding from a shrub identified as *Astrawlus* / J.' l ulifolius,
Bois., growing in Persia, it is largely exported to Bombay, add ... lu
medicine and for adulterating opium. It is sweetish to the taste ...
solves for the most part in alcohol and in water. It is not a true gum 'V!- *lls.
gutta, but consists principally of a glucoside, sarrocoUin, which liift o or
properties from saponin and glycyrrhizin. ^ "»

Balsamodendron Playfairii, Hk. f.—This shrub growing on the S> mali
Coast yields a peculiar soapy gum called " Iloui " which is sent in larijrq u
titles to Bombay. It disintegrates in water forming a persistent lathe? *IIi
is used for washing the hair. It contains an avid resin, anluble in ether ... t
saponin. The occurrence of saponin in a natural exudation is |nvUlh.
Another substance of a similar nature was collected on tour in KaratV
This is called '* Dakh " and is brought from the Mekran Coast, Persian *V»uU*
and is also used by women for washing the hair. It differs from the aU»? i(j
its appearance and composition, but contains a resin and saponin as its prni-
cipaJ constituents.

Canarium bengalense, Roxb.—A sample of this resin was presented hy
Mr. Kemp of the Abor Expeditionan* Force. It had the usual properties »f a
dammar and is used for burning and cementing purposes.

Sealing wax.—Twenty-aeven samples of red waling wax were tested for
the Controller of Printing, Stationery and Sumps, Calcutta.

Oils.—Papaw seeds.— The seeds of the ripe fruit of the Papaw (*Carica Papaya*, Linn.) which are usually thrown away as useless were submitted to analysis. The small black seeds have a pungent musUrd-like odour and yield an ally! compound when distilled with water. They contain over a quarter of their weight of a yellow fixed oil. The centesimal composition is: water 8.2; oil 28.3; albuminoids 24.3; carbohydrates 15.5; fibre 17-0; ash *.8.

Litsaa volyantha, Juss.-This is a small evergreen tree met with from
the Punjab along the foot of the Himalayas eastwards to Assam. 1he wste
yield an oil which is'used medicinally. A sample pfU; taiU fr». Ma-
£hat, Assam, was examined. The dfinri seeds yielded 21^2 and the kernels
33 per cent, of a white crystalline fat; melting at 38.5°. The constants
werT add value 98-9; saponification ^alue 244.8;..od.ne value^ 34.4. The
fat is of a useful nature, and consists very largely, like that of other Litsaeas,
of lauric acid.

Cotton «e«rf.-The Director-General of Commercial IfteUipnce h« *w** for e^arainatioi, «mpl« of refined o.l. deeort.cted o o £ • « * «* X bull.. Th«e were folind to have a good appearance a n\d* V»« V V •tandard in companion of timilar products in the European markett.

5o, kaw.-Experiment. are .till being continued ... of
Soy be?n. in Northern India. The « ^ ^ , * J ^ in selecting suitable
the wed* are io various that wme care ha* to be exercwed ,^
•itc. for the different varieties. The ; ^ ^ ^ ± *X* ^ Ro>.
Garden., Knnuon. planted Hollybrook -» •• £J£*£B&UV" 1888
garh. Analyiia ahowed that the »eed- r.«D tta « » t w14 ^ per cent.
per cent, of oil and time grown «t t*i «»»'! wcality gave

Aļso samples of Gun bean grown at Douglas Dmle yielded 18-66 per cent of w and when grown at Ramgarh yielded 16-74 per cent

Toe Director of Land Records and Agriculture, United Province*, sent •ample, of the same kind of Soy bean grown in four different villages. They afforded 14·3, 12·2, 12·6 and 11-6 per cent of oiL

Ockrocarpoi nawuntis, T. Anders.-Flowers of this tree, called Tharapu " in Burmese, were received from Mandalay. They are interest-In£ a* yielding a perfume resembling violets, and the principle may be ex. traded by means of oils and fats.

A supply of the seeds of the plant was also received from Mandalay and they were tested with the object of discovering whether they were oleaginous »/»other seeds of the Guttifene. Dr. Dymock speaking of *0. longifoliu** says, The need exudes a viscid gummy fluid when cut." The seeds of" Tharapu " yield*! to ether seven per cent, *of* a fragrant yellow acid resin. The occur-"**** of a resin in place of oil in the seeds of Guttifene is peculiar.

Xepktlium Longana, Camb.—The fresh fruit afforded 13 parts of skin, pans of pulp and 27 parts of seeds in 100 parts. The seeds which are a *aste product are sweetish and slightly astringent and contain much starch. 1hemical analysis showed them to contain: moisture 10·0; oil 3-80; albumi-noid* 6·25; carbohydrates 73·76; fibre 3·6; ash 2·5. They are not oil seeds, out the composition shows them to have a feeding value equal to that of some cattle foods.

Fibre.—PUctrantku* Wigktii,* Benth.—This plant was sent from Assam *nere it is called * Adurantumf as a papetmak^ urtsjrial. S*mpW ot the dried plant yielded from 33-6 to 37·16 per cent, of cellulose.

*Food Huffs—Rice—1** Director-General of Commercial Tutelligence "*nt several samples of rice from Burma to ascertain if any difference in the imposition accounted for the difference in the price. Samples of rice from Japan and Java with a high valuation were also sent for the same purpose. As the result of a complete analyses of all the specimens there was nothing <n the chemical composition to indicate the relative value of the sample*; the difference in the price being in the appearance.

Edible root.*—The Director of Agriculture and Industries, Central Provinces, has furnished this office with an interesting series of tuberous roota eaten by the inhabitant*. Some of these being supported by botanical specimens Here identified and found to be new to Economic Botany, and analyse* were made of the more important ones.

The list included the following :—

(I) *Hibifcu** sp. Ban bhendi or Khapsi Kand. (2) *Pyenocyela glauea* Lindl. Tejraj. (3) *Peucedanum Dhana,* Ham. Kamraj. (4) *P. glautum,* DC. Bhojraj. (5) *Eulopkia* sp. Bansinghara. (6) *Habenaria platyykyUa,* Sprang. Chilam chatta.

The tubers were palatable and nutritious The *Eulophia* and *Habenaria* mot* of the orchid family afford salep which is considered a nutritious food among Mahomedans.

Tea—Ten samples *of* Shan tea were sent by the Commissioner of Police, R:ippmn. for favour *of* examination and report. The leaves had a uniform moisture, extract and ash content and when minutely examined had the appearanee and character of genuine tea leaves.

Vith lanata. Roib—The fruits *of* this vine called " Purain" in kiimaon are edible and may be bottled like other fruits. A sample that had Uvn prvpnreil for the Allahabad Fxhibition deposited crystals in the bottle alter .«t.in<ling a few months. ThU iiicrusUtion was examined and found to eunsi>i of acid tart rate of potassium, a salt deposited in grape juice in the manufacture of wine from ordinary grapes.

*Fnvmria Y**ca.* Lfnn—The ground root stocks of the wild strawberry plant* nrp uned *by* Kashmiri villagers who cannot afford tea or coffee. The r»>Hlt»tvd root yielded a somewhat bitter extract containing 9-4 per cent of

J*>«» of Belladonna plant* grown at the Mma™ » . two veare old A 0·4 peroeat. of alkaloid when oneyear old and 0·4V.ben twojear.old A •ample of roots from three year old plant. *«s r~£!~.. »",' *„, JJ" divided into thin and thick roots. The former J * ^ ^ i rease in loid and the latter 0·44 per cent, .bowing that the root alkaloidal content after the second year.

. The leave, of Belladonna grown in the same • « * • ."J '^S andM» Leave, from one, two and thrie year old pUnts ^ " ^ " ^ from nUnu of Per cent, of alkaloid respectively: This •» V £jf PlMt8 of di&rent agea do not show much variation in ompoiilion.

.. C ^ 1 M ^ Linn.-A sample of root grown in Balu-chwtan wa. tasted for solid aqueous extract- . mounted to 27·75 per «ent. which is well above tbe PhanMcopofia limit of 20 per cent.

the year of Dlantashe. having a •g S^JjJ^'Sliw, rWftm ««it.». The whes of the foltowing planU were " « * J^ and S.«rf.,

The ash of the plantain was made a special study. ... it ha. long b.™ nwd ""India - an alkaline mordant by d U.e, » • ^ ^ ^ ...ctors as a •nedwne, as a crude form of table salt and a» » n»n ... therefore considered worthy of enquiry to examine ^ $ £ n .,d « Jkalinity discover if they p«sased any " ^ ^ L S K e i were foun<l to h »« wperior to that of other plant asb«. "useum «mp 27·51 and insolul ^ silica from

under supervision were next tested, ... proportion. Tla*» imposition and no single element existed in "XTaVricuWand t* l\me, potash and phosphoric acid have a certain ^» "J^TSl tKis £ alkali is useful as a mordant and for detergent purposes, but tnere is no standard composition.

*> Tameri/pallaM. Desv.-Among ome • K ^ 3 & '£'. £•£!"." h» Baluchistan was a sample < ***&?££*£ & * £. h£ Tamarisk. These bushes are known to yield a sa«n»r ... of manna, but the exudation of a -line wbrtance is ^S^L^MSSt*7 «*. had the following coition: volatile ... 5·0, silica "od'unr. sulphate 24·6. calcium * ^ * £ , 'J S , j h i substance i. an in- »and 7·1 per «vnt. It is to be inferred that this ... crusution left on the plant after the « * ^ ^ O T J J S u J5T the regions where Tamarisks grow is h-iM t*Mffd *'"> ™"T™ ~

,, HI. Llbr«y.-During the year 60 h«*s ^"£$££$22. and o%er 300 books and periodicals nurchasedL T IM^»£^ in\^ ,;,,„. P»l are desirous of publishing ^ ^ ^ ^ ^ Z ^ L I M M for ibis ne» in and around Calcutta, and with a view to.*W..y ... ted with those of the purpose the books of the Botanical Survey are being « Royal Botanic Garden.

IV. Publications.—During the year the following numbers of the Records of the Botanical Survey appeared :—

Vol. IV, No. 7.—*The Alpine and Sub-Alpine Vegetation of South-East Sikkim* by W. W. Smith.

... *ous Phanerogams culti-* ... *otanic Garden, Calcutta.* *Part I (numerical list)* by A. T. Gage

Vol. VI. No. 1 - *r iracea nova e Peninsula Malayana* by C. de Candolle.

V. «ua.-From W April IMS to Uth March ™*g£&%$ IMS., wa. Director. On the Utter date he^andrf • J J ' J ^ , fn)in tb» CaWer Mr. I. H. Burkill was Economic BotMisttoj«. ^^ jj. Irt till 17th April 1915. when he went on "JJL^Rounirt and o« Mj g. Hooper officiated till 1«th October IMS** if^ Jl e. post, charge of which BurkiU VreaigMtkm WH appoiBted penMWntly to tne po.,

he

Ranl*M during the remainder of the fear. Up to 14th March Mr. M. 8. of tk!tt*T' wd* ^•tttent, on *wbkú datebe* tii deputed to act as Curator Mr q 7f™nonj, his pom as Assistant being taken by Mr P. M. Debbarman. }L tV_ Bancrji held charge of his post as Assistant throughout the jetr. HeUJL D m "peeially doe to Mr Hooper for his unfailing support awl to barium ? M*ai!li "^ Bancrji for their valuable assistance in the Her- •

V™; Tl>e clerical staff of the Department ha?e worked well.

were t? 1*1^ n* the Systematic side of the Botanical Survey there allowance V? rowi "8 saving» under their respective beads: under travelling cellaneous 5s* 17*-8-3t under maps, books, plates, etc., Es. 10-2-0, under mia- furniture ^d 2O2U and under exploration Rs. 55-2^). The allotment* for On *" Po8tand *tekgnm* charges were spent in fulL

allowT the Eoonowic side there was a saving of Ba. 2W-3-0 under travelling -«noe and of Rs. 18-13-2 under contingencies.

UrW«t for the Industrial Section were spent in fuU.

C. C. CALDER, B.Sc., B.Sc. (AGRI), F.L.S.,
Officiating Director, Botanical Survey of India.

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betical

twt of oon-herbaceous Phanerogams in edtiwtion in the open.inihe Royal Botanic Garden, Calcutta - waToompiied andIwoed by ^Director >n his «*P«city a. Superintendent of the Garden. The list uof the nature of a prowvond indS to the systematic part of the ****"£** « being prepared by plants, seeds or mate invest- leave,

ons rbiaceae with a view to monographjng *the* family and also worked out and determined several critical species rorwardedtohim.

As regards field work, Messrs. D. Hooper and S. C. Banerji were deputed, the former in October 1913 the latter in February 1914, to explore botanically a portion of the Garo Sl The tours resulted in the acquisition of over 800 specimens. These been studied and several new records for the area were discovered.

Bahadur C. N. Kanjilal. who is engaged in the preparat of de lists of the Forest trees and shrubs of Assam, presented abo 5 00 sheets of Sisam plants to the Herbarium. irtly worked in the Herbarium and determinations given him ens presented form Mr. Cave sent as for seed distribution purposes. These were

JJ«.tudieTandta rLu^^era. gap* « » * « » » ^ " ^m are feng fitted The moseses collected by Mr Jwk.U. nomic Botanist to the Botanical Survey, dunng the Ahor gH ition of 1911-12, »«e determined by Mr. ft N. Dixon wbo«i»uh» havelJ" published in Volume VI, No. 3 of the Records of the Botanical. feumy of India. •pecie* new to wience are described breides a few which are noWd as indi eating interesting extensions of geographical range.

Of other contributions from Eastern Iudia, the outttanding one is a wllection Reived from Mr. J H. I« «-•. t***,?-*?^ t for ^ in Barma. Mr. Lace has continued his work on the Flora of the these were PUteau Z\j£Z)Zm sheet, of DhtB ««*«**«* J •tndied and found to oonuin several ^ ' P ^ - ^ ^ now range of the Botany of Burma has further been cons.derably enr-ched during the year in the Records of the The chief contributors have been Messrs. J. S. Gamble. W. G. . W. Smith. M S. Ramaswami and S. C. Banerji. Messrs. Smith and Cave published notes on the himalayan species of Bambus and on the East himalayan species of ... in the Records of thp Botanical Survey of India.

W^tero /iktei—Excepting a few gpecimens received at intervals for itotifiS/n^hing inX way of r^r "ltei« wo wa^1 fi«« :k;. pa.T of Tn.ATTOf*the publications connected with the Botany of this eid of

of the Botanical Survey of India. This number is ... to a complete history of the botanical exploration of Aden beginning with the year 1809, together with a detailed account of the vegetation in all its aspects. Interesting problems such as adaptation, relation of flowers to insects, means of dissemination, etc., are remarkably well discussed with special reference to Aden plants. Accurate chart*, illustrative of the rainfall and temperature, maps and photographs accompany the book, the is thus gr of his exh and Ceylon, indigenous and introduced, in the Journal of the uomnay nwu™ History Society.

rfr. L. T. Sedgwickhas continued his .^*<*?£f5 es of Western India and ho publkhed in th« above jounua a *hird lift of mosses found pa that fide.

ryral India.-The work of Mr. B. J. D. Gra^m • toiK«ic Botamtt• Central Province* has resulted in the publication of a " List of Grasses and ***iges found on the Naspur and Tclinkheri farms including ftfew common •|**N» from other parti of the provinces." In aU about 200 species of Grasses and SetW are described and the hand book should be of w to worker, in those two difficult fwilica. The same author has also contributed an article entitled " Notes of a collecting tour at Kj"1"**^ .P- «» «* Journal of the Bombay Natural History Society. The vegetation^of the ^»tn'ct is briefly discussed and about 200 species enumerated. The third *ytume* of the Ffora of the Upper Gangetic Plain by Mr. J. F. Duthie, is in ine pre»t and wiu ahortlv appear.

_. *Southern India*— During the year the officiating Director and the officiating .Curator of the Herbarium toured in the Travancore State ui August and September 1913. The part explored lies north and to aJitUe £tent west of the River Achenkoil which runs through the «»ddle of the Stf te. The weather condition, at the time of exploration were not conjured particularlv suitable for the collection and preservation of plants, «« in ep.te of thig drawback over 2,500 specimens were got in good condition. Time has not permitted of the whole collection being worked °«. but so far as ,t has bJen studied, it would «eem that there is quite an *Prreciable endemic element and a few new species /^almost *?{«* 80 (ar the most extensively represented faimify u ^ u ™ ^ ™h * •pecies foUowed bv Gramine. with 36, Rubiace* w.... 30, ...anthaceæ, Ljbiata? and Orch.dace* with 2! each and Cyperace* ^ Compositæ with ^ each. The remaining famllies contain fewer than 15 speceseach^ . A ^anical survey of the whole sUte is in contemplation and a full report will, W is hoped, be given on the Flora at some future date.

Mr M S Ramaswami officiating Curator of the Herbarium, has completed report tour and iu botanical resulte^riVb ^r.pt.on«^jw 8^ies. - This work will .hortly appear in the Records of the Botanical burvey of India, In all some 470 species are recorded.

Mr C E C Fi«her, Depnty Cowerrator of Forert* Co.mbatore h« continued to aid the BotanicaT Suner a. « ^ ^ " ^ t S * J 3 K •bout 200 «h««u. mostly Anaimalai nlanU. Th«e wewrtudled and round *» «»iUin many of B d me's orig.nal »V"™«* " SSTS in th Flora of arge consignments of Madras ... e beii L sent for mble in the preparation of the Madras Flora. Mention was made in last year's report of a collection of Madura plants sent by Rev. A. Saulıere, S.J. He has again contributed a few hundreds of specimens from the same region. These were all worked out and the names communi- l to him. As a result, Rev. A. Saulıere has published a Hand List of the ...erogams found on the Pulney hills, seven hundred and sixty-one species in all being recorded. A separate list of the cryptogams collected in the same area was also published by the s... author. Mr. Dixon has published in the Records of the Botanical Sur... of India a report on the mosses collected by Mr. C. E. C. Fischer and ...rs from South India and Ceylon. Half a dozen new *mtmm* are <k»cribed for the first time.

A collection of «ner 500 ,«cimen. of Madras Plants coUecUd pr.or.to •h* year 1910 w« praented ^ ^r. M. S. Ramaswami This contains ... unknown to have many gaps in our >outh India coUection of planU have been filled.

The Herbarium .U« h« undjruJ^^to " - " ^ such p sent from the Travancore fore* h***"-" U£ JR date a ... of aU bring number ha. hem forwarded and though time has •J^^riaily ennch workL H "P the collection, indicate that w» ^ all be ^ wicatioll of material* £T k««*Wge of thu flora. In ^ P ^ ^ ^ th the S wiU doubtle- prow «i• \? oı » •* tbt iUte this foren herbanum mater valuable.

Messrs. W. W. Smith and M. S. Ramaswami have d"™1*'fto species new to Scieooe from thi? part of India. Tie « a - ^ » W •«• been collect^ oii the Nilgiri, Travancore and Pulney bdla.

*North-W**t /irfia*.-Lieutenant Kenneth Mason, B.E.. of the Survey of India, forwarded a collection of about 60 sheets consisting ^ Phanerogamic species collected on the Taghdumbash Pamir—a little known frontier region, at an elevation of 13,000 to16,000 ft. On working out, the collection has proved to be a highly interesting one for its siie and contains three probably undescribed spe^ii besides a lew which indicate an interesting exteasion of geographical range. Mr. M. S. Bamaswami has ^"buted an interesting report on the collection which has been passed for the press by the Survey of India.

Captain F. E. Koebel of the Frontier force contributed over 200 sheets of ***hmir planU. These were studied and found to contain a large number of species characteristic of alpine and subalpine vegetation. Rosacw, Primulace« and Caryophylkie are especially prominent These were generously presented to the Calcutta Herbarium and form a very valuable audition to our North-West Himalayan plants.

Mr. N. Gill of the Kumaon Government Gardens sent about 400 sheets of Kumaon plants which, on working out, yielded several new records tor tb« **»• The collection is of further interest in that it contains several^ui^peaii a** American introduced species and thereby enriches our knowMff ot the alien flora of North-West India. A small collection of Delhi and Mmla plants was presented by Lady Bourne. These, on examination proved very, interesting and several Simla plants not mentioned in Colletts flora kimlensis^ were recorded.

Mention was made in last years report of the field ™rk done ^ ^apUm L- A. Watson and Lieutenant G. G. Everett in Baluchistan' Their collections have now been studied and several additions to the little known m·t «. tion of Baluchistan were recorded. As has been already pointedI out * the late Sir J. D. Hooker, the flora appears to be oriental in character mi'h an admiTtn^ of Himalayan and i«fi5orTPlants. The plants from the lower levels, however, are mainly Arabic and Persian species. Two of tlN* specimens in their collections appear to be probably new. Of the extra Indian contributions, the following are the principal about 600 Philippine Plant, from the Bureau of Science. Manila: over SW pwnw .rora ™ •»•»• zorg Botanic Garden; nearly 300 Scandinavian planU *nt by Mr.KM.rm.; •bout 200 planto from the "Singapore Botanic Gardens and about the lan* number of Siamese plant* fronftte Royal Botan.c G " ^ - ^ Z ^ller «*e«ion. of Cryptogam., mostly from Europe, were al» incorporated.

The incorporation of named .heeU. though not MJlin*J or «£*J""»»· meal knowledge! requires careful and reliable work and cannot safely be felt to .ubordinatef Itu» problem, for it u.urp« much of the time of the superior •taff. Some 10,560 sheet* were actually laid in during the year

The total number of duplicate, distributed was 3.655 sheets consisting mostly of HimSaW Soutl/lndian and Malayan species. They were *-nt »> 37 different botanical institution, throughout the world.

II. Bconomlc-With the retirement of Mr. Hooper the chemical part ... Such ...red to ..., the work of ...chibits which had become the worse for exposure, has progr... thi... were no doubt magnificent in the section when it partook of the^ ... in the Dep *n ' expoaition " but which are altogether out of place ...liminated as suitable ... now exurta have been removed and other, will be « up to date cases and ™«h material for exhibit become, availabk. New ud ... unsunca bottle, fo, the court are badly needed. The ^ . ' ^ ^ S S ^ S S . *2'the purpoM. for which each a dUplay a. ^en!e^LS?c7i«rand th« Modern requirement, indicate a complete ^ . ^ S i S S f S H . remove fe»t one can do under praent « ^ ' ? ^ ^ id^on J S b u i W u?acoltoctioB we owleM and gradnalfy by elimination and addition u> «»«• K

suitable Tor a court consistent with present day requirements. Besides attending to the numerous Economic questions referred to him and generally making himself acquainted with the work and requirements of his section, the newly appointed Economic Botanist has begun the collection of materials necessary for the compilation of the work 011 Indian plants of Economic importance urged by the Royal Society some years ago. To be of much value this work wlll no doubt take some years to complete, but that it is required U shown by the nature of many of the requests for assistance received, luring the year ledgenng work has been restricted to such subjects as an Economic Boun* might fairly claim and *such* a. are not attended to by departments which have received the old ledger files.

III **Library.**—Library work was carried on as usual; the number of accessions by purchase or exchange being 50. A number of index slips for the periodicals in the library was prepared and supplied to the Asiatic Society of Bengal which is engaged in preparing a catalogue of scientific literature in libraries in and around Calcutta. The officiating Director and the officiating Curator of the Herbarium are engaged in the preparation of ... not included in Hooker's Flora of India, ... um. The card catalogue for the «*£** «• .*™ ... proposed Index has now assumed a big sue ^ ^ J ^, of the Botanical Survey of *to* publish these as a single number oi we « » »

IV. PnbUcationi.-Dunng the yew J "r* £·. rx . •!»* *VPAT* the following numbers of the

Vol. VI. No. ^^^*JA* ... *ew Indo-Burmese species* ... M. S. Ramaswami and ... Smith,

<5 Rmaswaroi and &. ^- naawrj ... *kas*

* V.W W. Smith and 0. H. */«*• *Expedi-*

.^*Revert* °*'I* »o»e,°*t tk* Abor*

Vol. VI. No. ... ted by Mf. C.

(2) *Reports on the* ... *ndia* E. C. Fischer and ... *and Ceylon* by H. N. Dix

Vol. VI. No. 4.—(1) *Note on the East Himalayan species of Alangium* by W. W. Smith and G. H. Cave.

(2) ... *tarum in Herbario* ... *rum Auctore* by ... ^,!/ S! by Ethelbert Blatter.

Vol. VIII, No. 1.—F ... Ledger for

(A general Index, forming No. 6 (... x to Volume the years 1906—1912, also appeared ... g a supple- XI of the Annals of the Royal Botanic Garden, ... with 83 superb. plates by Dr. went to Part I " The species of Calamus" (Woardo Beccari was also published.

V. **Staff.**—Major A. T Gage, I.M.S., Director, was on furlough and combined leave throughout the year, during the whole of which Mr. C. C. Calder, B.Sc., B.Sc., (Agri.), F.L.S., officiated. Mr. D. Hooper, F.C.S., F.L.S., was Economic Botanist to the Survey until 1st February 1914, on which date he retired from Government serv J ? X December 1913 ... H. G. Carter, M.B., Ch.B., was appointed to the Departn.fnt on the ^*gfifrB****' *£*&.. ... remained attached ... ^TfilooiDic Botanist. and 9. C. until Irt FebniirTieil when he ****%* s. lUmasw^ appointmenti From the l.t April 1913. Me*n. M were ooofinned m U** Bai ... M A, Systematic .\ssistant»,

and admitte^ t0 gazetted rank. Mr. Ramaswami. however. continual to officiate as £«urator of the Herbarium throughout the year, Mr V M. as AssisS.?.[1] ^ ?0 a* » « for him Mr S C BM»J* *M thar p* of hi. " post throughout the year. The entw 9taff ^^ fU li satisfaction throughout the year.

VI. *i?ailc kl.— There were the following principal savings under their respectivTo i eads: ?nder contingencies Rs 798-11-8, under exploration Rs 947-... of which ««m R«- W^ were reappropriated to other puriniHo* under ni«n»al charges Rs. 89-8-0. under laboratory charges (in jwirt due to closinS, of laboratory) Rs 42-10-9. and under post and telegram ch.irj^ Rs 3W^1[3]. Gran*8 for the Industrial Section were practically sjvnt in tull off D.v "M onl>' remaining out of a grant ot «J» 2.000. Ot a total all-^nietit OI ita. 13,020, Rg. 12,201-9-10 have been spent.

C. C. CALDER. B.Sc, B.Sr (AGRI). F.LS.
Officiating Director, Botanic! Surrey of //„/,<*

Report of the Botanical Survey of India for 1914-15.

I. Systematic.—*Eastern India.*—In the Eastern Himalaya ... were made ... Mr. ... Curator of ... officiating ... Director ... examined ... Darjeeling ... Cmitrilluoni fr.

formerly ... H. J. C. Kinirhorn of ... Mr. W. W. Smith, Curator of the Herbarium at Calcutta and now of the Royal Botanic Garden, Edinburgh, has continued to interest himself in the Eastern Himalayan Flora and has published accounts of a new variety of *Plumbaginella micrantha* Spach and a new species of ...

... continued ... Kmijilal IW'adur, of the Forest Department ... Botanical Survey ... his ... collections. Mr. ... Assistant in the ... his ... Officer ...

... Burma ... was able to visit ... during the ... Parsons ... departments of Government and by private ... A considerable amount of work on material previously collected has been done by Mr. Lace, Mr. S. T. Dunn and others and seventeen new Burmese species have been described during the year.

Western India.—The most important work concerned with this side of India has been the continuation of Father Blatter's Flora of Aden ... apin'an-d, and tho last part of which is now in ... of plants from the ... District was presented by ... Botanist.

Northern India.—The first part of Vol. III of Mr. Duthie's Flora of the Upper Gangetic Plain, including descriptions of species in the families from ... to *Ceratophyllaceae* is ready for issue, and a continuation paper ... of *Orchidaceae* is in the Press, ... biological and biological notes on new and little known ... have been published by Mr. S. R. Kashyap, our ... several new species ... described.

Central India.—The ... and ... flora of Pachmarhi and its neighbourhood ... studied by Mr. H. J. D. Graham, ... Botanist, who has published a list of ... question. In all ... enumerated 36 species of ferns, 1 *Equisetum* ... *Lycopodiaceae* and 2 *Selaginellas*.

... From the Anamalai ... fills nearly 500 sheets have been ... Mr. C. E. C. Fisher, Deputy Conservator of Forests. Towards ... Mr. C. C. Calder, Curator of the Herbarium, was deputed ... investigation of the Vegetation of Travancore. ... the preparation of the Flora of Madras by Mr. J. S. Gamble ... F.L.S., and Mr. S. T. Dunn, at whose disposal the Madras collection ... the Botanical Survey have been placed. Mr. ... Fyson has given much attention to the flora of the Presidency and has described during the year a ... number of new species. During July and August 1914 Mr. M. S. ... distant for Systematic work ... hills of the ... and the Karo ... country ... collected, and most of them have been determined.

General.—Father Blatter continued his erudite work on the Palms of British India and two more ... Dr. Beccari has almost ready ... the Lepidocaryeae Palms of Asia. Sir David Prain has published ... of some additional species of *Meconopsis* with a key to all the known species, many of which are indigenous to the Himalayas. The writer's studies of the Indian and Malayan *Euphorbiaceae* were interrupted by his recall to India in August of last year, when his manuscript had to be left behind. Only recently has ... occurred of ... to a limited extent this work, which will take a considerable time to finish.

* In £ ? tri ? ?eCt!0B, Indlan •«*«••-*P*HUi* CWteft.-Dnrimc th*, window ex i\L- bccn "»•*«» eliminating frwn the public galloiy mere tW M that exhibltsoflhc **«* of private firms that are of no educational *if\nl* tion *treo«tof pbeein a museum as distinct from a commercial exhibi-oft^A^®11^ scheme has been drawn up for the gradual transformation their** * into *^Pty of the principal vegetable products-of India and IWttliwfrt* a m a 3e d on as nearly as pwsihtc a natural system of ascent, those eominTfi SerTC Primary necessities tuch as food, shelter, clothing medicine dyes ? J 8tail<ltttb8« that foster secondary requirements or luxuries such a* £? w ornaments, coming Ut It is intended to arrarge the products within bv iLS0111*tBain on a natural system according as to whether tbej are yielded wflUn* or 8tem8 or le8ve* or flowen or fruits or "***_ *h* ** hoped that nM*na abll aTailahle walter of supplementinj? the actual specimens where desir-m L11™ . Vres and photoi?raphs. As the educational value of a exhibits ^nds not so largely on how much is exhibited but on how the or to aw arranged, care will be takei to avoid attempting to show too much orc*rowd individual cases. . . . .

of lUny of the old cases are unwieldy and defective in.design, so a new typo of 2? ft becn dcsi§n«d. and five new cases installed. TTiesc cases being made as S2 &Iwathed wi?h wiod « .ight r* «^n« and cause.as^.^ction year. ble to the view of their contento. Their number will be added to every year.

Two sets of maps, one of India and adjoining couptriet, the oUier of the world, and a special form of stand for their proper c for showing the geographical distribution of produ the products.

The collections generally are in a fair state of preservation but a good deal of purging is still required. About six thousand labels were renewed during the year, but labelling work—which plays an important part in the general effect of a museum—is much handicapped by the lack of a label-printing press, an adjunct which it is hoped will be available in the near future. Over 400 products were added to the collections, over a hundred of which have been placed in the gallery.

Library.—The additions to the Library amounted to 982 volumes.

Publications.—During the year the following numbers of the Records of the Botanical Survey appeared :—

Vol. VI. No. 5. A Botanical Tour in the Tinnevelly Hills by M. S. Ramaswami, pp. 105-172, with map and 8 plates.

vol. m NO. 2. Flora of Aden by E. Blatter, pp. 81-336.

SUB.-Mr. C. C. C»UCT. B.Sc., B.Sc. (Agri.), F.L.S., officiated as Director until the 8th September 1914, thereafter Major A. T. Gage, I.M.S., resuming substantive charge. Dr. H. G. Carter, M.B., Ch.B., was Economic Botanist to the Botanical Survey and in executive charge of the Industrial Section of the Indian Museum throuehout the year. >W- n ar iuni to bis substan-F.L. 8, reverUjl from officiatini; a« Curator m 9th fc ^^19U ^ tlT(1 P«* as A«.«tant in tho Botanical SurKy to w to j^,, AprU1OT6. ^* *•• «» combined leire froai 31»» <?ctolf; «Jimatic work and Mr. B. F. VM>urman va« AwMant OB •probation for ^^ ,, the Indian Mutwutn •" m i Amtant Curator of «ne !»«>« ^itterial 'offloen b»Tc.nown 'nromhout the year. All the ""cu'.1^,5« the y » « « * , . •^niendahleieal in earryinp nut their duticj. the year. ,,„ WM fa. 4?,600 of , FlnMctal.-Tl« total badpet allotn^t\W » Wet. R,. 2^15 refined un.pcnt at the end ot J

A T GAGE» *Xyor.IJtJ,*
Director, Botanical Survey of India.

SURVEY OF

Report of the Botanical Survey of India for 1915-16.

I. Systematic.—*Eastern India.*—The usual collection of high level week for distribution to temperate regions of the globe * « w m*1*b J In-pcha collectors in Sikkim under the superrision of Mr. O. H. Cave of the Lloyd Botanic Garden, Darjeeling. A prolonged tour through Bhutan was made by Mr. R. E. Cooper, primarily for collecting on behalf of a private firm. A general account of the vegetation of the areas traversed by Mr Cooper has been prepared and is offered for publication in the Records of the Botanical Survey of India, which will appear in the future. Professor Balfour of Edinburgh University and Mr. W. W. Smith formerly of the Royal Botanic Garden, Calcutta, have described several new species of *Primula* from the Himalaya. From the same region Dr. Stapf has described a new species of *Smrcococea (S. Wallickii)* originally collected nearly a century ago by Wallich; M. Raymond Hamet has described two new species of *Sedum*, and Mr. W. G. Craib a new species of *Acacia*.

In Assam Rai Upendranath Kanjilal Bahadur has continued his explorations and has presented many duplicate specimens to the Botanical Survey. In the autumn Dr. H. O. Carter, Economic Botanist to the Botanical Survey, explored the district of Lakhimpur in the extreme North East.

The Botanical Survey is greatly indebted to Mr H. u. Clarke, Deputy Commissioner of Dibrugarh, Mr W. O. M. Dundas, C.I.B., Political Officer, Sadiya, and Mr. H. Nicolls, Assistant Commissioner, North Lakhimpur, for the aid they afforded Dr. Carter in his tour.

Mr. P. barman, Assistant for Systematic work contributed a large collection of specimens from Tipperah.

In Burma Mr. A. Rodger, Forest Research Officer, has materially aided the Botanical Survey by presenting duplicates of his extensive collections. Other collections from Burma have been studied by Professor Balfour and Mr. W. W. Smith of the Edinburgh Royal Botanic Gardens and both they and Messrs. Craib, Dunn and Lace have described a number of new species. Mr. C. E. Parkinson of the Forest Department has contributed over 200 specimens from the Andaman Islands.

In Bengal the late Mr. Ramaswami made a local collection of aquatic plants, studied their oecology and contributed the results of his observations to the last meeting of the Indian Science Congress. Mr. Caldar recorded in this form of interesting introduction to Bengal from Africa. This already shows ffiWrt« oWioceaL, a species of the family T^UiM^^ with a tendency to spread with undesirable speed. Mr. J. C. Carroll of the Imperial Forest Service contributed a particularly collection of the characteristic swamp P P J of the Sunderbuns, some of which have been forwarded to the Imperial College of Science for detailed study. Ii» ^iSTbaJonly once previously been reported *r*9*era parviflora* W. & A., (by Koenig in 1796) to int^*»^

Western India.—Mr H. M. Chibber the families and genera of the Bombay P. S S. L. J. Bedgwick, I.C.S., vegetation of Gujarat, b e T r t i i a W. The results of the researches of the Indian Educational Service and W. T. Saxton of the paper which they have contributed to the Records and which will be published hereafter.

Northern India.—Collections made in the Taghdumbash Pamir by officers of the Survey of India formed the subject of a paper contributed by the late Mr. J. J. g. Bananrami of the Botanical Survey Department to the Records

Lir« J i ^ of India. Mr. S. K. Kashyap has continued his studies of the a dA»JT lbc w « « ^ni Himalayas and the Punjab and has described about «*reti? "** ****** *rol«*>r Balfour and Mr. W. W. Smith have described the ^, Fnmmla$' "d M. Baymond Hamet a new species of *Sedtm* from tk Hj«««lajm The first part of Volume 111 of Mr. Duthie's Flora of rIVln P**r "&0 8etic Plain has been published and the continuation from eii2d " ITT- to ^ W" of *Orchidace** has been standing in type for a to J j? -** tlmt waiting the final instalment of manuscript from the author 'complete the work.

ba» u^- ?* /4M «. —Mr. H. H. Haines of the Imperial Forest Department »piililtahed a kc7 to the Forest Flora of the Southern Circle of the Central

of \}! hmtkrrm r*<K*—. Much actiTity has been shown in forwarding the study or ii rrtalion «f this area. The most important publication has been part I 1 « Horn oC Madras l»y Mr. J. 8. Gamble, C.I.E., the first 200 pages of which **r"InS with the natural orders from *RauuHCulacue* Vi *Jqutfoluicea* have Ppearcd. Mr. P. F. Fy»n has published an account in two volumes—one of H-^pRia and another of drawings-of the Flora of the Nilgiri and Pulney nu'i.i *?• Nearly •'«» »!»«« »re d^cri^' and t1*1®"8 nofc» «" flo»i «' m and ou tl» economic proi>erties of many of the species. Aeon*. -»,.IM of new species has been described by Mr. Gamble^Mr. Hutch ,n^n andothers. ColleetioiLMuadeinthe Anamalai Hilbhj Mr.C.E. C. FischeT of the Imperial Forest Dipartment, in Madura by the Ker. Fathtr Va. MalcU"»«. in Trarancore by Mr C. C. Calder and the late Mr Ramaswami have ^ wwk«* out a. opportunity offered daring the year. Ihc ^™» ent Lecturn"? ^n ^ Madras, made 'sptematic coUection in Jflni.d£ru*• of fiyff^ -»i^put,Goda,aria..a Vizagapatam. Vnote on th. ^raand£ Sil- ^ P * the rinnereUy D*rict were preptred for £• ^ ^T «^ ^ ^ct,aiidalktoftheplaiitigrowingin and around lipe was-

fi:tec Rev. Father Blatter, S. J. has published the Briti it—devoted to the genus *Areca*—of his work on the Palms of on tl Ceylon. Mr. M. O. P. Iyengar has published his observations facto of some Madras trees, in which he discusses the various grapl :nce defoliation. The Director has described some photo- registering the sizes of l ^ i « « d ^ « ^rfci«««. while nty —tunities have permitted has continued b a itud of ft* Ind *" " ofxTYudex of Indian Work has continued - Mr. Calder on the wpf *1"" Of " species not included ^ Her's Flora of B ri V mentioned aborei

In addition <• «*• contribution, of I nd iL o P ^ r f from the Royal important access ^ ^ „,,,, Indillll ptoto.bare ^ ^^ Singapore, and Botanic Gardens (the Smithsonian Institute 0, lhe United State, of A "." * Indian MMeum work

II. E

was condarted (.n lut T«r'. line., «l«»>ougho»' ng to ^ w ^ obtaining .uital.lt-gUwjar. ffor e«ibitio P 'P ^ ^ ^ ^«M«M« were ^ ^ desiral*,."11*" "« *• -«3r. Three ww-J^SI machine, were indent- during the ,ea,, , Uhel yhntinf pfc» and paper «"M'»S™^ ng of 19w.l7 • ed for, and »n»»«™enhTlor ^.Lituting ^.'^.nctioned. Hitherto P^^^'i^niradJctrSeii a. t.mler.

-' '"'H .|*ci..,en. of P Lt,to iHu.tri.te ««,•«««if/E d Botanic Garden, *:« •*« JI vly dupliaite. from the I f c* ^ ^J l t of Economie ProducU. Tilt!'"*- f* IBH '^collection of the ^ "21rfSS*fa* »re •"" ^l * n^T" "ul|l«'<-' «l'hou,(h quite in plaee ****Z?Z2* f"»" IWn? P1*"^, I? :^'•'•*»'i^ti.m.«,a^l oall^ction ha.. been i^e^fcpiitkm « f ^ f t £ ««•?•! Botanic oJeiTcalcutta, of •Ffme?LfOlaeat wpewhat rougli signed and »«ll flnithed fisne* to rep1** ** f™^ receptacles. .h «llert content* ill«tra»-

About a score of exhibits have ing the products of such species as :—*Albizzia* — *Boehmeria nivea*, *Coptis Teeta*, *Corchorus capsularis*, C.

Nephelium Litchi, *Eriobotrya japonica*, *Mangifera indica*, ... *Achras sapota*

Experiments were made in the cultivation of various species of medicinal plants in the Royal Botanic Garden, Sibpur. Henbane was laid down, and analyses of the dried leaves were made by the Quinologist to the Government of Bengal. The analyses showed that the samples were of normal alkaloidal value.

On the Government Cinchona Plantation at Mungpoo, a considerable quantity of Digitalis was cultivated, the dried leaves of which were also analysed by Mr. Shaw. The uncertainty of the glucosides of Digitalis appears to be the question, and Mr. Shaw expresses the opinion that until the method has been thoroughly worked out the best method of utilising the leaves is to keep them dry till wanted and then to make a fresh infusion, not a tincture, as alcohol extracts a poisonous glucoside—the digitoxin of the last named.

At the Mungpoo plantation the cultivation of Ipecacuanha which was introduced several years ago has been greatly extended during the year. Over 3,000 plants have been added to stock. *Atropa Belladonna* and *Podophyllum* have also been introduced, but it is as yet too early to form an opinion as to how the species will thrive in the Eastern Himalaya.

Quantities of the seeds of *Gynocardia odorata* and *Taraktogenos Kurzii* have been supplied to Lieut.-Col. Sir Leonard Rogers, C.I.E., to the Bacteriological Laboratory and to the Bureau of Science, Manila, in connection with the treatment of Leprosy.

Investigations into the botanical source of the various kinds of Asafoetida are being carried on.

Material for the investigation of the poisonous properties of *Lathyrus sativus* seeds by Sir Stewart Stockman of the Board of Agriculture and Fishery and by the Imperial Institute, is being supplied.

Material of the leaves of two Rubiaceous trees, *Mitragyna diversifolia* and *M. parvifolia* has been supplied to Dr. Berger of the Lister Institute, London, for the investigation of the alkaloids of those species.

... with an enquiry into the ... in India, collections were made of ... the coast of the Bombay ... did not cover the ... were mostly species of *Sargassum*. The ... of the plants of ... Preliminary collections ... are ... of unknown species and various ... work of improving ... made with a view to assist Dr. Maxwell ...

... made to the Library ... the usual ... Museum ... found in the Industrial Section of the Indian Museum ...

Records ... publication.—The concluding part ... the end of the year. This ... forms ...

... the plants of North ... Eastern Himalaya by ... Saxton and Sedgwick; an account of the vegetation of the ... of his Travels ... Carter's exploration in Ukhrul ... Assam; ... collections by ... Bhutan by Mr. B. ... Cooper ...

Mr. A. Meebold; S. J.; and L* «Wc«™* lıf £ ' •?"*• of Almbia b I the •». Father Blatter, by Mr. G. H. C e T * "*• P«"»» of the Lloyd fiotanie Garden, Darjeeling.

V. Sta...—ine their respective posts Si!!!!? and ^ Eoonomic Botanist were in cham of loss in the untimely death ...ghout matic w ...

* Vtt/^t ?ⁿ ^ 19thli?J$,^ — Ramatwami, Senior A»wUnt for Systematic all ffi J11*1^^ PeriSiu*, 1916. He wa« a young man of remarkable gifts, be ... plants ...

the Department on t£kflr£aa?*n' ******* on probation, wai confirmed in Dr. Carte* tiT » 1Ufch 1016, duties ami thT^l^0110111^ Botanbtf has been awidaona in attention to hi* ^^ officers of the Department hare all worked well.

VI. Finar... allotment of Rs. ^kr Tllere *•• • *^in« of Ba, 1,77O-1S-O on the total 41,800-0-0 for the department.

A. T. GAGE, *Msjor, I.M.8.,*
Director, Botanical Surrey <tf India

Report of the Botanical Survey of India for 1916-17.

I. f

minor ^^^^^*Eatl*^[1]^*K»tkiml9i^^Ajui* from one or Wo the staff have 1]' ?° exPlo»t»on work was undertaken during the year and corresPondents a S i been ibte to dcvotc al1 their timc *° ll?e a^toM of fficers, as in [A.!? ^cumulated materials awaiting examination. The same Sotted to U ^' ^^^^ y members of the Forest Department, hav ^adur visited *t ?r*ell slPPliod w»th material. Rai Up«ndranath Kanjibl On tbo forest pi Ucro*rium for several weeks in connection with his work ^Mnination hut of A8fiam< A considerable mass of his matrrial still awaiu ?any sheets »V l ^efitod as formerly by his generosity in giving u» Dun and I)r ^ n c c the viUue of our collections. Mr. R. S. Hole of Dchra connection wiik Bari w of Coimbatoro have also visited the Ilerbarium in for distributing 4 " ^ ^ wO'tin hand. The usual collections of hi^h level srols li*Uf* woA^l ocmPera^ regions wow made by Mr. Q. H. Cave who also co. materials for the Lloyd Botanic Garden Catalogue. The ext«nt to h 5 ? tion of Mr. R. B. Cooper's tours in BhuUn are now to some Pri*u1a an?"iJ! thc Publ»cation by Professor Bayley Balfour of new^sprciw of Pti«oulaa all ?hodod«ndron. The revision of the Himalayan and Chine* given aom« Elections, toother with Mr. Cooper's new material, has examination f*y new species. Of these, fifteen are the result of more critical Himalaya ; >a the light of recently acquired knowledge from the Bait and Wnt the remainder aght arc Bhutaneae. the outcome of Mr. Cooped exploration• nnd Professor Balfo we Western Chinese. From the mine cotton m*t*r-i and four ble to record two new Bhutanei Rhododendrons Burma St^^^Senus mmonerin Mr. Ward's material from East Upper Journal ! ^ 5e Asiatic Society of Bengal. One deals with the o papers in the flowers pollination of Terai ... further with the Terai for*ts between the Ota"^**- in « 5 J ? ?'*» of Mr. C. C. Lacait*. tour, «HM two *to£J*"!+-

collected ... exploration of the same region ...

Mr. A. Rodger, Forest Research Officer, Burma, has again materially enriched the local Burmese collections of the Botanical Survey and retentions from collections by Messrs. Smales, Osmaston, and by Lady Cuffe have also been allowed.

The Flora of Siam and Eastern Burma continues to engage the attention of ...

tl>.,W'<?"r" '•*•-The recite of M«.m Scd^iok and 8 ^ ^ ^ Z ^"»efi»:tation of Northern G jjmt, referred to iDlMty. ... r«\.Tbe).te Mr. lUnum-it record «**KgS & of »•-*» TJ ... and ppeared during the year. Mr. H. M. C. ... in the Jou... f?»«ra of Bombay with elaborative commun... ^taa ... Bombay, Natural History Society. Mr ... garden ... S ... nation several ... of Cassia from ... hitherto ... hw established a good connecting U«* 2tT5>ilitf of • ie*w»—..... met plants His observation, point to the ... g ... the (dbneter, hitherto separating »m« ... botonical ... the cJu^acter. hitherto ... Southern /.*«.-Thi8a«acoDtinu»to Mtract ^^' ontinuc(B),irork ... *•• ">o.t of theotherprorinc«.Mr. JB-flamble. C.l-^ ... the *h.e «ora of the Presidency but, owinirto the lo« of M j ^, m w t in «••£«on ^» orkdevolyin? onir(h m hk '^o w h ^d ^itdj, that toUo.ei in ... somewhat delayed. The method of ... ttUM r

the *

facilitate the identification of the specimens enabling the collector to ascertain with certainty the ... to which the plant belongs and, this object attained, to limit ... the character of the plant under examination which ... are ... identification ^

Mr. P. F. Fyson communicated two papers to the fourth sessions of the Indian Science Congress held at Bangalore in January 1917 ; one dealing with ecological observations on the flora of the Sydney Tuan, the other with observations on the ... habitat between a true water plant (*Scirpus mucronatus* Linn.) and a land plant (*Ammannia rotundifolia* Ham.).

Mr. C. E. C. Fischer has ... a paper on the ... ication in the Records ... of the Anamalais.

Indian Science Congress ... Rangachari presided at the Botanical Section of the ... when he communicated a very interesting paper on the Tinnevelly Flora.

On the same occasion Mr. Venkata Rao and Mr. Cherian Jacob gave papers on ... of Plants in Mysore, and on pollination in ... Mr. Hamilton gave the result of his continued ... on the ... of Ceylon and the neat similarity of its vegetation to that of the ... of additional interest to Mr. J. C. Willis' ... of the island with reference to the dying ... spread.

General.—The Revd. Father Blatter's treatise on the palms of British India, indigenous and introduced, deals, since last report was issued, with groups *Cocoineae* and *Lepidocaryinae*. In all some nineteen species are dealt with, the history, nomenclature, taxonomy and uses being treated in an exhaustive manner. Major A. T. Gage continues, so far as the very limited time at his disposal will admit, preparation of his materials for monographing the family *Euphorbiaceae*.

Dr. Stapf has given an historical and taxonomic account of *Cycas Thouarsii* R. Br. and contrasted its characters with those of *Cycas Rumphii* Miq. and *Cycas circinalis* Linn, and has also had *Pandanus perotius* described and figured in the Botanical Magazine. Mr. Dallimore has contributed an account of the Asiatic Pines, including some Indian representatives, to the Kew Bulletin. Mr. H. G. Carter's paper on Zor Hills Plants with Notes by Sir Percy Z. Cox, K.C.S.I., K.C.I.E., has been issued as Volume VI, No. 6, of the Records of the Botanical Survey while Mr. Calder's records of the species of *Oxalis* now wild in India is ready for the Press and his account of the vegetation of Travancore is nearly completed.

III. 2. Economic.—During the year the main subject of economic investigation was with medicinal plants.

The cultivation of *Hyoscyamus muticus* from Egyptian seeds in selected places in Bengal was successful. Samples of leaves thus obtained along with some collected from indigenous plants in Baluchistan have been examined.

The European Henbane (*Hyoscyamus niger*) has not been as successful ... effected. But as seeds of it are easily obtainable in drug shops at ... and Amritsar, recommendations for its further experimental cultivation ... been made to those likely to take interest in it.

Podo ... is being instituted whether it can be obtained in commercial quantity.

Atropa Belladonna ... been reported to be available in Kashmir. Our attempts to organise commercial supplies have not yet produced much results. Seeds have been supplied for experimental cultivation in the Khasia Hills.

Seeds of the true Chaulmugra and its substitutes were supplied to Lieutenant-Colonel Sir Leonard Rogers, C.I.E., I.M.S., and to the Bombay Bacteriological Laboratory.

Kelp for iodine has been obtained for the Bengal Chemical and Pharmaceutical Works and Dr. B. L. Dutt of the Presidency College, Calcutta. The

5**« this ... .

thorough enquiry. product "A" not appear promising but seems deterring of *

Among other medicinal products dealt with may be mentioned *Cmtuttibit*, *Digitalis, Strychnos, Valeriana, Gaultheria* and S...

The major port... Stewart Stockman ... been arranged for. ... «e Imperial Institute has been met. The balanc* h*\

The enquiry on Hing (*Ferula* sp.) has been at a standstill for want of sufficient materials.

Edible fun... and

Many «»q«irie. . r i T i C fWM UTe ..... ***** i0..le rtteBtion prod... ! r «re woei J T . " ^ . H>'cei, **• pwiwto w^ wriou» industrial ... ied to.

work of the ... industrial Section.

Report ? f 1 9 1 * " U & t of . tlw G * ^ y on the line deBned in the Annual some o... *• new dh... continued and the re-arrangement of specimens ..n For ins... in one of ... a8e8 ^ been done on the lines therein indicaictl *latifolia* (Mahua Seed and ... the f01^^11^ ei«ht industrial oiU, (1) ... Oil), (2) *Cocot miZt* ... W) *£ra*ticajuHCCa* (Indian Mustard S"«d and ... (Punnag Seed and Oil), (Coconut Kernel and Oil), (4) *CalopkylUm fnopkf/i.* ... *usitatissimum* (Linseed ... Oil) and ... (5) *Gouypium* sp. (Cotton Seed and Oil), <G) Z/«ii ... oil) ... ofoam^ • f*** lnd oil). (7^ *Rici*H$cmnnmi9* (Castor Seod and ... ibited sidehT^'^^'^t 868111 .. 60,6^^1^ Seed and Oi!) have ^ n ... which vieS ?k with ? he bo<*nical specimens and coloured figures of tho ,71%ed alo*n» ... ty*one botanical specimens were mounted and *'* •Pecially uLiTii timbera exhibited in the Grand Staircase. These wc ** °f the 4 2 r ... descriptions printed in prominent typos of UUJ

AarTJ^W^^0fth^timb tre^

E... I» atm^f ^ year tbe difficulty *of* obtaining exhibition glass jars from ^PUcinifthA^u ... lnues aiui consequently very little could be done towards rv DttrWIv ldfa8hi onedtin.boxS by glass jars.

... ^ rW? A70*'°w fifty specimens were added to the public collection. 111 the PuhH... 2!« Ww? ftre of •P'c'»a1 economic interest and have been display^ (I) fu i^Wp the others being put awar in the Lockers :^

Hydnocarpus ... *no$ Kurzii* (Truft Chaulmugra of Commerce), seed; (2) (False Chaul... (PaUe Chaulmugra), seod; (3) ... *odorata* seed; (5) Sy... ? 8eed; (*) *Rvdnocarpu* fTighiian* (False Chaulmusjra), twigs as med... ^^ a £lllarf* bwkM medicine; (0) *Rhododendron Camp«maaiUm%* sp. ... jcine ; (7) *Jumperut macropoda,* leaves as medicine; (8) *Sargmn^* ... (Sea weed...) ^•*'.») ^iinMau (Manipuri Camphor), lcax-es; (10) C«^. ... ^ ; ^ *Dolicho* Lablab,* seed (black variety)^; (12) »»»ote6iUfJI ... seed; (13) *Bnpleutum fakatum,* fruits (a subs titute for Zira); (U) ... *9"ku** (Sirkhi grass) seod, used as an adulterant for Zira; \J ... *Aitckiiom* (Siah Zira^, fruiU; (16) *Puerarn Mero$a* tubers (edible) *vilntu*'* " v*l*TM'*'** (Cashcw-nut,« Hijhbadam), nut and gua,., (1J bark!- J Ol(rf««^to. edible fungi ("apuna rong); (W) ^f*"11^ fa'ttfa' DAiZ/ / t ^ ^ M dy« I (^) *Martdemia ti*cton+* dye; (21) *Q%rard*m* ktttr^* *w«(Nilgiri Nettle), stems (chopped).

w * i t h a view to give a good and brilliant .appearance.to.the show case, it hai r^/.^nd desirable to remove the black P ^ ^ ^ l ^ * 0] 1 1 *)°" <*** UHT jM»hah them with wax. This work is m progress and a ^wca^of^ ... •* EesinsTv have been wax-polisbed duning the year• «U

Over a thou^nd label, hare been renewed tin. year . T» e old ^ ... be"»g rapidlj replaced by new ones printed in the new style m the labej ^ in

is

V- P»Wi«ao»..-<0. Bome pI«U o£ the Zor ttll^ Kò»,lt> ^^ by H.- O. Carter, M.B.. Cb.B., *mvei.* a^.-i-i, t«.

(ii) Plants of ... W. T. Saxton,

the u** 8t*ff—Major A. T «.

Privi S.T ".are 1T11 fo*nV Ut A ^ " 16 ^ ' 611 * 5 ^ ' 111 in charge of on special duty Plantation. Dr. H. O G S T With *• «V««J <> the extension rfCiSfi charge of the Industr ^^ as the EcoaoBUC BoUnitt and in executive During Major G^V »SL i 101<* the Indian Miueum throughout the year. duties and was in admuf"06 ^ cfflci atcd as Director in addition to his own D... v C nnai1 ^ierotted Si I?"^'^ charge of ^ W»*Tud Section. Mr. P. ^ *Ut J "U A«i«Unt r im entirely to the systematic work. Mr. E. p Into rl?^T ^17, irK^I1?10, of the Industrial Section from 1st April 1916 to" ^a P»l •ctfijf'o WCulon C(mbined bTe for 8ix montlw and Mr. r aim.

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Carr?'^B out thJir dSfifT11111*10,1*1 officeri haTe §hown commendable seal in VII. Ti

mcn t Of H^3?JSo5ial"~TllCTO wai a •aTin» of ^ 2.ftl&-l*-0 on the total allot-

H. G. CARTER, M.B., Ch.B., (Edin).

Offg. *Director,*

Botanical Surrey of India.

ft
eport of the Botanical Survey of India for 1917-18.

1. Tours

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thi ^f* «»nbined witf?'.[1]?[1]"]"? of »«lucinit..expenditure on work that can he
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in the i G< Carter .2. » mwi »«u"n. The only tour was a sbort one in.-uj,
^coiic ^ ter Wt of it e, TMon on>ic BoUnift, in the Khauit and .'nimia Hil|»_
,flc Plants. 1U|*M18. On that tour attentiou *as paid chi«.Hr to

OfflZ.""°* wore cim v°«—JSufam iadia. Prom Burma romidoroble
histel- ^r-B.G r -tnuW b* Mr- A- R*^'' IF8>. FonNt :ica««TMh
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«olW- I*ebhfu*r^Ur cont'n «« hii work on the Fin-st Fl>.-i <>l .VMOUL
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"** State in nk^-r ^n "Kpporah and has enlistod the aid of I lie K»rM oiBoow
kn ^"*tkert* "Olam"»g collections from arons that he cpuld nyt 'ipluro.
I'M[1]*[1]'*[0] of *th*^~*An* important and vnluablo epntriliution I., diu
W->U- N*. P.-V**? 5 this "*ion i« " The Forest Flora of tho 'UDJ.1, -,
»ndTP "PntiBiS-[1]*[8]- *H****TM «PP«re'l during the ror Mr 8. R.
descri üC Wah?? J M8tudiwf f 4e LiVcrworta of tlm We*t,in Ihuiatoy*
Him^ ^yan ^r.·J. 8.. Gamble has publudit-d a luadatory note on the
"wfa.

Western India.—An account of tlw venation of K«tb«n Gujant by Messrs. Saxton and S Fick hasappeaxed iuU.o K«ord.»i «•**»'*£s.ur^-
The latter has a PuWUhed n «t«·on the »«»«»•> Flora at taMlc- I.*k. irt
a paper •» tt« S C ?oRec of the Boml«y 1'riMdcnov. The B».T. Inthcr L.
Blatter, S. J., and Professor UaHberg l.avepublUhed'conUibut.on. «o«ardsH
Flora of Persian Baluchistan and Mikran. u v, r M.

Southern India.—Mr. Gamble conti
Madras Presidency. An account of the ve ^ 1 - ublition in tho
under preparation by Mr. C. B. C. Fische
Records. The Revd. Father Blatter has i
High Wavy Mountain of Madura District,
note on its Flora. Mr. C. Tadulingam, Government Lecturing Botanist, Madras,
made a general Botanical Survey of Viza a Vtau. Bella , Chingleput, Salem,
and Nilgiris Districts. Mr.C. e. Calder. C«r»tor rf at So nprtorlum of I ho
Royal Botanic Gard . Calcutta, continues the w 0TM'^^. of »ho Rlulu of
his explorations i" ^ ' " ^ «« publics .n *B*^ rf the Plants of

General.—T ^ 0 Rev. Pat lier Blatter ha» P^JHx wiU ultimately appear in
Arabia . «!«" «habitats and distribution »" ^ e e u ult h o rs' account of the
fe<f. Jr.*[1] of W.-The twentieth instalment of «« Hc [|M also, in conjunction
^!? ^of^ MJt Indi» and Ceylon bat app081*?-1-" Indian specie, of Jl^aia
« ^*» W*allbcr K' P»bl4eda «T1M0^p bi5.ruice«. wherein four new
*P^o,Tan'a. and a p<p\» «n new Indian Be^~*foxalit* now wild in India
and » C dftSCribod- ATac^ount of the •pe".**^°*g**£ C. OMer and a paper
on TriL ril)tion of a n cic* of *r*r*>*»»l usnxAi*^ ofa new »alam
and a *amplexicaule* and Mr. P. F. Fyson of the
Presi dgwick are in the press.
College, Madras, has under preparation a monograph of the species of
Eriocaulon for the Records. Mr. G. B. Patvardhan of the Agricultural College,
Poona, has recorded his observations on the interchangeability of vegetation and
fruit structures in *Opuntia elatior* and a sport of that species. Signor Beccari's
monograph of the species of Lepidocaryeæ Palms other than those of the genera
Calamus and *Dæmonorops* is about to be published as a volume of the Annals
of the Royal Botanic Garden, Calcutta. Sir David Prain has thrown light on

the ... Chozophora of which he has given an erudite account in the Kew ... In the same publication Mr. A. W. Hill, Assistant Director of ... an important paper on the genus *Strychnos* in India and the East, ... two new species are described, bringing the known species of ... up to a total of ninety-two. Mr. J. Hutchinson, ... for India ... Published a revision of the genus *Aspidopterys* ... from the Andaman is described. Several new ... species ... published in the Kew Bulletin by Gamble, Hutchinson, and Stapf.

... work in the Calcutta Herbarium has been ... performed by Messrs. Debbarman and Narayanswami, the two ... botanical Survey for systematic work. Mr. Debbarman has ... paper on a teratological condition of *Allium Cepa*, and another on ... of the pitchers of *Dischidia Rafflesiana*.

... the Botanical Survey has no ... experimental cultivation on any scale, its economic work is restricted ... to determining the origin of viable products, to obtaining supplies of ... plants ... for interested parties, to placing buyers and sellers of products in communica... performing the functions of a bureau ... regards such vegetable products as are ... During the year the Economic Botan... such work more ... products. ... of ... work but the ... tation of ... preclude a ... general character

In ... seeds ... obtained. Seed, of *Btotfrn...* ... undertook experi... mental cultivation ... Lieutenant-Colonel ... *Asteriostigma macrocarpa* were obtained ... Sir ... I.M.S., in connexion ... *dnocarpus* ... *Tarakt...* *Kurzii*. *Gynocardia odorata* ... connexion with ... to the ... Bacteriological ... to the ... research work ... and ... of the ... available, the bulb, of ... Bureau of Science, Manila. European ... substitute, and *Urginea indica* ... are ... utilised to a ... communication with each ... were placed in ... of the ... bulbs ... Male Fern ... imported ... of officinal ... Eastern Himalayan ... investigation, and ... species were sent to the ... Calcutta, for testing.

... undistinguishable ... leaves of *Melaleuca* ... Garden, Calcutta. ... together, and supplies of *Lycopodium* ... *C. anthel-* The cultivation of *Digitalis* and of *Chenopodium ambrosioides* ... *minticum* — the latter two the source of an oil used in the treatment of hook-worm disease — has been started on a fairly extensive scale on the Bengal Cinchona Plantation. Obscure points of nomenclature in the varieties of India... ... of considerable practical importance — as lack of clearness in nomen... clature has caused no small trouble to American importers — have been cleared up. Supplies of Lichen material — which before the war used to be exported to Germany — have been arranged for and the investigation of its tinctorial value has been undertaken by Professor Sen of the Civil Engineering College, Sibpur. Towards the end of the year the Imperial Institute was arranging to supply seed ... *tes Fordii* and of *Perilla ocimoides* — both important sources of ... — for experimental cultivation in India. Other species of economic ... dealt with during the year included *Ipomoea Purga*,

I. Turpethum, Citrullis Colocynthis, Strychnos »"*""•** *«"«••• *Kurroo, Taraxacum officinale*, etc.

IV. Industrial Section. Indlw Muiwm.-Ai it has been impossible to obtain either glass for new cases or ipeoimen jaw, work during the year has been restricted mainly to keeping « o exti ng colleolioni in gooS order. Almost all the old show-cases have a black finished iurflI€0, ^ «. rtino * was made of scraping the black finish off about a doton oafea to as to oipo* the natural colour of the wood and wax PoUahing the latter. The «sult haTboen so satisfactory in giving a lighter appearance to the gaUery that U U intended to treat the remaining cases in the iamo way.

Over five thousand }**»*• ^^ been renewed and almott all tho ohl printed and type-written ... j ^ |hewSr?" ^^ been renUood by more effeotive onas printod in UM hand ... to the Botanical Survey.

Nearly 1 ... in^k!f CCi?.. e n8Wcrott ^«dtothe oolleotioni. wine of which were displ... «» pubho gallery and the other* placed in the reference ooUee-tions.

V. Library.—...ut tho unufcl ^itioni wore made.

VI. Publi... ... the Records was published during the yea... I.A.R.O., ... on I.E.S., vegut»«on i j>. J. Botarivk, I,C.8. Hhia piri a general doKnption of the Vll e!:. »«oloaiy and a list of the apooie found in the arm.

VII. ... additi on 2 ... O*rtor, M.B., C.I.B., officiated at Kwtor ... Thereafter ... a. rkonomic Botiiiiit up to the 7th January 1917. ... t.Colon(>l A, T Qaw I.M.B.. rewmed charge on hi* f«turn from special ... systematic w... appointed assistant on probation on the 1st May 1917. Both have done ... work during the year. Babu U. C. Pal, Head Clerk, officiated as Assistant Curator of the Industrial Section of the Indian Museum until the 28th February, thereafter Mr. E. P. Vieux on return from combined leave resuming charge. Babu R. K. Das officiated as Head Clerk up to the same date.

VIII. Financial.—There was a saving of R4,287-10-8 on the total Budget allotment of R40,600, mostly under Salaries Establishment, House Rent, and Travelling Allowance.

A. T. GAGE, Lt.-Col., I.M.S.,
Director, Botanical Survey of India,
and officer in charge of the
Industrial Section, Indian Museum.

GGPI—4 D B S 1—13-3-18. 450.

Report of the Botanical Survey of India for 191849.

L. Tourlng.—Tlie exigencies of a war-time limit**! budget restricted louring 191\"I llilmim" T*o Gnomic lloiauirf collected in the Khana Hills in April ^.^•'Jjorttiiw, giving |iartii'ular Attention to those plants made UHC of fi T indig<>n0U8 IHJpulation. In January and February the Dmvlor, and £*» January to April MO Mr. P. T. Kiuft'II, who had U-ftn depute from the th?P Ciocl »ona Department, explored the great forest* of tin- northern half of strict of Tavoy in Burma, primarily with a new to select site* for Parting j^J-inchona plantations there on a large scale. During this tour both officer! JJ considerable collection*, which should prove of great scientific interest, at *oresU of Tenasserim are still very imperfectly known.

for ii WM top 08 * with the small amount of money available alv> to arrange Of the lwo »»»«tantK to ip on tour. Messrs. Dehburinan, B. 8e.. and Naray ^ami, B. \., however did good nerviee in working out the enlhflWBi for ulentifieation by other departinrati and by imfividual offitrn*.

II. ^m tle.-Aiireni *Udw*. The urarcihr of (4 w and the «eep-tionally urary demands of nar work irreatly affwtid. The help uwually received from officers of the Fore* and oth«T Department* interested iin Many. The most important contribution from thu. i^ide of India »» made by Mr. C. U. Ro C.I.E, F L.8., w ho pn<si-iitnl a fine eoltoctfcm of R|»*yinieiw i«n«lf by huu ^.course of a tour in Tat oy and Mergui dirfricU of Hurma.

hither* Ortherw «— Mr. (i. 0. Allen I.C.8., \m |Nibliiihetl a tut «f «|wi« m* W * ii Curton pd *" owntring >" <MI iwiglilnwrhiwd of Muwmorie. From MK> Forest Department y» collection*, liave IXHII contributed by Mr. 8. N. Mitra «f the F.L.8., C nkervat OT of Forms, worked up in tlw Jtoyal Hirfanir (Jarden. Calcutta, p, 8Bihlr and Oriua eoUwtiow in pn'paration for the urvjortwl Province, and printed a fine *mi* of duplicates FnMn tiie able ^^ ^ ^whi, the Uev. *I* Bre«wr», 8. J, has contri»mt«-d ao»HiMler-ion.

Raj- ^ T «^.-The vegeUtion of the Indian Dwcrt of Wcalern *-Em. Wn clnill%| Htllili ^ »•> lll> Uo< K Blatlcr8> J

Mr. E f^* ho ^^ I'uWinhwl an ixa-Hent illustrated aocoun! of *ir*- flora. ^SteW*T! « *wl«y Prwidenc^ and IW »> a tuly of the of th^ W* ipeeie. of Ziivpbu*. Dr. K hlbl Annandale Director ^nUnf Zoological Survey of lmlu. made an intormting mlleciMti «f effects of e Ukp Win of 8*>ifltan, Md v*ll*M<% ohMinrilt|OU m t)w environment and on other cpcolojrical point* of interest.

On the Tp,*^ ^ Mr. J. 8. Gamble, C.I.B.. *V* H-8., ha. contim^ hi. work ***Ju2 -ll10 Madr» ^»«^n'cv and in addition ha*JHIWIJHII n sH ,*f The Gov ^ 111 of ^ families and genera that hare been under Mudy l,y him' Salem, North A™, .oor Ani t deNih Nii,bid » n*d* * *****«**»**: criptions and illust «"**<* iome of the common gra«e. of hr phw rf Madras, and a list of *«* P'anUof Tinnevellv. Tltf Ilrv. L Anglade, H. J*.tai collected largely in the Madura dfcriet and 'ooDtril«U taqply to^ IW«« » Survey collection

General.—Captain C. C. Caldet, I.A.R., Curator of the Herliarium, Royal Botanic Garden, Calcutta, while on n the latter half of the year made collecti were also received from the Agricultural Department there. inmm, Assistant for India, Kew has investigated the genera *Taxodrophis, Balanodro-llus* and *Cordia* and cleared up obscurities in the specific characters and distribution of the species of those genera. A considerable number of new Indian species have been described by various other botanists. Mr. L. J. Sedgwick has published an interesting oecological study of the morphological characters of some Western Indian woody species.

nJ& i ?00!w"ite.--The most important economic work of the year, if thfn? '*W *o iu V<™to* future results, hat been in connexion with Oin-nn* rillt!\ati"n- After a prolonged tour on special duty in WIT to disco ?, T TlUU>K> for **» 'Nation of Cinchona on an extensive scale, the Direc-W T wnillPI"W r0HerTin« an area of about 400 square miles ^ ^ T j ^,^wrtl«thWoltidMri€tiifTbfiy» Bwm Forthefirst four [.<"ths of Him, Mr. P. T. Russell, Manager of the Bengal Government 1, T.! 5" l>Unt*™ «f Mungnoo, and fromtbe 2 Wh March to the 24th Apnl •ut:» A" "' L 8haw "•*••*•"•'•• '^ Government Quinotnfitt, Bengal, we* o. w'l ul *T««fcHi to the Botanical Surrey. The Director and tho-e two ^^^•lort^inmori.deUiUhanitwiwpo^i^foT the Director to do in a" V; 'w1 *»wt€il arm to discover nuiuble sites for starting Cinchona planting " •'7 the erection of a factory. In thi» work Talual>le help was given by M fi,L llln«B.8c., Executive Engineer, Tavoy, «pevially in the matter of ^imating the water .m m. r.iw,£ for factory purpose*. The re*ultH of this tour and the recommendations lii«N«luwm them form th«'"«il»i^ of * special report to Government. Sufficeit to ^ here XhMi §uiUllUt gitol WerC dis-covered.

Cinc.^ ^ tf Hbi n of medicinal pUnU other than Cinchona on th« Bengal l*lul ManUtM*„ i. rrfcmd to in the annual n^port of the^.pUnUtioniu The ^onom^ l^^Uni-t'. work wat concerned mortly «ith the line, of inv (•<r«r!!MlM ""^"wieil in last yt«r'ii report. The inTertigatHm »y Lieutenant of 31 *Sir Umard Knqm, I.ft.S., into tfie hydncR-arpic aeul content of «ed» dIT, r T *lfrif* of Jlydnocarpun ma. aided by collation* of heed* of ai many depart-mw - rained.

IV. Industrial Section Indian Museum _OwinK to the rentrictivecondi-Wni, ^raranilt^'»nuillneM(>f the HUIT, w<rk was comfitiM-d mainly to to F*! ? «»«*«II« collection* in K"wl order. A vast amount of work reHUirw ul J;H ??*; lf th<? # I»**blic gallery is to reach the standard demanded by modern l,ttl V! »e functions of a raiueum, hut until an adeauate sUff is providiji inMr, 7proVl,ni<>nt (an Jlp oi|».vt«l. Mr. Vieux the Assittant-Curatw, hasmaile t|u, J IVt* •>*|N'riinenm m the UM> of the co|>i»er acetate process for preserving g ren colour the collection*.

• Wbrtry.-..\U>ut the usual additions were made.

H,lnTt Fubl>«Uoni.-No. N of Volume VI of the Records of the Botanical <f \)*lv** lllWi*lied early in 1919. It consists ohm account of M The Species UiW r r, ao*iWin ^J'a'an'd of - A new ImUan Vernonia" liy C. C. Iriekt, UnitOr ^ the ll«>r»*"uni, Royal Botanic (iarden, and of ptpen M On Uo nn!'?M|.'*lWr"" K, Ur- w*'1 Trickodttmm amyltxicault Auctt/1 and on of A r f!*l'"l" «»l>rei«hy L J. 8ixU«ick, I.CA In the IV*. are the " Flora h *L (j'\arter. ythc ^^ B.BUiter» 8, J».and " Uiirful PUmU of Ukhim J lur "

tiVf JU *{•*•-All oAii-rs of tlic .lcpnrtment «»T«» in charife of their respeo-»a»i« Khoilt *h' vi«arexcel* that Dr. 11. li laHertEi«nomk l^iUiust, *v£JF'*lVr*' U^v fn*» i** l-Bth April to the 1 Hh June 191H, and Mr · V. l^*"" %m l™iU^ >««-r fn«i the i:,th to 2*h Fvl.ruary 1919.

»«» i T'l?1*11^ .- The Hu-lrt allotment for the year ^/w a special allot-"a*U, ŭrV^10 fw«pmdilurf in connexion with the exploration inTavoy, «n tluV T^w wan a saringof IU. 1,558- U-Diurt of which wis saved Tavoy exploration account.

A. T. GAGE, LT.-COL, LMA,
IhrtH+r, 3~*e*l Swrrtf of lmf%^*
mmd O/Urr tm Chsrfi $f Ike
Imlutir' I Stctim, M** JHm$ntu*

Report of the Botanical Survey of India for 1919-20.

first 1\ T°wrto* -.With the Economic BotinW abaent on tore during Uie .JfU of the y«*r and the Director during the wcond no field *ork man poss «>le beyond what could be combined with work unconnected with the Sur vcjr. Neterthelew material awaiting elimination at the l.orlanum is a wa i y 8 more than sufficient to keep the •mall staff fully engird. The absence of «« valuable incentiremd exerci* to the fmltiea of ol«mati<* in field Work n milch ^ *>* deprecated, but until worker. are available in number 8Uffldent t0 °°P* *M> t»»e mwaitie* at head-quarter*, fteld work » hUly to be th caide to suffer. While on duiva* 8uperintondi.Lt of Cinchona 1 ult nation the writer M opportunity to nuke collection. indU.auppU-iii.-nt th,nol«, published in Mr. Gamble's list of tree*, etc.. of the Darjwlmg Di-tru 't hut Wyond th be ^0, * * " *1 field w«'k win puwibln. Dunn? the current y*r atUuipU will of "»*ae to depute the Systematic A-aiatanta, one at a time, for a limits term dem tounng Mort. It i/ e^ential thlt the Syatematirt ahould not Miffrr oral^tion th™gh ^n« narrowed down to work on dned mitrnal only, or a.[11]!- Syttemttlc-*But*™ India.* Mo4 of the collection*, either oripnil B,it uphcaU, sheet*, which Mr. C. (J. Roger.. laU- Chief Contenatorof romOn, «nna, had made in different parU of the province were already pn^nted to ^'^oreheterminitedhwrcrvkT. There rvmain.Hl with him, h..»eireT. th™f *0° »peiimeiii of pUnt*. nh.ch for varioun n w m had not l.ren Murd to J* nerbarium, aud thene he kindly made OTCT beiore loaTinR the nt-nrice. The TjWy Director of Agrirulturr, InM-in, liurma, **nt a collection of imiMe»»f BuKi lCIl tural "nportinoe for checking and fi*ur»nJi and with a v»fw to plication. Identification of granN* and lmml^o. in oonnrcium w.th work L- P11^ making in which the Burma Oil Company are inU-n-st.il Lv aUo 7** undertaken. From the neighbourhood of the Chilka LiU Dr Annan- ^.contributed annm 200 specunenii. He haa uiul.r prri*nHH»n a |«|H-r g?llng with the biology of the lake and hw hwlthe aid of oflkrr* «f llir Uanl!^ S thc workinK'out of the botanical list wbich will form a |«arl of the H5£'iTke moie important botanical work of the jeir d«-alin »nh hj^rro H-i• bwn dono on l)Ulnto i->Hected during tho Abor KipwlIloB b3 Mr tion-ltrai "'lateof *nc «"tAnkaU Surrey. Thei« plant* hare \w*n undrr rxamina- teL ?lr Wurkin »"^ «*»•«• "P^rta at home. Some twenty »pac>a irw to J ^ !h^e already bern d.-*ril»ed from Aborland TIH« MW a MK «C BPHIT- familie« but proUhly tht- rnnut imiwrlant arfditiona are the *Um* new find/1** devribe,! by Mr Dunn. Home of tU may turn out U» I* valuable jj" f^m the horticulturiat'a point of riew. One in particular wi.ich hat »n cultivation for aome yean at the Lloyd boUmc CJaroVn may ta a prominent place in Bevinia culti>ati<»n. Mr. U. H. Hole a*» arkdaw «ie i "l>Criet of Ixo™ from the Yaroeibin dialncl of Burma. «l*ilr •, II?roTe •P«C1« iir.p^ra Z/«MM«II baa hern described by Mr.C «. Roger " f h i i y h

•P«C« iir.p^ra Z/«MM«II baa

province. from the tidal fowt refioii of Mrrgui in the MBM sional ilr. R. E. Cooper[1]! BhuUn oollcdiona continue to jidd ai o«a- supplied 7 pltnt, D'- ^^ ^ deicribed an Aennite raiaed from *«*d* l,y Mr. Cooper. ^^

Nor/*ern Musoo —Mr. G. O. AlJen contino« addition to hit 1* of tOf Hn, 1>lanta whilr tb« attribution and d#«criptiTe morpM*T. of ^'••nialiiyanliTcrmortaforma the continued ntudy of IVofi*-* Ka#hyap. of p^?Xol»hyc«. of LahoTf itdoait with by Mr 8. L. Cibo* and Uie florm species rer»»'i BaluchiaUn and Makna by Blatter and Hallberg. T«o new Northern ****t/tn** *bt*galm*4* and *UmimmUmm* kftfe bea*¯detfhbed frx>ai

of *iJZ?[1]*'* **<K*.—A* paper by Dm. Aaawdalr and Cirtrr on tl.e TftHatiet itttroT? "PP'^iDtbe Journal of tlw Aaiitk· H^oHy dunni th« mr Tke syn 2;lor); Plrt dnda with thc rffreUtion from tl»« eoolomoaJ atawl|»oiDt and the species c li-t eottUiBj wfi) aotei oe. tkt dktributiop and iota) naoM of tU ing a IOMd. &«•• B ti^ll & i. »• Plrfwilf 'BiUhert ar« |*hlia«. of the mhaj Nlturmj Ha^ory fceMy ajni arr wmtribuliog mattriaia for i

of the Plant of the Maritime and Executive J; -« faluida. Mr. Vt. O. nraiiley in a paper to the Kew Bulletin now draws a comparison between this flora and that of the Aldabra group in the mid Indian Ocean. The variation of Bombay Striga has been studied by Mr. W. Burns. Mr. L. J. Sedgwick has a paper in the Indian Forester on the analyses of some morphological characters of Bombay woody species from an ecolog ?5 standpoint and has also had under examination the specific values of certain Alysicarpi.

Southern India.—The mart important work «of the year on this province appears fro h' F' ra of the Madras Presidency.» the h,,d ,,(Mr. G«mWe in the 3rd P^ 7no^.CIE salpinioide. to Caprifol- T»"» f* U«l. with the flora from W ^ K e w e n i u in the Kew Bul ?**"» one new species are appearing lu J^TTrn In(ii,, hare been described.^ , In''e '* **'* °u 'T 'nd five Memecylon from the W. w»inb« includes five oruenmiR-r-.'jjcorery of the planu Cira^J'^'^worTraTancore. An interesting^^*Jl* wa.ma.le by p S f *' Wuht M *Beterocarp*** *g*^' "^Toeatecnce of theM planta f^T^T.^n while botanUing in the Pal**!;. 'T dtoco'W^ bf u P ~ fT?r Cn K JrCtSons *>»« «">* TM» they are. TI'^,^mentioned by Wight. 11,-"*?*• the IWer« blue, not yellow, or orange as to tower .lope. «he rg^ttattlie oran^ coloured flower, may ^ ^ Ir. M. Bataubrah- ^ X ^ r e d to tl,« higher. Profe»or .^d^rmining theex-tenoeof C!S? haHalin *udi «l tW OCOIOR.WI conditions dew ron rf Jfadia,• '••'Ar to«r~ # th« aauide vegew- lliamueh con-

General.—Mr. H. H. Haines has described and arranged the number of known fused Indian species of Carissa. Mr. Gamble has raised the number of known India Mimoseae from three to seven with figures and full descriptions of the new species, and a useful key to their determination. For purposes of this work he was supplied with material from the Royal Botanic Garden, Sibpur. Sir David Prain & Mr. Burkill have cleared up in a very exhaustive manner the synonymy and taxonomic position of *Dioscorea sativa* in a paper contributed to the Kew Bulletin. Mr. T. A. Sprague has had the genera Dolichandrone & Markhamia under revision. Indian material of the former genus is now on its way to Kew. Recent work on the Mahoganies of the West Indies seems to throw doubt on the generally accepted belief that the tree now largely grown in India is the true mahogany. Material from the Calcutta gardens may help to settle the point. This is being collected as it becomes available, and will be sent home in due course. A paper of some interest to Indian botanists is a study of the ecology of the tropical rain forest by Mr. R. C. McLean appearing in one of the issues of the Journal of Ecology. Professor Fyson has published in the Journal of Indian Botany a short resume of a paper on Eriocaulon still to appear in the Records of the Botanical Survey. Mr. L. J. Sed his views on the nomenclature should be extended systematics. Ho n»k« the -"W estion that nomenclature of the term 'variety' in to show at a the variety and enumerates some half dozen meanings of th erm.

III. Economic.—The most important economic work of the year has been the initiation of the scheme for Cinchona Cultivation in Burma. The newly appointed Superintendent of Cinchona Cultivation in that province reached the reserve to start operations in the second week of March 1920. He took with him e>o«!!hw;«lto fill nurseries capable of planting up some 100 acres and also • «*rtain number of oUcr Cinchona ^ r f i e r in specially constructed wardian cases. By thb mean, it wa» h^.10.**' take to the new conditions. It is too beyond ,,,jHn« *a«e ^ have been difficulties with experience of how plants £by yet t, »,«.k of *,cce« "» t ^ 'meant an anxious and arduous time but point the belief that Cinchona will eventually area. Careful data are being collected

**t ** grown with «Ulc«* i« *• "J The absence of leaf mould in the 2*"» to climatic and soil «3 ? dll &ll than Cinchona has been accustomed tural fur,,t indicate, a beav.f partly set off by the fact that the area is very to in Bengal, but ,hi. cnndii wn •« remain water logged and even a few hours well drained. The land doe. »«*

55" » ho»Ty rainfall the Nil regain, ito worloible ^^ ,h J ^ ^ 2 !
«<-ulty Iie/in the bringing of "^Nf " T " ^kSrta *eSSS
conditions as have been recently
experienced will be less felt.

r. The cultivation of medical plant* other than Cinchona on the Bengal J-mchona Plantation* is dealt with in some detail in the Annual Report of these plantations. There has heen quite a gratifying »< success in the cultivation J[r] Digitalis, the Ipecacuanha has seeded well-a factor of some importance J*the multiplication of dock-but the cultivation of ^'f i ; ***on account of the small volatile oil content. A .ma» C«H J"™\^X™ 2 Belbdonnt in in cultivation and experiment, earned out on b. luH. M afloral ci[e]mical fi[rms?]o to show that Taraxacum can be 8Ucce«fuUy eipluilcd in the ^ungpro district.

w Mr. Gr^n, Manager of the Hanson* Plantation has . ^ j « " f W [u] *[£ f j « f work in tte grafting and management of fruit [rt]^ • ^ ^ ^ I-'f ict. The Economic Dotlnin's work was ^ ^ ^ ^ 7 , ^ *** of investigation mentioned in previous report*. ^^™™J£ ^PlanU ofnXnalimporUnoearo being received m w ^ " ^ ™ ^ formation as to mctlioibof cultivation, etc., usually accompanying tuerequitti I or nut.!

. iB IT. Induttrltl Saetin. Indian Museum.-No progress could be made '"the much nvtiti iinprov»•1111•n» of rci.lac.ns .the j. d « » * ation tins by those manu- ghBWhr K lu. .peci....... Jan. a» it wa. found impo».ble to haw the work of ^»?» in India and h o j .upplio. were not lurOieoannf] ^ i n g the black poh.h of ite old J.ow cam and • n j * * ' " ^ ' ^ «"" *»». »a» completed during the yoar. Thia »ork w h««nin U I • «tth » ylew to gi vin a lighter .ppewnoi' l« the RalL-ry. The r.».lt ..t,ry tt«»factor, 8om^nft;Uo^'in«n.wcn- added to the " ^ ".j f j " ? tion. organ of the

^U ocU dbpAj^i.8u ch c a eit-to-fo,*,, i,MIH tr camondy be though t-tt wh « - adequ»u-to the need, of the departDicnt i. prouded.

ma J" Llbf «7 -The usual addition, of books »nd pefiooicaU wcw

-., VI. Pub«ottion.-No. lof Volume VIII of the Record, of the IWani- »1 Survey l«B,VJSt Tof U.v. E. Hlatk-r's Flora Arab.* was p.Mi<M m S'Pt'mher !01» In th0 PrU a^ th.- 'V-ful l'lanli. of UUim.p-.' l-y K- «• C B. C.

S *• Ipper Gangetie 1'la.n" Vol. 111. l'art II by Duth.e and
K" E. BlalU-r's "Flora Aral.ica."

tin I"' Stafj-Lieaunant-Colonel A. T. <;«. I M. 8.. was in administra- lea L*^5"'»om 1st Apnl to 11th ()tol«r 1U19. who he went «« combined Off^ Mr. C. C. C.lder, B.Sc.. B Sc. (Aw.). K L. ».. oir>c*t«d a> tor and Mr. w-in-Oharg, from •„,!, «»d.*er 10W till <»» *»* of '^J official year month. (i (;1rtir- M B. Cbh B, ... in clrcnlive chaqje exc.ptm for seven -»»th riti four ^ ^ 13U April «« "**^\TT** L L*u^JS 7*™ conhind IMT» far .E. F. Virox win A»«iUnt Curator from W \pnl M,[1] "h >>»Sr 19l, .h*n towert <- Ijjr. without , ,.y' .D««, \H ilcux» »!•«« Bh Ina Cham* pjotVWed a. A«rt«i < «rat.». ve given commendable attention to duty

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IU JiSL HWMW-HM- BudgM allotment for the l ^ - f ^ r ^ *otl of thU 1U »2.W1(-J.m pent ^ " " " T'TL wMk -« Rs. 52,158 under «»b»ri,H .nd b0O1.«Bt! ^lK.g»utf» Cnchon. work *•• of which IU Utft.14 WCM a m i

C. C. CALDBH,

Offg. Director, Botanical Survey of India, and Officer-in-Charge of the Industrial Section, Indian Museum.

B.G.P.—4 DBSR—80-11-09—400

Report of the Botanical Survey of India for 1920-21.

}- Systematic—*Etulem India and B*rm*.-* *«e forwU of the norf h-°rn third of Tavoy District in Southern Barma, Mr. P. T. KUIK'11, Superintendent °\ Cinchona Cultivation there, ha* made excellent collection* The Dirorfor v«ited the name area early in 1921 and al*» brought hack a collision. Tho d^rict ia boUnically rich and these preliminary collection! ha\e already yielded {** *nd interesting species. The diatribution of Floras in S. K. Asia an affected by the Burma-Yunnan range of mountains, has t*en itudicil by Captain Kingdon Ward. In the Kew Bulletin hat been published a paper by the lato Major 8. M. Toppin, M C. on the Balsams of the Kachin Hills. In the samo Journal descriptions of the new species in the collection! made by Mr. I. H. "will tome yean ago in the Abor Hills continue to appear. In Notes from the Royal Botanie Garden, Edinburgh, 8ir Isaac Balfour and W. W. Bmith have published new specie* of *Primula, Omphalogramm*. Rkododendrom* and oth* genera from the Eaitern Himalaya and Upper Burma.

o *Xorthtrn* 7MIM.—Part II of Vol. Ill of the Flora of The I7w*r J^agetic Plain, by J. F. Duthie appeared in 1920. It contains the Millie* !I°?i Coni/Vra* *° *JHticaCfae.* Thif work U now nearly finished, and it in hoped Im* o7 ano^ber year publication will be completed. Mr. R. N. Parker of the *th^fP*** Foreit ^e^ioe has dinoo?ered several hitherto-undesenbed species IQ TM *V W. HimaUva. Profeswr 8. R. KaAysp has publidied an interesting S?JJ on the Tegetation forming the floating islands of Riwalsar, a Uke in Mandi Stue. 7** BaJiami of Chitrfi are referred to in Major Toppins paper mentioned above.

We<*m *Indinr-nt* Ber. Father Blatter and Professor TTallberg continue to sliow Krrat Activity on this side of India, their contributions to botanical literature during the year including a paper on new ipwien of varioua Saillfa found in **** Bombay Prrsidrm-j, ttudies of the Flora of JciJhpur and t^»er, and of the Flora of Baluchiian. The drought resisting plants of -1*°can form the subject of a paper by Mr. R. K. Bhide.

ui th ithern India-During 8eptem»ior and October. Mr. V. Narayanswami Bl 7 ToUnic*» Surrey eiplored the Rampa country of the Oodarery District M on llcctlon*» ^nging from 500 to tMX) feet of altitude ire bo.ng norked out ^Ppo.rtunity allowa, and promise interesting results. Collertiom were aUo ^Je Ui Alamanda, PoUkol, the Pulney and Nilgiri hilU and in kawgode Bnu IDl?eTnJ *7 Mr. K. Rangachariar Aver^a). the Madras Oomnwt tin matic ^^l * and hU aMistanU. Thp same brtanist has under pwyna• to k!!!Parat* lut« of pUnU for the various districts of the Madras I'rwicleiiCT, kaiiSk?^ ^ttpiUiion of district Floras hereafter. Mr. J. 8· Gsmblf, C·I.R. lot oPf Ublul^ in connection with the preparation of his Flora of Madras a fresh •uk?\ !*? »l*ciei from Southern India. The Wol****!*** of llulasi form the subject of a ptpcr by Mr. Ayyangar.

General - A larft number of papen not ocwoprned with purely r^ontU botany have PP«*re5 during the vear, of which only a selection can be mentioned here. ñfH «• «*in«» fcl B ^ cl€lwao p • •OIIIPBC *!1I 7Ioo fu tion hitherto occurring the u of the names *Amoor.* **Wk and A *Wal* *mSh* and ad« IH/UM ^of the **VM*

••* *U??!?***1*** •Nation in the nuwew of *Jtrnfmrnmairnkmimm.* **P* rvTH · ^ 7 ^ ob^iratiooi Ctttbc iDflorwopnce and flowrn cf tU

by Mr. K. D. Sawhne ... Mr. I. B Sabnis and ... drils ... aspects of the vegetation of the U— Gangetic Plain have be*,i and by Dr. W. Np.^f.5K this abortion of the inflorescence V-thr... ^ been rwrdedb; Mr. P.M. Debbarman,

II. Econo mle_D<lrl"* ** 7** Cinchona work in Ta?oy bat been tontinued under the diffl<^lt circumstances inseparable from til pioneer work in ^•n e7 'I?!**! f°r***. So fir u nursery *ork is conoefned tie results haT« IMI*ere-r'' lent V M^llin1?1 wminating and growing rery well. The real teat, tllr henvV*" tO now the 7^°^ P Untg wos» planted out in tbe open, will stand T"**Tr\<A» moni00Tl precipitation tbat occur* in tbe south-westera oorner of the J"un» hi 1 T1*TM "p'ralioni ha»e been started, has yet to be passed. If tbe (l*>mrh h V?*XrA »»tU ope* at tUt beginning of the montoon do not come *** i* tuflcte f1ly. »t don aot necessarily follow that tbe whole retmed tl<>r iMfihP ntinentinyntcondemned as unsuitable. It may be found that "• till », ^ panting out from the beginning of the montoon to near Ue fu f the tbunic planlu to be buAoiAnilyl feUblabed to withstand 'Kteatrv 7 ***"' following morMOon. On the otber hand it may be found lit,. no l?iJ nM»?* further inland, or to the southern third of Tavoy District or »«n in L n k TtV0 ^ of W«r»ut DUtriot, where the rainfall U ooniidtfrably lm fcuf ficiont alv. 7 . AnoUier year'i eiiierienoe will lie neootur}-, before futurr .J- fmn >>e VMbered on which to bate a definite opinion M to the Altn °, nU>b,Uk<in

dealt withT nuil»brr of enquiries* too numerous to mention here in detail—were ted, uuriug the y«ar, aod many teeds and economic product* dittribu-

itl ,^^kiZ ho lllfl India, Mr n. o-.Cftrter» **" Economic BotanM, wu ennged '* '« honMi .^' *.rt'l"»rt <>" the economic pUntiof tbe neighbourhood of Shulong. hi lull " lna v IM foun<l !»o^hle horrafur to pul»li»h hit report.

^MIHI ii n^aua}>*lal Section, Indian Muaeum.-Work m conducted on the *J»Uory Wb re ?ru| fe«piire« no »ix«oul mention. Tbe collectiont in th« public development T llM(^<)nlfr,luUnlil1 qualified Curator it arailahle, no possible or "JB gallery on modern lioet of Hneeum manafrement it been IV.* D

Pitt r.^Wtlon*—TXiring the ymr the departmental publication! ham J^thie "'!. ?f. v«l. HI <4 the Flora of tbe lm?r Oangetic Plain by J. p. V| <* tiiHooorue O1?* ^onirrt from Coeji/ff«w to /Ni0Mf»f, and No. I of VoL A ^ hiu . * iUt% 1Jo««n^l »»rtey being Iteful PlanU of the District portant vZJi. d AiMm l! u- ° *nd !>• N. Carter. A list of the more im- publi heil ,lur l*rt"»«nial publications on Indian Botany that have been 1921 V. ft. V#Z~#»fPP n W-

Mr. , thrJi? ~Wr &. <TMer officiated ti Director until the loth Januarj after ' ' O u.er Li^^nant.Coloo«l A T. Gaire, I.M.8.. reewning cham. serving Mr' P. w. V Kc<>nouiM5 BoUni*. until the 27th Februanr 10)1. there- Bran witK *it T^J»Uniian often ting. Mr. Cartw resifned Goreniamt V. N. to K.47 1from Uve Uxh .'arch lQtO at ths ead of tW pririUft leav* Narayan L . °l Uir lHth rVbruary \K\. Messrs P. M. Debbarman and Umo Wan. li."!1/ *8 "wasmatic Assistants throughout the year. Babu Section indUn u, Crrkt °Aciafrd as Assistant Curator of the Industrial Rajomi charge. V "'''''. up to tbe ltth September, and from thai date Babu Debbarman All officer until the 11th Oetol«r lltto 1 liereaiWr Mr. Vlmi resumed work of the and X1 «f the de|Mirtmmt hare worked with satlafadtsM. Messrs. ..,". , lr»}»n«wi,ni hair M u«ual irWen greal isssstaftet in the Rs. VI. ?i TTln of I*" Hoyal \\<***>c Gardftt.

part '^.1OC ? ~Th* u*** allotment for the department was Kt *' »'t anil in. «Sh Km UVU° wna for the purely botanical side of the de- »****\ -idL rrd U »» ^•nch rna work. The expenditure on the purely botanical work. Its. (KMM-11, the fitess being due to ij none T T or !••) f«* Maff ooffnng into eff rrt during the year. Of that advance »n|y i. "Tl1 ICi 10.000 wnr* sunnetr>aened to OoterwDtnt. Of the principal y on L W14.11.11 were ~p«tW leafing a sating of Be 15.19M.1 in the quantities

pared.

A.T. GAOIX/ ·CW. /.Jf.f.,
Director, Botanical Survey . . a, and
Officer-in-Charge, Industrial Section, Indian Museum.

LI8T OF PAPERS.

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. Mora of U» Uptwr .Ganprtio Plain in<) i.f tbr Ailjaiint Siwalik and 8Qb-ilinala>an Trartt. (m, i, 1/9^/J, ;,,.

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Report of the Botanical Surrey of India for 1921-2?.

°f the v yi*ema**c-~ *Radfn InJtn amd Burma.*— The mow! important erent I and if*1!HL1^ re8api* to th* botanv of Eastern India is the appearance of pan* the InnL° ,£ ^^ny of Bihar and Onna hy Mr. H. II. llaine*. (IK. late of 8*1 76 famı.i ** rMt IServ '^IVIYr. The two part* now published runt:mi the ^cttmnt to the ** from *R^an f*r*ktem XoComarrar.* The work is a vulluble addition B^ORTBDP^1111 Floraa of Indla l,n Bwi„ l1 l>r„fwwor ^ ^ h.i« rtMdie.1 the •«w haad ?*7butlon of tlie ape*-*** of /'oiy/wriirr.r found MI that province ln the Ch e8cn„ed "Pveral new species. The specie* of *lhptrro.<u),,,t<* occurring Mr. and Mr 11* ')latru>t have been studifd and form the subj.it of M paper *br* on J,|g i^PB" r «w»n of the Imperial Forest Service. In Assam Mr. hmijilal carne* °' a Pore«te?|l*ltl0n °'*he forest vegetation in preparation for the puMicatiuii the botan *g* °' *ni* province, ln Burma attention continue* to lie given U accumulated of the Cinchona area in Tavoy and collections an- licing nteadily duti^ by '- P- T. Russell. Superintendent of Cinchona tlim* a« hi* other la OWirtTT^). II !" *" ^f morp f(>n»i^te that Mr Russell is taking up tl»n «ork(°' ^he Ko, ack °' 'Ull(*8 »t has been impossible to depute any of the *M*tatı,ta tpad quart^niC*1 flurv<1)' for *b*M* *••* The latter however are «orking up at ^e ^^ect ** °PP*)rtunity l^rnuiii the collections made bv Mr Ru^>U €1 W. *y $*°T\ ^conw«*er»ble number of new orchid* have lieen •>. DUNI l.\ Mr. Jjontier b^'if' ^m ^'^tions made in I'pper Burma and the Burma Uuna ^ BDecies f·P^.'°IT*<|t, Captain Kingdon Wanl and the late Mr II Farrer. publishe.j •O- *PktAnroiptTmum* and */WtmZani* from the same region have been material c *y* Mr ·0- lionati. A new genus of Mons–TftMm«i/<>»»wi founded on by Mr. ^ollected many years ugo by Tarinh at Moulmein. ha^ I wen dc«*. ril^l were madI© b Dx U °n' ^unn*.tne 1921 ^%^ni K\ere*t Kxpedition Milltitiuna that have ij TMr- A. F. R. Wollaaton which ha\e \iclded st'\eral new speitea, oeen deecribed by vanoui botaniaU.

Northern *"*la.—An interesting illustrated account of the Forv«t formations and successions of the Sat Tal vallev in the Kuma4»n HIIMMIHVH In* lieen published by Mr. L. A. Kenoyer. The Liverworts i»f the We«*t«ni Ilirnalava continue to be investigated^ X Mr S R Kanhxap The *ArtrnwU* of the Sub-Forest ^^nUla «onn the aubjartof a pa|M-r by Mr R N. Parker «f the In.pena] Himalayt k-^i*^" a oonaiderable numlwr of new speties fn»m the North Weat Nepal cilU^r Published by the aaroe botanist and by Mr. S T. Ihinn. In Iect|ona we* made by Dr. 6. P. Agkarkar and Profeaeor K. S. Inandaf.

Western India.—Mr. L. J. Rtdgwirk. I.C.R.. has pnbkabad atveral new species of flowering plants from the Bombay aide, and a colleetiom of Mo*ne« made by him in North Kanara haa formed U»e anbject of a paper by Mr II N I'txon Aa ecological study °f iWcan graaalaod baa been made by Measn W Burns and G. M. Chakrade*. The vegetation of Northern (Jujarat has been further inreatigated by Mr 7- T. Haxton. IK H. and his reeulta are now 1a the Preai aa a number of the Records of the Botanical Hunrey.

Southern India.—Since Uat year Part IV of the Flora of the Presidency of Madras by Mr. J. S. Gamble. C.I.K F K S, haa appeared, containing the Famibaa Rubiaceae to Ebenaceae. Supplementary Note No IV on the Flora and deacriptions of new species frotn the aouth of India by ihe tame author ha\e also baan published. A new species of graai fmm C<Mmbatore has b«en «*e* r» .M| IIT K. Rangacharyar and C. Tadulingam and a aatr ganiu of Moaf (nun toe Nilgiris by Mr. H. N. Dixon. Mr. K. Rangachari— the Madras Government Systematic Botanist, has published a handbook of some common South Indian Grasses and a second edition of his Manual of Botany. Mr Jacob, hia AaaifUnt. made a collection in the Tinnevelly Hills. .U oaaal. mal»nd wa« a«ppbui to Mr UaaUa to help in the preparation of his fk of Madras.

Grarra/.-Mr. T. 8. Ssbnis continned his inTftti«ation of the P**1^**^ J^my of the plant- of th- Indian Desert and Mr. PTY Fyton bis account of th« T^/Pecie. of *Enoravlon.* Profe-or Hallberg has recorded several ***** 2^formatwn. m varMM1s Indian species. A revision of the genus *LanavUa* ^been public by Me-n, C. V>iper and 8. T. Dunn.Jbe fowtnn« of Af****nm *juiaUa* u, the object u(a Da£r by Mr. J. 8. Gamble. Short general accounts of the Family *WtnUrocea* and of the teneraof F""™*^}?™ ^ published »>y Mr J. Hutrhinson. Asiatic Sedums have been studied by Mr. R. L. Praeger and a considerable number of new species described. Haines has published cntical notes on the Indian speciea oE COTUMi and M A o. The Indo-Malayan .pears of *Juuum* have been studied by Mr H. N. RidWy. Messrs. R. «. barker and B. L. GupU continue to puMiah thair useful incUi to new Indian ed of Kowtim Dortane*. The fi t* mi i the systematic account •« tnT^OorW^ ofthe Malayan Penin«U by the Director oltfci Botanical Hurrey CTbeen in the Pre- for many montbt now and deacnpteMtf of th ° *w "Pw* »«« pubbabad d«nn« Uie year in tbe K«»rd*. Tn« species ^^muui of erononuc importance aa U» ioui« cjSanUiu were Rvnua of economic ImpwrM^w C C C1d Ct f tbe Herbarium of Garden *tKewbvMr C f Calder Curator of tbe Herbarium of the Royal Boianao Botanical Ulmtu. while he was on'leave. Mr. P M. *DMmim**, Ajsistant in the last meeting irvev. cmtnbutod 6ve papers on various branches of Botany to th« in various of tbe Indian Si ie«ce Congreas and has published notos on Syncarpy peciea of Indian planta.

II. B

Cinchona ^noouc-By far tbe most important work under this beading is to men <'ultvation in Southern Burma. As it would Uke up too much space submit ^ m drtail all the work of the vear and as detailed monthly reports are ^ ^vernment, only a general account u given bere. The rmlu so far obUmed have been instructive, if not so satisfactory as could U desired m« very respect. A* tbe site selected early m 1920 for eaUbUabing nurseries was found on account of tbe » O M H a«ltil aad bigk wifA to ba •Miitibli for planting out the ^»ing. in the open, the Utter were plwidd Mi abMt 4 miles to the North-Ka*t of tbe Humgy* Taan| ampbith«atf»-the srte of tha nurseries—on the Southern flank of the most South-Westerly tributary of the Heinze river 4t •• Ovation of about 1,700 feet. Iiantmg ^^J^«f»• KM a iJ^T until • » ' «** end of May 1921 and was continued thflHsjfcisjl JSJM. time ^ ol the unavoidable laU-n^s in planUng out the young l4a«U had MH H?*ao*«iaU thetr position in their new quarters before the full fury of the J^^m upon them. As the South West end of the valley acted as * funnel mi L 00* curT»' the Toung planta fared badly. The rainfall can he of J^J<*h M umfic. During June. July and August of 1921 over 840 inches *****"* ol ^ wu *""« lnim ll to Ie incbf*m tWL* ty 'J2ir

W-r-L h*11 th* Una^ X««m r**^ «tt««nibed to th* oedeal Those thai !»22. howev^. put on excellent growth and up to the time of writing (July in at.? Ut*r u* quite healthy and growing well The vacancies were filled ^IUL ol the *»•»' I Wl •«* pUn«W «t^n«<»n« were continued as WMthsv to H-7?1 P pf»itl€d up to May 19tt (M ihr Uter plantings from OeteUr IH1 time <5 I!? th"» planu planted out up to the *mA* of January Iftt a» ai thn •Met n JT1^ M^it* bfmhhv and putting oa fDti powth. bit those p e M «SJ4 ftHj|lt •»! Jwma^ ,w ^^^ wllamlAnJ a sramt} of ram d«ruM tht eaHy t ^ZT r.•a 'oilwifd bv a very heavy *Ui*»«*m* rainfall, and it is probabie thai T ^^ Pm^ugs of them will be unable to hoU q«i ot« iht Nntftoom. %t • *hZpL!*** "pw^nct so Iar gained .bows thai Osffcssi, if psasiUr) o«i which UunW^^v^canrtaiidupH^^^,*110"11011" ri « U"- appears to " ^ than was ,m eiperUd of tht pn€sit pUntaliofa site, >hich inadvisable "*1»* point of impart of the f«ry arrow-wswd of *%m* sinaswua, ij aj As the rainfall further South in the Tenasserim Division of Burma is not only considerably less in amount but is also less unevenly distributed over the year than is the case in the Tavoy District, it would be preferable to select another plantation site or sites considerably to the South of the present one, say in Mergui District, where there are enormous tracts of virgin evergreen hill forest land available rather than to continue to take risks that are unavoidable on the present area in Tavoy District. Proposals for taking action on these lines will be submitted to Government at an early date.

In ad litton ftKk ntallv It , to (<IIM*n«nn. the cultivation of Ipecacuanha ha* alw been experi-
19*»*l—state**!?' m ∧ *'"u'nolw arwi- The latest report m-eiveil m Aiipi.it
growth. Th T **** ∧P***01481**** plant* planted in 1921 have made very tine
•quahle thiuTtl' ate L of ∧ " ∧ m Burm* t*ing M "V*"1" t∧P∧uremore
T«»a«8erin» mln "iat of tae Kastt>r" Himalaya, Ipecacuanha in likely 10 (Uriah in
fort* «f exiill ""e it ua * "Ot to ru" tht> "**. of **»»$ «!*•"*!<l thf «'»W1 Uttenng
nurseries TI ∧ "eav.v rain- «« 1MB a small plant and » cuttivateii in pmterted
under very t extrfIMe' .v *n'uww pioneenng work of nplnnng ami opting up
P. T. Hus∧ll i ng/bndltlo"s ha" ***n f*m« louf throughout the vear bv Mr
factor in th Lue fcupenilt«l**t*nt. whose energ>* and leal have fonned an eavntial
Knowledge w far atUtneil and call for the highest oommembiion.

At head

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nu abr(»d, IWerutiea and pnvate rndtvidaab were dealt with.

III. Ind

∧umtor of fata Ser ? 1™1 Section, Indian Mutenm.-There +** m» permanent
ro ∧nine Im utlon <lunn« th<i _vear aml work *M consequently restricted
4111(1 »<»me tkT Mwt of tbf «P∧«H»«».M in (fee public galleries were overhauled
tw Ullrt>" n™ «J,,b,t« added, and orer J.OUO re-labelled.

of the Botanical Survey —During the year the following parH «f the Records
tion of the Flora Arabica appeared : - VoL VIII. NOB, 2 and 3 being the continua-
d Survey of the Flora Arabica by the Rev. Father E. Blatter, S.J., Vol. IX. No. 1,
IX, No. z" funk∧ of the Anamalai Hills by Mr .r- *. <l KNI∧ l ¥ S Vol.
•he mye' m*mt nmxrr Pnmumk Mniaftma hy A. T. *#. A Ibl of
ButHr>y VR Z ∧ T! 1 fxtr»∧P«rtn»enUJ pubhcsUoMcunmned »iti Indian
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The ?** of OUm?∧J ∧∧nfuge, the average Quinine pen∧taft beinf 5·73.
March, 19*» nr ∧i|»hato Monging to ti»e (k»vernm«it of India on tW 3U

VI. Financial.

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saving be- mostly in 24,43,444, the
VH. a∧L the !«*»∧ bvk and quinine.

Si!" m c'tame~Tk Uut nint*Col0lltl A' T« Gt∧ .I** . *** * P T. Russell
∧Un>««»l Sui,vp nr!>u and b<'"t Hie •\-etr of dmr waparti∧ p»t∧ ∧ Ih∧u* ot tk*
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was a M!> in H" ∧*" ∧l» . Botii U aad Mr Narayanmaw aa M«al piw
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Assistant Superintendent of from the Government of Bengal ('ar tations
December, 1921. All executive tad •iilKiriil CAMI tf tk Department have
given commendable attention to tMr dutiat.

A. T. GAGE, Lt.-Col., I.M.S.,
Director, Botanical Survey of India.

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Report of the Botanical Survey of India for 1922-23.

I. Systematic.

°'thei^> ma**C" "-BaMiern India and Burma:—Apart from the tours but m^ rw tor undertaken primarily in connection *ith Cinchona uork possi j, u Vantage of for Botanical pursues as well, no touring *ns confined (Jur»ng the year. Work in the ht*rbariuni has therefore been fication i° c''^cctumB already awaiting examination and to identi- o• current consignments from outside collector*.

On th for ^onT*****"1*110 M<*c * *rratvinf*? o'Mlll'>' during tnc F oa* c»Hi with Indian W'^ tn« development of tfntamcal Schools IU coiiurotMu to in Cr ea« 'u',veri,tlM *nd Collides the range of stud\ tends y*«rly now ha\tt o' ^ract »calW all tbc main Kmupa of thr vegetable kingdfiu being given their 8tu dentn and an iecrcaninfi amount of atteution it may p«cei A man?r KroupH of plantn mhich for oie reason or another P Dl atlont1on ID tho I'tMt Thu* tlM§ 'AjS(af. tin- Li\er- sue un8> aow havttheir taxonomiHtaand a ma>si)f lit«r«tur«! these as well **(>n ^c n»«ner ulants in finding issue in new botanical journals and Ptpers.

Mr. Central ^*1, funheF Ptudy ^ the flor*of Bihtr an<J Orissa and the C? to Vifn vinces has revealed threxiaUncr Q{ th«- follov. ing four *pcci<t b' lc*er i/oJU| *~*frf°*p€rmum august if claim. Pnmna nilytna.hucaB ee11 Wished and C *fn,ma mkut'i Full dimriptionj of IIH-M* Lave U Ko* mthe ^©c^d**" KrmrnaiH auction of the Kew BulktiU.

th d l S Bia r Oln ** Roval B<»tanic Garden. Kdmburgh are |>uhli»l.cd dsurons. 0 o*€t *>y ^ru[. Balfour of a large number of Aftialii lMn <k»- Burma anc ^ J *H art dfalt¥llu » ^ g Kingdom Ward ort« East Himalaya collecUd by Metart Farrer, collected by For %ad ^H**. *1M) a Urge nsbtr frum China and Tibet Bambuseae, Neo E1 • MUf Can ^ naa d^Tikrf a new genun of tho stachyum Dulloos, Ga ....zeaua. o e name Trino- North East I^j »bU has h«-n known from Bengal eastward in *' t^^thp %n^ •• Banna. It lt a^w reported from French pottta- by Mr. GambU*^/!11 originally Bambusa HaJ cr % ba#beer ed new genus %<J tk the Ktw BuU ^'» wW*w k« gr*ea •» account of th# previously kr*«WB^! lert of IU «*>r^l •• tkt aomt ncUturo of certain vegetation of W* £?**"' **•*** fc»l •«« dealing w.th the ^ Iran tkc loMi oficcrt p«««nt of view •*•

appeared «a Mi. C. I. Paikinton's latest fmbbcatiom. Tbe ke/s giresi furnish tl* field botanist with a rtady means of identifying mttcml as he goes along and tht falto descriptions in the body of tbt work supplement tbe information of tbe keys whkh art artificial. Prom Mr. Parkinson's collection in tbt islands Mi. Hvtchinton has described a new •P^W—OrpAaa torvfcsa^belonging tt the Anontctat.

In B<"ma the temporary dis- organisation caused by the transfer of the C^hotu planutions and tbe beary work entailtd in opening up tbt new -** ^v« printed Mr. Russell and bis assistants from doing at much field botanical wo A M ******* ^e ^ n p ossible under mot* norm4] the o^COadllloas- During t tour to tbe Mergiii tret Ute in the tttt tions. C A l4tia 8 Director took oeettion to collect tnd taptrrite cflOtc- accumup. *d<iitiontl mtti of mttehtl over tb'tt cttttcted in Ttliy it botany T^ 4nd wiU form the bttit for fatare work on tbt t/iteibtie The j of ^ junglgt lyiag between Mtrfpi tnd tbe gnU of 8iti«.

**** °< Bengtl bM been mtde tbe special subject of study by Prof. Bruhl 1Dd hu «M>«ttnU in (be Biological Ltbontohes, CsJcntU. Treatises on & Indl4n b%lk Al*** *"* *C<mf$ofof<m* btTt tppetrtd in tbt Journal of bark t[! ^e DeP*rtm«nt of Scitnct dwing tbt ytmr; tererml specitt Bengal oj**° new to soe&cf htrt been dttetjbtd wbik tbt ditthbiiUon in the p ftUmerou- P^^iootly known forms it being recorded.

o**; t|flrporAcei* of Bengal forms t subject of study for Prof. 8. R. the CL I**1* of bis researches art btir* istmd m tLt Bonftk of North ical

%i«l T; reta- -Tk« Boat faprtMt botMidd voik k*riaf ft Mr. been Hi^ ya. T i"*iu* 0D tk* r<MW> *Oa^miUm* «i the Otrkwal conditions Te work is u. oeeolopMl 4«4y «l tkt tea* aai the and societies auect ^ th « **station. The formations, associations illustrated ttatk "* *" dM "iM tod a series of excellent photographs

the d ^ new species of plants from Northern India have had Hardwar, etc.; previous pub *AmcU fu»4,,l0u~* (ra Ktt»n. Kashmir, Ind *0/«r< riltri liilmw in a tk« Ckuaba Suta ud cognate, *Leptodermis* UMMM boa Oftrkwtlud *Astragalus* Mr. W from Kumaon.

Cyperaceae ^ ^ "U b« • ptpc a. , qowtioa o(Dom«MUtan ia t*« Flora uf tb« r ised w co U(cti<ui with ktf vork oa ta» group fet tk« The angetic Plant.

of study of Prof. Kash of the North W«t Hi»abya an tk* special subject Amongst others Prof. Kashy»P4ad kutek«aiattk«UaiT«nitr oita. Punjab. grants. Kash has interested himself in plant immi- In a paper Nad «t tk« B«tliBf ol the Indian Science Congress

I

he gives Lahore. tuaocount of foreign species establiahing themselves about

Dur ^ theyear Prof. Ihllberg, U«e of 8i. XATMT'I College, Bomb*?, made ^ H ^/ expedition to the North West to disoover the distribution, tj ^ * 110 *. times of flowering, etc., of the forms of *Artemisia* found over tick · ** tod known to contain santonin. 80 far as obtaining material

of ~* ^tOQiB wu concerned the expedition failed, but a whole crop ^ o t i o u on the reasons why santonin wai not found have been extracted from the same ** EPPreci*We amount of the drug had previously been why no itnlOllin WM o o U i n ^ on ^ n l occasion are obscure, but the subject is o' ***** economic importance and it deserves to be further investigat !*. * r ^ M d a P U n U fromth6 North Wejt the collection! of the Bo-anical Survey are the richer by many thousandi of sheeta as the result of Prof. Hallberg's tomr.

Western '«<ia.—Preliminary to a continuation of his work on the physiological anatomy of th • P ^ ^ •» * • I b d i 4 n dc§ert Prof. B4bni ^ is compili and the ^ ^ °* P^nU of the 4esefU of Sind. Localities in 8ind 1918 Prff 119^1 distribution of the different species found arc cited, h Bot **** v***0* ^^ Mr 8ed i w i c k published in the Aeoorcb 0/ *tk** ^ tk_ lifVf y °/ *India *%* aooount of the plants of Norttfem Gujarat, tion of * m**7 ^^^iotu have been made and these, with the inten- tions now ^pplying information supplementary to the main account, been In the '•bhiW' same publication • 'nrther part comprising the famfliea Labiatae to Ceratophyllaceae of Ethelbert BUtters Flora Arabica has appeared.

A very handy Account of the ferns of Bombay has appeared in Messrs. Blatter and D' A l m d l k *I****1* pubbcation on thin group. The work in illustrated in ^JcaaZ figures lowing the essential mor|>hol<igiral details sod A ^J^^l^ieral appearance of the frond or plant is also given.

Prof. i ^ and ^ *t^^-VrocUoa* maralA^mJ—from the Bombay Van's Rijks H has been described by I. T. Henrard in the publication of the described b fii Wbli*** Tbe ^^ f p 6ciei *comt** ne*r *U'* *HHa*m* identical. In pf but material is not sufficient to determine it is being evident and the th e small *moQflt* & ••t*nAl *TM*M* differences at* tentatively, sp lQthor *»M thought the* sufficiently marked to warrant, istinction.

Southern India new species from the Southern part of the peninsula— *Tort** am*talUm*$*. Didymocarpus Fischeri, pnlgkatmm. Ligustrum travancoricum. *Bfckplflma Bm* and Brachystelma Rangacharii—while Dr. 8tnpf fn Hooker's Icoaes has fully dearrited tiJ figured new combinations in Cyrtococcum trigonum an J 'V rf

glaucopsi«. *»o new ««•«•. The mot important boOweol wwk de»li»| with th« higher pUnu ud connected with thi. divWoa «t preeent undet preparation i. Mi. Gftmble's Flow of the M*dm Pteetfeney. Among* the lower, ^ 4 , , MW genus ^ ^-*Bedtmidl—taaid** «m*e-rial collected many yJ MO by Beddome in the Hilfim h*. be« d«-scribed by Mr. H. N. Dixon.

General.-ftof. P. F. Fy«mhMeompletedhi. ft*? of the Indian Eriocaulon,. H«wro h«»«mibUthedi»theJo«B»lolI ndian Botany and in the wpnat fom . fc^dy guide to the ttwleat ia th» i»ther difficult group of plants.

The Indian ^pDNBMHBi ue dealt wrth by Prof. I- D· D'Almeida of St. * * W College, Bombay. The extreme variability of the mdi-vidu* comprising the different species hs. been the etnee of much splitt ?*« « the genua. Prof. D* Almeida has renewed the ehancten whic * ***** to him to merit consideration from the systematist; the group is ~} «-«ranged and described; Indian dietribntiona an dealt » 4 ,. W "^ references mad. to the ra«ioiutiyii»i»M on which tfca

The * « * of Ceylon continue to metre the attention of Mr. T. Petch. Addhiom to the Fungus flora of the ialaod are being published in the A fto BJ. ^41* «< the Boy.l Botanic Garden; Peradeaiya. AH addition*, !<*ti; *o wh»t group belonging, art taken up. As meat cf th« 1^I? w» aot endemic in the isUnd but eitend their diatrilmtion to the t^ P*nianlU0U»w the work i. of nrach TtJae to •tatato of the ttt«W Fora of Ind

A new colonial member of the Ieokoatoe,. gr«wp of. % M· collected in the inland fresh wrtw> o* ^y'011 b7 Pro<. , E· Friurhl „ described by W. B. Crow · mor-phology and • the Anuk of BoUny where the e©mp»r»tiTe *T*teme,fie rektionahipt of the new apeciet *an* •eecrihed.

Besides the above many works on systematic botany g with groups of plants, some members of which extend their distribution to India, have found publication during the year. The genus Calendula is dealt with by Hallier, the genus *Plyxoglottis* by Moore, the Euphorbiaceae-Phyllanthoideae-Phyllantheae by Pax and Hoffman and the Compositae-Hieracium by Zahn, the last two in the Pflanzenreich. Pfeiffer has a monograph of the Isoetaceae in the Annals of the Missouri Botanical Gardens.

Dr. Church has published an Introduction to the systematy of Indian trees, being notes arranged for students of Indian Botany at Oxford.

Sir J. C. Bose has studied the physiology of the ascent of sap in plants. Prof. Brühl and his assistants have papers on Vitamines and an interesting and timely account of the new pond pest Eichhornia. Messrs. Dastur and Saxton have studied the vegetative methods of reproduction

in certain punts and also the oeeology of some plant comnmnitiei il the Sevan rt formation.

* prelimmiry note on the lift history of *Ctdrus Drodara,* with, spec r% 1 reference to fertilisation and the structure of the prothallua has n... ***° been given by Mr. Saxton. Paper* on the anchoring pads of ^ J * a J aJm *eockta-ckitmu,* floral purification in *Symplea* roora of • n°te on an artifice of nector tipping bild* are tome of the results J" ^barman's observations during the year.

^ « - «onoBk._The mo«t important item under this heading con- ues to be Cinchona cultivation. Reference was made in last year's X^? P poaabfor the transference of work to the Mergui District it i* fiur »na. Condition* in the Tavoy area proved impossible and **ter*"* €Vidfnt tlut • **w IocalioD fof cnlchoIUfc WM inevitable. eOft(j Ttf y careful preliminary mventigation of the toil and climatic •Urt . Ioni . '11 *b* neighbourhood of Tenauwnm. propoaals for a fre*h *M* Ci^w tkii diftric* were sanctioned and Mr. Russell, Superintendent from I** 14 Cu*tivation, »rth part of his essential establishment moved T* V 0 T. to fre«h quarters situated in the foothills south of *th$* Tenasserim H e v * plantations at Xyaungbinkwm. As conditions here seemed to provide all the essenUals for Cinchona, work was started o* * fmiri J e-xtenaive scale but not on such a scale as would prove ruinous if unforeaeen events Motived the are« as a source of supply of bar>. By the end of tk« year son* 1.500 kamras ' Or •6*l »ngi were m course of conulruction of which 150 were already carrying their stock awaiting trsnt^ plant ing, a miied labour •

^ • p 2 ! ! i 'Wi§ ^ ^ wdocin i thf)un ?Je ^ ord*r wJliJf roArfi weri Or *»Id lhroil «Bto Jmk up Cinchona camp with the ouUide 4| the ^ ^ i||^>»«»t stores through in antinpstion of the timt the rains would put an end to all but the minimum «f commuui- cation. ^ • krij T ? * * * programme provided for a * break ' «f r^m acres ^NaajJJ ior • c<>n*iderable part of this had already been clone when *** ior L fnr'»fHroent forcsd a re4uction to 250 acres. Sufficient than *V * minj «nuin only fM therefore sown and in far leas time ^ * V ° g'nmnat* m the Bengal planUtions the seedling! is, of course, 1 ^r **y through and lookusf ihi picture of h^slth. It happened to ' ^ k *oo earlv *JH U>* clam *9W$tm.* b«t so far nothing baa result. la.. th

- all thf f v I 4 «M «p U» the present points strongly It Si*11* IUI!11 §ttlUd luf ^ P n w ^f o* * Cinck«»a reaws. Ii 3 %!/•* lk* i^dliaf. *mm* tknving M well that it seemed *£*** bt 7 * ^ *»**»a«ti»g *Mart* being p«t p«t ift ptmaAcat

^^^P^sikL pni . Ofoir^»• k*« *^n phenomeaal a»d rt has ^ l o f ^ t o bt bub <» a seal* larft tmiffc a*W

•««ei«m quicUr to tccon.mod.te .11 the .eedling.. In the process Jfiling the ^ u ^ . to the .un. method, which have J T ^ J !*«>* poMible in Bengal haw been .ucce-fully prored tkui j w r « Bur^. The mort encouraging feature oC the whole .cheme ». * « W now »v.iUW, from TUITM. earned out by very young U * grown « the T*y' • « • lke » * « «• tH tEw Wrwum % * £ alkal

tensio*» content f.iling on account of the low elev.twn .t which ex-periment h*l to go ouT Thi. would h.ve been in «>eoidM»e wit. the point * g.ined from elev.tion t«U in J.r.. So me«n. of... gave us data for ed powible unt.l b.rk. .ufficiently old for Mergui barks grown on Mergui but it w« (.It th.t «> aonlyM •< se in Bengal might aff

Jf «"rful evidrnce of . p.r»llel nature.

tio '«*• T.voy bark .n.lyJe. now to h.nd c» be Oken as an indica-of ! J »Wt m.y be looked for in Mergui, no more prom».ng ^.dene. qr '««». wccej could be .ought. The* b.rk. .« twjc« - nck« tr > »» B.ng.1 b.rk. of the,r .ge u-1 ^ « - f 1 ^ ^ ^ trees grown under .uch «Jre«e clim.tic conditions as have ... rienced in T"oy gi w.t a ye.r.of 1 — lkaloid content of 4% and at one year •« betweeo 2% and 3%-pm«nUg« attained by Bengal trees at 4 na planting In a

O h Bu««. k- on. factor of prim* i»porU»« n .«• favour. v S " ^^ition. h.ve be«n .Imort ide W; the tmoer,tur. «tk^kot •MT^*9"" • »Htle higher than Cinchon. like., but it v not « « * • ' • PSJ2** *«de pl«,t,ng .hould eMily center itt eflecU. ««JijU • B l ? none ^ the w>rror « (t and D TwM * "^ * • ^ T T c « ! ! - u

n,ijr'«»nyerop. Under the careful ropwriw* « •*• *""•*" 1... ltt!l • »ery ncceatful freah .Urt hu b«n •*»••

*«hlr^fc». the only other crop .t pr«ent eiperin.«t*J wtfc cultiv^« of being much more amenable to ordinary met*©* «* trying 7 in Burma than ha* erer been found to be tbe c-e in the mf plants l"»»te of BengJ. Wh« U.t awn in the nuraene. the jmMf Seed for i * '" ••OH • •»«« bloom and looked healthy and roh-jrt-the extended cult,T.tion oJ Ipec^uwh. wiU be mad* T « W 0 this year from M"*poo. MeMwhiWeii«rin^UO.tk. extraction of the drug ^ thTdried root M. be,nr«rried out .t the B««nl factory, the »W being to pUce emrt.n,. the fin.ahed product, o. the market.

III. Industrial Section, Indian Museum.—The appointment of a Curator from the beginning of the year rendered possible the initiation of a scheme for the re-arrangement of this section. A revised plan for the gallery, involving the removal of exhibits which were out of place in a collection devoted to economic plants and their uses, was drawn up and a beginning made to render the gallery less like a home for stray

?)**«aeooj producU baring no other fixed place •» •bode. The IJ'^Wotod to food* and medicinal product*, the firrt to be begun, ahow considerable improvement. A study of the exhibit* y°a* i, b^ag ondwUken by Mr. Bal, the newly appointed Curator, • »iew to the preparation of a catalogue of the lection. "-".dee ™[1]* work, th« rovtiae of renewing and overhauling exirting exbibitt ^ n the year.

IV. Publication—D«ring the yen, the "J y.»5JL'L*I kZ ... BottmM fervey of Into appeared :-Vol. Vin, »•. « g?« eoBtiw.tioi of Ike *Fhn Ar*im\j* the Rer. Father E. Blatter, W1 ' * **> *• * kmg *AWioml W* in unptamu* oi Vortier* *G*J*°™* \JL* Sanoi; 1 U, I.BJ. I« «» Pwa. ... V ?' fcT «eoo«it of the *Boto; of tkt Abor Bxprdition*. A litt of the ^npworw extra departmeiiil pubUcaUoiu concerned with Botany is »pB«nJid to thiK report.

arch^ Thntur Bark an* QniniM.-During the yeaf fi^J»- of bark and S»,«82 lbe. of quinine wlphate were receire4 lOjj^**' under term* of the Bark and Quinine agnaaeata. BoM HJ^*- of J»r, bark were worked up at the factoty at Mugpoo M V^»,(»«lb«. qaiuM mlphate and 4.8W IU. Cinchona febrifuge, % J!P *quinine percentage being 6fU46. The factory extracted WL % * the theoretical possible The stock of quinine sulphate *^OoYereme»toflB*lia on the 31st March lifltt amounted to 220,5... ^aB- By... IJIBABU, a* 4% matter of convenience, large ... QuiniM Mlptute OB the Beng al Cinchona Department are ... on occasion inm Imperial ttocks tt theMiueum. •• tqMl V***V ... TV•• tke Qof^miurnt ol India ttocki at Mvifpot from flO- ... ***• tbere. Dunng the year 8/21ftj Ibt. Quinine sulphate ... ^2 *o Ooremment DepastmenU and to Local bodies in the Punjab ... 'j/J^oe from this source amounted to Ra. 2,80,ft65.

VI. wi^J*«llL--The total ajloteeat (or th« year was Rs. 27,15,000 ... *M.000 were for tk Botaaieal Swrey proper and the Industrial Section the Indiaa Moatum, Ba. 3,17,000 lor Cinchona and Rs. 23,46,000 for F«mhato si htlk **d quinine from Jara. The total expenditure was Ra. IMM»lMf Ibt saTinf of Rs. 1O.V.791 ... ^y **• to bark a**l qmaiM coMifMoenU being below estimates.

VII. J^t to f[1]^[1]*[1]^^«k « Tavoy cloaing dowi.

Lt. A >llj im --c*^i A. T Oafe, IMA. waa Diwetor faw to retirement ... January lf»,m^sm^wfsnoaiUvfpreparetor7 the year. Thereafter the undersigned held the post till the end of ... Mr. S. N. Bal was appointed to the post of Curator, Industrial Section, Indian Museum, from 1st April 1922, and held the appointment throughout the year. Mr. P. T. Russell continued to hold his post of Superintendent, Cinchona Cultivation, Burma,

•

JJ *• went on lenve for thre. month, from lrt Jo* *
J* ^«i«rt \m when Mr. H. ThomM. AmwUnt D-jiili^
JJ*- «*ed for him. Mr. Thorn*, reverted to Bengal to *"*£
^r — • Plantation on

^•'^.inTto^arl^kTe^d'of tkH^- «•"•?"VT
?****^OrenWe, *tktke iCinehonPUtttion, Burmn., from the* b*g»-
ung of *• y-.. Hi. k>owM«. of k~l • – ** **-- - " " energy
and trustworthyness k*T« proTed of moek kelp to Mr. B—eU •» whom
the burden of opening up in Mergui has haq to n · TV – rvices of
Mr. P. « · DebbumtA, AMWtAt f«tSjr«tom»Uc Work, were transferred
to the Government of Bentfkl fw« Jrf Jw»o*«T »*23, as Officiating
Curator °» tke Herbcrium, Royal BoUnie O»rde«.. which po« W"
vacant ky tke tnnafer of tke onderMfned to officute M Director. Bo-
tanical VcyolladM. The po.t voted by Mr. Ptbhtmua f * m ^ g
unfilled • order that effect migkt be given to »•»» * • • * V^n9^cmlm
made by Government. Mr. V. N»r»ywi».w»mi baU ki. f* •• AmMr
^t for 4M'n 8T«*«»tic Work throughout the y«»r. Memn. B. F. Vw«u

Up ^00* tke yen*. Bab* ,n T" CWnd» BaMqt. «• « •»
year. WrDiTi ^«i. Clerk., retired from Government -"vie* dunn« the
year. Babu S. B. Btuirrii. a Lower Division Clerk, was promoted to the
Upper Division and a Lower Divi«io« "u—trh'T thus falling vacant was
abolished by order o(the Government of India •• • w*Jl« 1
ment. All ^ --»vutr*f &nd*minwten.U ofioen of the Department have
done ^eir ***** with commendable zeal throughout the year.

C. C! CALDKR.

Offg. Director, Botanical Survey of India.

LI8T OF PAPERS.

Anonymous . . . ladkn ONU*. (OrdtU Reviem. ax, 3S4, 19a. f JW)

Ammermius, O. . . A Bcw method for the tnaljrttt of plant [illegible]. (J<mr% 0/ (kcolcgy, x, 2, [illegible]

Balfour, I. B. . . Kkoiotmtrm, DiafnoMi qpohnm amnun U. (JV*u /rom tkt fey. BcL Oml, B4m..wmM)

Bose, S. R. . . . Polypotiotii of B««al (part T).- (JBufi. Omm. CdL. m., W.)

Brühl, P. & Biswas, K. A%M ^ipbjrtioM fp<phJo»e UKIICM or Ittlka Buk AlfacMJ""* 0>p«. 5c, C^ Umi, v.)

" " " . On • ip«ei€i of Ctmpmftjwn growii^ in [illegible] Cal Umr, v.)

Camus, A. (Mlle) . . Un genre nouveau de Bambusées (Bull Mus. Nat. D'Hist. Nat. 1922, p. 100.)

Crow, W. B. . . Dimorphococcus Fritschii, ft 00* colonial Protophyte from Ceylon. {Am. Bot., xxxvii, 14$. p. 141)

Dastur, R. H. . . Vegetative reproduction by loot ruaMr in two Wfmm of Clmdmb*. {Jmtm. ltd. Bct,m,S,f 1U)

Deshpande, P. M. A mm of anl flocd fidtelioQ of tk«* flower [illegible] rubra. (Journ. Ind. Bota., iii, 1922, p. 66.

" . . Some observations on the anchoring pads of Gymnocladus cochinchinensis, etc. (/•»«. /W. IK., tit. im, f. U)

Dixon, It R. . . Some new genera of Mosses. (Journ. Bot, i*. 7it, f. mi)

Hallier, n . . BcrtO|« sur [illegible] der Thymelaeaceen, etc. (Mald. van Rijks Herb. 44.)

Moore, . . . The genus Physcigleton. (Journ. Bot, lx, 720, p. 360.)

Percival, J. . . The wheat plant

Pfeiffer, N. E. . . Monograph [illegible] Ann. Mis-

««i AN. 9ml, u, f, p. 7f.)

RIDLEY, H. H. . . The dirtr station of pkata. *{Amu. Bit., MSBVii, 14S, f. 1)*

SAXTON, W. T. . . Mixed iornfttioa ia *tm*.—A. wm* concept in Oecology. *(Journ. Ind. Bot., iii, 1922, t- *>•)*

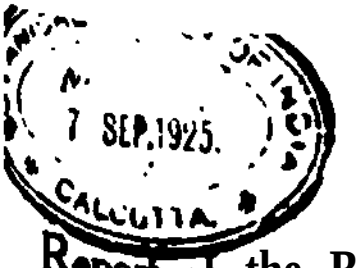
" " . . Some observations and suggestions regarding NjetiaMtj- *{Imm. Imi.* Art., *iii, 8. 1923, . 127.*

SPRAGUE, T. A. . . HoUa oa T^MMMtl. (/••»•. JWL, *h3.I9Z3,r.U.)*

TURRILL, W. B. . . Vot«a om Cyp—-•• (*«» ^Pbfl. J, iftt,

VILLANI, A. . . Sulla classificazione delle Crostacee. *(Ann. di Bot., xvi, fasc. i,* JJB3, p. 71.)

CALCUTTA : PRINTED BY THE GOVT. PRINTER, INDIA, 8, HASTINGS STREET.



Report of the Botanical Surveyoflndiafor 1923-24.

I. Syste rmit^.~-F<M^« *I ml ui and Burma.-* The financial string^y which has been influencing the development ol the Depart11 for some yean has ajtam made it imperative for ibe year'* work *> bf TOnfined to headquarter*. No purely botanical tour* could be indulge! IQ ^though opportunity wan taken dunnp tour* connect od with other work to add to the collection! at headquarter*,

By much the rue** important botanical rwultn for the year concerning ^i« Division niwt I* considered Mr. 1. H. Burkill. * Flora o(the Abor Rxpedition 'whirh hMB;"11 •pI"*TM1 •* Vo1 .X o f Ihf Rrcowli of the Botanica lRurvi-v of India, f^r a work of ilu* *le«cnpt.ou. oto which might well br Ukeu aa a aample for future mork of the MOM nature, sometl1'^ «'Min- thun a lucry |»a*sinn ralafMM •«•• *mm*sary. Mr. Burkl11 •w"" l*^* ^r A~r I^P^1*111^^ folw *"•• the— n stion T * * of November to Much 1911-12 int" • Wd where the o h m - The 1 ••<* oottectionn made prove to »e o« the highi*t «fientific \alue. 11^•*»• to be A particularly nuitable one for the ntndy of quettions concerning tin- ecology and (tfographir*il diMnliution of plant*. Abor land forms lhe ***** point of M Vf<rd m_V aullUfl t>ptl11 of flora all of Whlch ** «»Mly analy^l b> the a«*fcor and a flood of light is now throwi o* ^ •"i111 ol thf Fl^ri,lU hlitOry twl rfUtlo0r shipa. The work d.videa itaelf into « uaffta a» foilowi:- (I) Inuoduc tory and a gnera» view of the outer Akor H.1U and ollfct plain juat under the hills in whic

of the country, the climate, the soils, the occurrence or non-occurrence of certain genera of high geographical importance and the effects of man on the Flora The biology of the flora of Abor land forms part 2 in which are described the various ecological formations chief amongst which is the *Shrubberg* (on»at*on. A list of the higher plants, their names, altitudes, dWtnput,on and a comparative analyses of altitudes in the Sikkim Himalaya .r. K'V« in part 5. wbiW p^U 4, 5 and 6 deal wit wider -^ ^ tonUuon ··rtrt 7 <Uak wrta U, genera of the) aorm and ifc, w«k a«U. Part «• w»k • complete enumeration of the species found, their localities, elevation, etc. A map of the country and a series of interesting photographs illustrate the volume.

Professor *· W. Hoak ^a Mr 0. lWk«™ descriptions of the following fur new or interesting species belonging to the area in

Notes fr the *•*ia HT!T *oytd BoUnic Garden, Edinbwgh.-Pn«J» Valenti-Francli P mzt. ' " * • * W*y*o*w W. W. 8B., *Primula calliantha* A ^ f a Adhmia Watt. Pnmyla *lacerata* W. W. 8ni.

in th^iT *I?**"* Tnmetc** cine*, i* described by Prof. 8. R. Bose of *Myc!£r* d« U **»<*• Mycoloj^ue de France. A collection M m jjT20^ frof» Northern todi* ha* Iwen worked out and publish-Mycetozoa Jo«nul of Botany by Mr. 0. Lister. Comparatively few series js ***DM *> *v«* 'oeen collected previously and the present the distributi said ^ ** "P1***'^ v*l«**blf in extending our knowledge of Indian L V on of "I"*'6*. prof. s . K . K**hy*p. the authority on VerWortjl, ^ * »n°rt paper in tin- Journal of the Indian BoUnical Societ3,,011 *X°TM»4***um trmerum.* a liverwort deaenbed by Griffith 80 years made |Q |^° *o'* Dot found again till it turned up in a collection ^ftt i8 . 30. An interenting atrount from the ecological •tand-ley * * * ? of * pilrt of lh<* nv «n ^ t ^1 «' Burma by Mcwn. Dod- ^theiif analyses ^lle ^^ *D*Dthfhf J0101Wxk1 @' *WnAw* · Tk* authon terise thf H m ^o*e P'*0^ or ^"P o' p**^ which charac-partial picture of the whole erflli 'onuatioA. a method which while giving only a to long lists of *b dmdTantagea attachin|r reader unac pU&t ^ " ^ v h ^ T.H MkagH piMaible for the average concluding t <JU4lnU<1 with the area to reconstruct the main scene. In ers in this f^l aotJlOrB rf,frr to m difficulty expenenred by most work-present day d of l»»wWge and not avoided by them, Lamely the cal questions. ^^pkuty of nomenclature when dealing with ecologi-

Northern India.—In the Indian Fomter Mr. H. 0. Champion has discn... for*t trZT (br '"*•«« of the hand of man on the distribution of from the F ^ in the Kutnaon Himalaya* TW Maw dmaioiu are made purtance being allowed to characterise the divMBflsja. Tkt MaJB cosj-clusions arr... effects cause certain spe-cies natur and loss U»/, Vr*VaR «• MrtH* araM to be dnna to SMiguous r>fe.nIr ^ , Dlekn>M »^ tlut tb, IMUOC* it tkiM balk more author ^ •kJK B>o1* "n*!*)^ typ* of nijitiHn. TW same ^ jeract on P*prr of irilliy numt when be dob with habitat in the

The succession of epiphytes in the *Quercus incana* forest at Landour has been studied by Prof. W. Dudgeon. The various stages in the succession are distinguished and described. A noteworthy and surprising result is reached in the relative abundance of the lower orders of plants among the epiphytes of this region. An examination of the forests of the lartem Hwaky* would almost certainly

shift th balance f*v<Nir of ari increased proportion of the higher PUnti appearing amongst the epiphyte flora.

Ref **1** **• made in the last year'a report to the question of Santonin yield from *Artimitia* in !l* North w<1|lt . Since then the subject has keen furthir invmtigateil. IW. Hallhurg haa returned from lea ln Europe and m nom- rugagrd in furthering the original enquiry. Anotiler lttv»tigator haw alm> been in the field. Material foH**nt ^ro« the North West to Calcutta mhere it is being success- j^ttracted in a small way.

** Western Ind As in several other provinces the chief work of P. , ** ^i*- haa been of an ecological nature. In the Journal *a4* /7^ ' W · W. T. Saxton haa dmcuased the phaaes of vegetation ^l * 1 * 0011 a)twiltl0tl* in * tract of low lying countr}- near Ahmeda- "'H ourked and fairly regular aummer monaoon. The pro- cession of ** * oomni^nitie« in relation to the stage of the monaouaj and consequent humidity of the aYea is clearly brought out. £igki Symusia or aggregauoiui of planU belonging to the same hfe-form and making similar d«mand^ ujwn a mtnilar habitat, are distinguiahtd. The eco relate t^^ '«t«re«t of th«* paper lien chiefly in that the oUrnatios* are the -n area tt W^r^ or no (f1*1 length of timr dunng a y«mr stant climatic of commuilltl «l *H«»wrd to makr their drmanda ot» con- results obtained °r edaphir conditioaa. It would be interesting if the ed with th from Prof Saxton's obaenrataoas could be compar- of % kotavT* mm %n *rpm Rlving fair ^ **•*—* «**ph»c conditiona 18 •Hgg^ iJmtur*. A» Prof. Saxton haa now left India the aiibjcct *OtW i* *L or Otll^r ^oUmatf interested and with opportuaitiea for « IB tie name fi..ld.

Flora of Madras la*-- Another part, being thr fkb. of Mr. J. S. Gamble's revision do... haa ^Pl>eared during the year. Thai brings the work ii ij^j"1 ^ •!* middle of the family Scrophulariaceae. The systematic ^7 to ^maiu for manv years a standard oot for students of •N||*t»o^ U nr longing to this province, lo *tb** Decades ... ^ ^w * •the K*w Bullrtin Mr Gamble haa aaasdibed the follow- graphic species.—*Strobilanthes Lawsonii, Strobilanthes urceolaris, Andro-* ^ J<*^T*?' ******** anHWi-all from FfmnaiiUr India In the

and Crotalaria ... survey has a cntiral note on CraHsWiai ajfeawWmn« ed to be specifically distinct were first combined by Baker in 1876 aad most subsequent authors follow Baker in keeping them together. Mr. Gamble in his new Flora has, however, reinstated C. ... as a good species. Mr. Debbarman while inclined to thmk tWt taW tM species are inseparable, realises that niflwtf ftaPiiDatM ai Hat ftsJi

necessary to clear op the point. Mr. Debbarmaa deak in the Journal with an instance of itaminody and iiiiihiaiwlioa of petals 8. Indian taorita. 1W ve§eta- Ontral India hms been studied by Miat Mabel Hartog enumerate* the donititnamt altaMtt of torn

krge incrrane in the attention paid to ecolo- there it endwa af am all the lower group*. The frah-watjr Plmk- n, A group hitherto neglrrted, hare baan ttndied hararter of the material and lha bavtar tigation to certain riaa*e» of oi tfca pky any accnaat of th« Plankton at an ataoctatiom. Thirty-tii haTt not bean raoovaad of then are not nn- The geographical rmngr of each specie* it obtained of the coamopootan aatwe of thk A paper on the Indian (Wophyta rrad bef< the general meeting of the Lmncah incliklfd dearnptiotu with figmra of two new and An appeal is made for in- tn the neid and a proauae given of

rrof Kanhyap eoatmnea h» »ork oa bfiaa LjTer- A new species °f the ft«Hip *Ffmmm Umtm* has beea d earn bad fora of India include Mr. Mitia. ylon all of whom have published

dnnng *» yoar

In the Botanical Gazette Dr A. AfW ha. discussed the morpho- logy and development of the leaves of certain Gramineae while in another paper she deals with the leaf-tip tendrils of certain Monocoty- ledons. Part of the material for this investigation was sent from the Royal Botanic Gardens, Calcutta

The most important general work concerning the higher plants and a work likely to be a constant source of reference in the bookshelf of every systematist is Mr J Hutchinson's Contributions towards a classification of Flowering Plants. The work has been undertaken with the object of preparing a phylogenetic system of classification of natural families and genera and Mr. Hutchinson intends in due course to publish the full results of his studies as a separate work. The utility of such a work appearing at cannot be overestimated.

II. Economic.—As regards work ^T ediate economic import-ance Cinchona cultivation claims • pwojdence that it is now likely to maintain. The l » -he™. must still be considered as in an experimental .Up. hut thm i. • !«<»•«« volume of evidence that at no distant duTit ».» emerge . . . wdl established and flourishing industry. There have been times of misgiving but no industry in a new sphere can remain entirely exempt from its initial difficulties. In the Bengal plantations, during their early history, the appearance of a certain disease gave rise to all kinds of pessimistic prognostications. Yet these plantations, outliving their era of misfortune, emerged to a state that belied all that had been predicted for the r and it can now be said of the Burma scheme that nothing short of accident or a misfortune that cannot be foreseen will prevent ^ successful development.

Last yea confined to plants in the nur-sery where . ltt Iun«« o(growth .poke wrfl for their future but the real test — * «- wh« they r-ched th. open The present re-port can — ^«k of how th. yo-| pl-to beh.r when they have passed the nurseryman's u*d* A. -rfy « perience might mean a sa > » ti M Md «p,Dd,wr. .Kerwrd. it w» decide Jj to get a J* ? *« pUnu from the .b-do-ed T.ro T .re. «d .W to .h,, J^ 1 • * - « - fiU of pUnU from the Be«^ P 1 ^£rvat.£ being to ..^.telT ^T-oek of plants under in the open, in conditions exactly similar to those that the oncoming seedlings ^ ^- .«- erjuj would hare to inert. Tb* Bengal shipment did * * * • the .«™. th., n, hoped for. the lor* ~ I "?* ™ ^ ** L prov.og U« much for the «J«U but the T.w lot, which were -J down by Mr. Ro»*U V* rsonally and had ex-per- well and in the • •»««it w . throughout, rtood the m«ch Sorter jooraeT the event were to prove of my (rrr.t ei^nn^nul win- They were immediately put out to penn.ne«t «tu.tK«» « • «*• exactly similar to what il^r'.'nBl'wiwI plMU will rt At fint they hung back as projecting *» Ue ,h«p but .„.. were «K bM seeing that the fresh conditions had been found congenial. Line by ^ ^^ picked up; there was scarcely a casualty and in a few months time the experiment gave results a year ahead of what could have been looked for had it been carried out with local stock. It was evident that very large nursery plants could be transplanted with every success, at least at this time of year. An experiment with a different object in view therefore suggested itself If plants much larger than would normally be called upon to withstand a transplanting would succeed what about seedlings put out to permanent situation before they had reached what had hitherto been considered transplanting age? Could nursery existence on these new conditions be shortened t kWMMI

advisable ... the results obtained show-
ed wi
Aa in tfa ' •** remaining doubt that tbf gamble was worth while.
it i* poJ ^ °* ^ T*voy P^nt* thepe WIMI an immediate check and the experiment tUt apVDhi^M peT*od of dnra^t woakl have brought

^r of Vfr* nt > a M than it is on any of the Indian plantations, a fac-
open. |J ^ f* t ln> portaiKe dunng the early existence of plants in tke
nothing would ... the UDT teedlintv went ahead. Thereafter
such an "^ than . Th ^ now co^utuu the Mergoi " Note
from Tavoy. tr** o 3rouift C ^ ^ h o u ah^d e\rn of the much older plants
in Mergui can be M mt onc€ ev> ^ el t that nunerr exiatcnof for Cinchona
planting or *ft<"tei»d. V\Tjrtber this » the best stage for trant-
that CjncH ** fPm ^ 1111 (or *«rther experiment bat it is already p»m4
in the ^ ot J* r « fo out to the open at a stage viewed as ImpossiUs
experiHfcnu . pUnUtioili aDd in practice not attempt**] kInva. While
bulk of J^.! D ^ °P rn wm ffving these encouraguf tssnhs tke main
lesson tj 6 ^ ^ B till in the nurseries were writing their own plain
young plan *70** qt'l'fal to read. A tompahson bttwwn thaa and
permanent in the open at OMI sWwtd *t adrantafi of eaiiy
ceeded expec ait<ution. At the same time nursery seedling had ex-
for handling and ... The
to take them. **"* W<mW ** mocil Uf*CT *« the land was ready
a few inches of 8eVfl1 ^ a irilJ »«• therefore cut back to within
plants under the tJ* ground, treatment wbeh killed a number of
the results of cutting bark cotkiltlOQjl in vBich it was enrried ont. Although
is at the date
conditions J|ff of ""ft knovrn tUti « * ^ ctn be cut back undrr
beds ... l ffOln tboM1 m whlch * ** firit tri6d - Untoi *.
but ^ •HI if the " ^ ^ **l°** the operation bleedin|K to death may ensue,
to * Sr^, JT autlon of «^nnff bs taken the mortality is reduced
con ^ erable 'aakf* the oprration a sniesss. This n a result of
mear importance in view the likelihood of seedling develop-
getting ahead of land preparation.

So far the above experiments relate to *C. Udfermm* only. Cin-
chona succir... far behind r? ^ »U> b^n *own but in this species the nsuH* an
possible that further Ledger. cannot be called a failure and it is quite
the writer's opinion f*J*nm«t may prore »umTubra a success. In
may well take the • hybrid in ruhiratitsj on U» Be*#al plantations
of this hybrid has place t4 sucarebm *in* Burma and slrendy nsui
low elevations in been ^*kfUi* lor trial It thnm rery Vfll at
When seedlings Bengal. * pornt in m iirotr far tnal n Bumu.
very young bark were cut back opportunity was taken to hart tk*
with those got from analysed: the result ... year's
y i ^ i Tatty narks Nisrr«i lo in lnH

Ike yetf! experience! of Cinchona in Burma merely go to con- ** the optimism expressed earlier. There are 8t.ll dangers ahead •?* di*eaae to the plant is always the danger tba* suggest! itaelf when fetation* of any kind are attempted in untried areas. A defoliat- !j* ^tterpilUr was found troublesome toward* the end of the year but * «flecU were never really aenous and it disappeared when the rains **•• More recently there have been some signs of canker though *•* ** M yet to a degree to cause misgivings. 80 far, *Hdopdtii,* ** P*t scourge of Cinchona in Bengal, is absent from Kergui. A J^wttch for disease is being maintained. Given a continuance ^dom frum attacks by insert and fungoid pent* Cinchona Cultiva- *"j Burma should now present no difficulties that expert plantation ••fwiient cannot cope with.

a*iOa.--Tliis is at present the only other plant under expert- *»* Mergui WDm jt js obvioualy much more at home than it ever ** •» the Bengal plantations. Nursery lines of the plant are look- **H *ad though a certain amount of rhiwme is already formed might be extracted there has been no cropping. The present policy conBJMS iUeU t0 muitjpbcauon of stock. The experimental cultivat of lpwacuanha in the shade of bamboo jungle may fi?* results ««iMing ns to dispense with the cost of erection of nunery lines and *P*V*nUo** ^* .As under such conditions there would inevitably be • certain morUbty, the experiment cannot be tttcnpt- ed on any teak unul stocb are aificiently Urge.

III. IaM Ikl iMtkAt *laAMn Wamut* -*fkm* 127 spedmetti added* which wne loud substances and medicinal drop, ware the Cur *• coOactioM during the year. Numbers were collected *by* **** ^ ° ^ «" parchaaed in the local markeU. The most welcome addition is a collection of preserve fruits ena ed *f * Agri-Horticultural 8ociety after the exhibition in the Eden Gar- dens in December. The Cinchona exhibit has been renewed and tkt usual work of ovwkanhng existing exhibit* carried oult, some two thou- sand old labels ***•« keen mewed. TWdsttwrf rearrangement of the gallery en «W \imm M tk« iwriata plan is *pop**** and the* preparation of a catalogue a1 tW sjedicinal Uys ia well under way. **15 on the pmafration of speamena in bqttidi hart been

The number 01 «S*inea im?rd and refW to rffardinf economic and medecan Departments tion in deta . . ^ • India and tbtwWt M ^ l[illegible] to men- [illegible] others enquiries [illegible] to the following:— Gynocardia sylvestre. *Podophyllum Emodi, Astragalus fasciculata, Carum copticum, Ferula sp. Saussurea Lappa, Atropa Belladonna, Hyoscyamus*

sp. Derris en1/1'*". *MyrUtica fropams, Camarimm betqalemie,* C. ren sferum «*</ *C. siru turn.*

V. ^ca j q ^Mcttioili - Vol. X, No. 1 of the Records of the Botafc*i *urv ^ m 8 Mr ' . H. Burkiir§ Fiorm of the Abor expedition, appeared tn(* l* under distribution. No. 2 has gone to the I*rea§ with ord eTi ,or Panting. Hfveral papers by members of the staff and oUt*'^ contributors are awaiting the issue of No. 2 before going into print.

V. Cinchona Bark and Quinine.—During the year 608, 103 lbs. of b«rk and .'fr.682 HH. of quinine sulphate were received from Jav^ ui nin» JUH!*' tf*rnii of th*_B*rk 1D<* Q1n1n11* Agreements. The Quinine dated agreement between the Secretary of State and the Dutch Com-beginning of the 8th April 1921 which came into operation from the 1923. Under that year, expired with the clone of the calendar year nine sulpha *r the terms of thin agreement the total quantity of qai-it« r«vive*l m 60.000 kilos, equivalent to 152,276 Iba.

Th «*rrang^,lM·nt iy mhieh the Bengal Factory took all the Government of India ^*r^ connn? for*and has now been modified by allowing th~ ll ad ri* F**tor_V tu extra<l nml,th, *l'T «ri«- *Tb* **w* •rranfe-ment iB oVR of the Mad ran factory being kept in commission while at the same time the pressure on the Bengal factory is relieved.

Some 430,604 lW of bark wtre worked up at the Bengal Government's factory at Mung|Njo to produce 24,956) lbs. of quinine sulphate and [illegible] nine su ate OD tk<> 3I(rt M»rrh 1924 amounted k> 281,966 lbs. of which 1:1,418 lb«· were in the Indian Museum if 3,806 original cases and 151,568 U · at Mungpoo.

During th year a bark shed for storage of Government of India [illegible] tor ^re^i f?01M, a MM W*» M ^ •tfiruge mparfty of the and itni ^ rxi§ting was found iMsjSsjMBt for the provincial D together.

Distribution of Quinine During the year 10,328 lbs. of quinine sulphate were issued against 8,215·75 lbs. danng the previous year to Government Departments and to local bodies in the Punjab. The quantity of cinch [illegible] ndents are met from [illegible] cases a [illegible] inal

"* of !. " '*1<«U *tnm* ttorlu nunul^Huwd (rum tfca Uoren-in original C U k at Mungpoo. An exchange supply of 2,078 lb. was issued from the Indian Museum on behalf of the Government of Bengal, an equal quantity being added to the Imperial stock at Mungpoo from the Provincial stock there.

Revenue by the sale of Quinine The total revenue during the year was Rs. 2,77,806 against Rs. 2,80,865 during the

year. The decrease ia due to the fall in the price of quinine. Of the total revenue (tit. R«. 2,77,896) Ra. 40,574 were by caah aalet to local bodies, •*., and Ra. 2,37,322 by credit to Government Department* in the Paajab. The rewuue doet not include Ra. 46,298 being pro- jj**» horn the aale of 5,722| Iba. of oiftchona febrifuge by the Govern* J^Xoi Bengal aa the aame waa deducted from the cost of extraction quinine paid to the Local Government

Area */ Supjrfy.—The Punjab ia the only provinoe which ia, at present *** applied with quinine from Imperial atocka. The qua*- tion ^ the final allotment of the am of aupply to the Governments of India, Bengal and Madraa aa raeoajimended by the Cinchona Conference held I tt LMhi on the 1 Ith December 1923 ia still under the consideration of the Government of India.

VI. *Wadal.—The total budget allotment for the year waa Rs. 18,06'97o of wllir,1 ***. 4ft.*no werr for thf BoUnicml SurVf T proper and tk h* loduatnal S^t.on. Indian Muaeum. and Ra 17,61,770 for oinchona including Ra 15.75.000 for the purchaae of bark and quinine from ... of j j * ^ 3* ^tal fxpenditure waa Ra 16,83,115 leaving a Having ...,000. Thf Having waa chiefly under purrhaae of bark, freight charges and co«t of extraction of quinine. The expeoact of the new bark shed amounting to Rn. 3,500 and the coat of recruitment of labour for Burmiu. Ra. 14,000, were met by roa^ropnaUon from the budget K^Mit under coat of extraction of quiniaaj.

VII. Staff.—In the absence of Lieut.^ol. A. T. Gap. C.I.R., I.M.S., the undersigned held charge as Director. Mr. P. T. Russell, Mr. Braybon and Mr Maung Sine all held their respective posts in Burma while at headquarters Mr Ral wa« Curator. Mr. Vieux, Assistant Curator and Mr. Narayanaswami, AMutant for nmtematic work, Under orders of Government the MT«nd poat of lyitematk Aaaiitaart remains vacant. Amongst ministerial OAC+TB Babu U. C. Pal waa head clerk and in both the Botanical and Cinchona sect** of tW 8«r- vey his praiseworthy ^fiortt ii akaiing with much additional work concerned with the distribution ofquifitt* deaerve apeoaJ meatioaj. Babu R. K. Das was cashier except ior a ftmi of Uyt wWa hia duties were performed by Bahu H. §. Qbam AI executive and ministerial ... have done tWir duties with

C. C. CALD1B.

Off. Director, Botanical Survey of India.

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Report of the Botanical Survey of India for 1924-25.

I. Systematic.—*Eastern India md Brnma.-The* absence throng! illness of Mr. P. M. Debbermaa during a large part of tba year combined with a reduction m staf elected to *mcart* the objects of retrenchment, has brought the Survey •o far aa fold exploration 10 concerned lo the position of being • Department in nf me only. There wit no officer available for depu* * « • to do laid earn? work and until a staff adequate for the duties at headquarters is provided it is inevitable that there should be suspension of certain important functions for which a fttrrej exists, namely, the systematic collection of flatfe ttanghout the jrat and recording of <UuinthaleUltfl|fomteiinbf6faLiaa'ilyjis of the vegetation and for tka miiijien of local Some. Mr. Narayana-swami, second assistant in the Survey, was, during Mr. Debberman's absence, deputed to take charge of the herbarinm and thia left the Survey for the greater part ef the fear without a einjgle whole-time officer for systematic work. Ok thoeptematic side, therefore, a partial suspension of the normal activities of the Department has been inevitable although this suspension has been more than balanced by the added duties which continue to fall to the Survey as far as economic work is concerned.

A considerable amount of systematic botanical work by students of Indian botany both in India and abroad is, nevertheless, due to be re-ported. It would seem that the pronounced tendency to the study of ecological problems referred to in recent reports has brought about a realisation that the proper ground-work for all such study lies in a broaden-ing of the knowledge of systematic botany, and a leaning towards the systematic as reflected in descriptions of new or rare plants and in the compilation of local lists is now evident from a perusal of the botanical literature of the year.

In connection with his work on the Flora of Siam Prof. W. G. Craib has published full descriptions of a large number of new species by Dr. Kerr from this country. His lists comprise, species of the families Anonaceæ, Violaceæ, Guttiferæ, Ternstroemiaceæ, Leguminosæ and Tiliaceæ. Under the auspices of the Botanical Society Prof. Craib has also published the first part of A List of Plants known from Siam. Besides giving the records and distribution in Siam of the various species cited the list is enriched by the eidMe* ef UenJ remarks upon the responsibility lot whirh has fc*«'«*»*tai hv Dr. Kerr.

The Flora of the Abor expedition referred to at some length in last year's report has now been distributed but some of the lower orders of plants and in particular the Algae remain for publication. The revision of these has been undertaken by Dr. N. Carter and an analysis of the list together with descriptions of new species will appear in a forthcoming number of the Records at an early date. During the year a very important piece of [illegible] work has been [illegible] Mr. F. Kingdon Ward after traversing the [illegible] completely unknown [illegible] the Eastern Himalayan range. A number of new species as the result of Mr. Kingdon Ward's exploration is a certainty of the near future. In particular the vegetation of this unknown region partakes of a Chinese rather than an Indian character. This was to some extent indicated by the analysis Mr. Burkill made of the Flora of Abor land. A comparison of the results obtained by Mr. Kingdon Ward with those appearing in the last issue of the Records will therefore be of very special importance from the point of view of plant geography. In connection with Mr. Kingdon Ward's tour the Botanical Survey lent aid where possible in the supply of field presses and pressing material and also in the preparation of Wardian cases for the safe transport of the valuable collection of Rhododendrons, etc., as seeds. Mr. Kanjilal continues his work on the Flora of Assam. From the Cachar Hills Mr. R. N. Parker has described and figured in the Indian Forester a new species of Alseodaphne with much smaller and thinner leaves and more slender shoots than any of the other species of this genus from the district. In his materials for the annual report of the Lloyd Botanic Garden Mr. G. H. Cave notes on the effect which the very severe winter experienced had on plants usually hardy at the elevation of Darjeeling. Amongst exotics the chief sufferers were *Cestrum aurantiacum*, *Jussiaea peruviana*, *Fuchsia macrostemma* and *Doryanthes Palmeri*. Amongst plants indigenous to the district such species as *Luculia gratissima*, *Cassia laevigata*, *Solanum verbascifolium*, *Saurauja fasciculata*, *Musa nepalensis* and *Curculigo recurvata*, usually quite at home under the normal conditions of the Darjeeling climate, may be said to be those that felt the adverse effects most. From the Darjeeling District Mr. Banerjee has described a new species of Swertia, *S. pedicellata* nearly related to Wallich's *S. purpurascens*.

Southern India.—The fifth and sixth parts of the Flora of Madras, Ranunculaceae to Plantagineaceae, completing the Gamopetalae have now been published, and Mr. Gamble has drafted a series of notes, published in the Kew Bulletin, explaining the views he takes regarding certain critical genera and species worked up during the course of his revision. In the course of his work Mr Gamble found a number of hitherto unknown o

misplaced species. Full d««friptioiw of the following aw given in the D»-
cades Kewensis ea a ^op of * e Kew B ill for th e w* . H ectranthus
Bishopianus, P. . . H
waltheoides, Apama Bamrmtm, Aumxtoliu arfntnu and TVMYIWM ^ leo-
Hills Messrs. T *•»*«" *«d A > r Aarftm. From the Tinwvelly
the name A * d w l * » y M4 J»«ob luwdfCribwl» n»w .pw k«w undor
tion cases J^***"" wfliiHi^ w ttd k«re «IM> lud under euuniui-
curbita in South India. P**nt ter*t4fty •" CWoro|.hvtam, Intfigofera and Our-
Mr. M. O. Pa hasarat Iatfc.Jo.rad of the Indian BotaMnlSoeMtj
found about Calcutta a kv lrM « tr ^ dorriptioM of tWMW Alga
is also described "* M*drM A new livdrodictroa fion HMIIM
Botanic Garden, Peradeniya Mr. Petch has papers on the relationship
of Cassia Lechenaultiana in Ceylon to other members the genus, on
the interesting subject of gregarious flowering and n mrnttic ranatioa
in the genus Loranthus. la • fortkroount paper of tat B«oni* »ill
appear Mr. C. E. C. Fischer: account of th«aaawMM ia awociaUoa
with its Ltat, India.

197 new India.– Messrs. Parker and Gupta have added a hirtJitr
new Indian species of Forest imj>orlaiir« to tlie Urfe list tAm&y
compiled at Dehra Dun. This compikUoii will thortly be mpplmcutod
in a paper by the writer and Mr. Narmj-arMwami iD mhich will be brought
together a comprehensive list of Indian species of plants of every descrip-
tion not dealt with in Hooker • KUm of BntiA Uia. Tbe Banmcnpt
of this list is now in the press and its appearance should not to delayed
much longer. A very interesting account of 0* cultivation of Conifers
in Northern India is furnished by Mr Park* m t^« Indian Forester.
For some years efforts have been made to get together a representative
collection of this group of plants for the Arboretum of tha For«4 R*-
search Institute and, though the trees art 0Ull quit« jovaf. it hat Urn
possible to collect data likely to b« of BM in dH^mininit the possibilities
for successful growth in N. li-d-a of tlie vanoia t|.«cMi now under ob-
servation.

Botanical notes on some plants of the Kali Valley a bttlt known
region on the boundary between Kumaon and Nepal forms the subject
of another paper by the same author. As a result of Mr. Parker's tour
to this valley he is able to redescribe Mr. Duthie's Leptodermis formerly
in L. lanceolata. During his tour Mr. Parker had evidence that the
sudden appearances and disappearances of plants in the Himalayan
valleys are evidently due to the considerable differences in rainfall and
elevation that occur in places only a few miles apart and that these fac-
tors seem to affect the woody species more than they do the herbs.

From material collected in N. W. India Mr. S. T. Dunn has descrip-
tions of the following species new to Science Draba ebcrura, Astragalus

Isabellae, *Cotoneaster humilis*, *Pieris* [illegible], [illegible] *Campanula* [illegible] *Scutellaria teucrii-folia*. Mr. B. O. Coventry's [illegible] flora of [illegible] has this year given opportunity for acquaintance with the rich flora of that part of India. The work [illegible] success attained in the production of [illegible] publication of these plates entails considerable expenditure it is to be hoped that financial support [illegible] further series of this work [illegible].

Western India.—Messrs. Burns and Ranade have carried out and published an excellent piece of pure and applied botanical work on *Cyperus rotundus*. This agricultural pest, one of the worst and most widely distributed throughout the East, is responsible yearly for a vast amount of damage to agricultural land and [illegible] to lawns and courts. The life-history of the plant has been very carefully followed and while no easy specific to its eradication is given the authors have been able to [illegible] the best methods of dealing with it. The methods employed should aim at bringing [illegible] at the hottest season of the year [illegible] practice be exposed. Preliminary [illegible] physiological anatomy of the plants of the Indian desert Prof. Sahni continues to compile a list of the plants of the deserts of Sind.

General.—Of general botanical works having relation to India the following may be mentioned:—Mr. I. H. Burkill's list of oriental vernacular names of the genus [illegible] monograph in the Pflanzenreich of part of the Cucurbitaceae. Mr. Hutchinson's continuation of contributions towards a phylogenetic classification of Flowering plants, Knuth's monograph of the Dioscoreaceae in the Pflanzenreich, Pax and Hoffmann's monograph of part of the Euphorbiaceae and Schulz's monograph of the Cruciferae.

During the year an important event to the Botanical world was the holding of the Imperial Botanical Conference in London at the time the Wembley exhibition gave opportunity for the union of botanists from all over the world. In the systematic section Dr. Hill discussed the best means of promoting a complete botanical survey of the Empire. It was resolved to form a central body to co-ordinate certain lines of botanical research throughout the Empire.

II. *Economic*.—A further year's experience of Cinchona in Burma emphasizes the truth of the statement that one seldom dreads what is the event is most to be feared but is ever apprehensive of what seldom materializes. A very anxious time during which the future of Cinchona in Burma hung in the balance was experienced towards the end of the rainy season of 1924. A collar disease exhibiting symptoms of canker

made itself alarmingly evident with the program of the ram* by caiuing a mortality **tiniated at 18 per cent, over an arm of \ery promising Cinchona plants out «hen operation* were fir*t *Urt««d. The trouble is first made evident by a flagging of the whole plant from itacrown downward* and by a thickening, darkening and longitudinal cracking of the bark at ground level and A few inche* Above. The general effert *o much resembles faogoid action that it wan considered dmirable to get the Imperial oncologist to MtTgui to instigate the dmeAM on the spot. In spite of repeated attempt* with ample material to work upon no fungu* capable of producing such an effert could be i»olated, no culture from affected parts would doTolop in media and microscopic examination too failed to reveal the preaonco of organic growth. Had the test* been made with scanty materi*l or on plant* at one Mage of collapse doubt might have remained •* to whether a fungus van the cause but the negative result was too P«*»i»tent and Attention had to be turned to cause* other than fungoid ioT **• trouble \N hiU ihe mdoi of ridge* were not fro* of the collapse...

M • ^t ^boua in a utate of colU|*e wan much more in evidence planting of "P ">nd swept cre»tn The effect produced indicated the the strong and improved svMem of dfAUMfO And care at the time of tion possib**% for a* no anerinc di***s* could be found there wa* A set of uity of Rnmethinjr wmng with the system of cultiva- rainy season just ^Mul uluervationA ntdo by Mr. KUMTII during tko and collapse P**»ed auppurta the tl^offjr that the collar thickening wind action which phrMolofCkal effert of deep planting combined with With the swaying of the *Ate« * lorii maf'er-loiqrin*: at the bane of the stem, cone shaped depression, young plant* oft tk* wind swept crest* a hollow considerable time, smooth and capoUo of reUininf water for A show that the collapse at the collar. Mr. lhiiiir oUerration* go to their root system almost condition i* MUOOI fosjad in plant* which have of earth. The prevention the surface and the collar completely free drainage system ... probably li<« in An improved all earth ... tfctwnoTAl At booing time ol very marked ... the ... tbepUual The praont year ahowt A conduct ... the percentage of sickly plants ha* been reduced to An almost negligible quantity and another diitinct advance records *m the experimental cultivation of Cinchona under these new conditions. In order to minimise the effect of the high winds experienced, belts of natural jungle will in future be left across the main directions of the storms to act as wind breaks.

The appearance of Cinchona at the end of the year under review left little to be desired. Plants three years old were already eight feet high and had developed in proportion to »A ottoml that made it A mottor of difficulty to push one's way between the branches of neighbouring

e

double tk ... condition that one would be glad to have in trees of ... the Bengal Plantations. The entire absence of *Helopeltis* the scourge of Cinchona in ... tic Mergui area mi scarcely to be expected ... been ... would have ... During the year it ... in the new area. rapidity with which growth is made ... counteracted its effects and it was never really serious.

No ...

J ... ve analysis of barks was carried out, a check ... done ... on the *hwk oi trtm* that had ... [illegible] ... the trees mature. ... Labour con... [illegible] ... was not ... during the year left much to be desired. Labour to ... an attempt ... through business agency ... year ... tivation ... laid down as necessary for planting, some ... already out kept in proper cultivation ... recruitment ... than the mere granting of money for coolie mining ... [illegible] ... year in the rubber and pioneer work, scarce ... at all times difficult to obtain for may be necessary in the near ... (amp and it controls recruits ... future for the ... agency that available, for ... a certain proportion of the labour

The history of Cinchona during the year provides much cause for encouragement and points ... to further effort. The scheme must still ... more evidence now ... but there is much experiment ... indicate that the ex-

The most pressing difficulty ... industry may ... as the plantations increase ... associated with the supply of labour for necessity. While it may not be easy to ... for ... and maintaining even a few hundred acres the difficulties are immensely increased when the hundreds reach the thousand mark. They are ... by a growing knowledge amongst labourers ready ... kind and that the work required of them is of a rough, heavy, pioneer ... and that the estate they are wanted for is remote in an unopened and largely uninhabited jungle. ... is at this stage of development essential to take every possible care of the labour secured and to see to it that a good name for the estate filters back to recruiting areas for it is more evident now than it was at the beginning of operations that one essential for success lies in a plentiful and contented labour force. Given this force and a continued freedom from disease, I see no reason why a

large Quinine producing belt esftamlbf boat the faiaawim River east-ward to the borderaof 8iam should not reanltand prodaction on atcala sufficient to a«ect controlled prices and bring the drag w*hm the reach of India's malarial millions.

III. Industrial Section, Indian Museum.—Some 200 specimens were added to the collections during the year. They were mostly food substances, medicinal drugs and timbers. Of these the following may be mentioned as of special interest: (1) a set of Margoss exhibits from the Calcutta Chemical Company, (2) varieties of *Solanum tuberosum* from Assam, (3) a set of some 130 specimens of Assam timbers, (4) models of edible fruit [illegible] of a Marathi turner in Calcutta. These models are turned or shaped from the wood of *Eriodendron anfractuosum* and painted [illegible] natural colours of the prodaeta. make quite a desirable and instructive addition to the show-cases. (6) Products—fans, etc. made from [illegible] grass *Andropogon muricatus*.

[illegible] of overhauling the specimen exhibits was continued and [illegible] thousand old labels were replaced by typewritten ones. A new show-case has been added to the Gallery during the year to take exhibits of oils and oil seeds. [illegible] Hut* from «Uak tht «ti m*i» •** prorund. Born* during [illegible] of pUhU ntuYt w*M** MM »JW<ifl by the Curator [illegible] tour in Assam sad added to Ui« HorUnum of tk« IndtuUitt Section. Materials for • ctUlojiM of ±» mmtkmti plMto have been completed and a start made on a catalogue of the food plant exhibits.

IV. Publications.—The second part of Mr. Burkill's Flora of the Abor Expedition being Vol. X, No. 2 of the [illegible] Botanical Survey of India, has been published and distributed. The following works are in the Press :—Dr. Nellie Carter's Freshwater Alga from India, Mr. C. E. C. Fischer's [illegible] of flMthcn IMI» M 4 tkar [illegible] plants and the writer's [illegible] Mr. MtAjtMruu'i [illegible] Indian Plants not mentioned in Hooker's Flora of British India.

V. Cinchona Bark and Quinine.—During the year 234,821 lbs. of bark were received from Java of which 127,474 lbs. were received in Calcutta and sent to Mungpoo and 107,346 lbs. in Madras for despatch to this Government's Quinine Factory. At Mungpoo 698,270 lbs. of bark were worked up to produce [illegible] Sulphate and 6,605 lbs. Febrifuge. At Naduvattam of the Java bark received there, 107,347 lbs. were worked up to produce 5,800 lbs. Sulphate and about 1,000 lbs. Febrifuge. The year ended with a stock of 1,200,042 lbs. of Java bark in hand, all held at Mungpoo. Imperial stocks of Quinine on the 31st March amounted to 308,130 lbs., of which 120,616 lbs. were held at the Indian Museum, 176,934 lbs. at Mungpoo and 6,000 lbs. at Madras.

Areas of distribution.—Final orders … areas of distribution were issued during the year. The allotment of areas has been geographical; the whole of Southern India including Indian States therein receive supplies from the Madras Department; Bengal, Bihar and Orissa and Assam depend on the Bengal Department while the remaining areas in Northern India including Indian States therein are supplied from Government of India stocks.

Issue of Quinine.—… 11159 lbs. Quinine sulphate … the Punjab has … 1925 … the issues should … allotted … the Government of India. Most of the year … show a further increase … for only a short period … from the … stocks held at the … direct from stocks … Museum, small indents and broken balances … Mongpoo. An exchange supply of [illegible] lbs. in 17 … equal quantity being added to the Imperial stocks … from provincial stock housed there.

Demand over the year has shown a marked tendency to the substitution of the relatively cheap Febrifuge for Quinine. In view of the high price of Quinine this is not surprising but there is a well defined limit to the extent to which substitution can go. Febrifuge while a very valuable product, is of … by-product in the manufacture of Quinine. Roughly … four pounds of Quinine extracted there is one pound of Febrifuge available. As the demand for Febrifuge exceeds supply the amount of this product has been rationed and … to distribute this product to provinces in proportions to the amount of Quinine taken. While a certain amount of Febrifuge is extracted from Government of India bark no departmental distribution of this product is attempted. The amount which … till well after the … of India is not known to attempt to … financial year and it would be impracticable going on. The Bengal … shares of the product … distribution of it is … Jail Department, therefore, undertakes the complete distribution of this product to all areas in Northern India as also the distribution of other minor products.

Revenue by the sale of Quinine.—The total revenue during 1924-25 amounted to Rs. 3,16,953 against 2,77,896 for the previous year. The increase is accountable to issues to the added area but the excess over last year's receipts is modified by the fall of Rs. 11 per lb. which took place in the price of Quinine in November 1924. Of the total revenue Rs. 56,231 were by cash sales to local bodies and Indian States and Rs. 2,60,722 by credit to Government Departments. The revenue does

not include the sale proceeds of Cinchona Febrifuge below to the Government of India which ... credited to the Government of Bengal and ultimately deduct ... of extraction of Quinine ... A. Bengal and over 6,000 lbs. ... will be due ... exchange ... Full details ... given when materials

Financial ... allotment for the year was Rs. 6,62,000 ... Rs. 4,43,300 but ... surrendered reducing it to ... additional expenditure ... tion labour and ... extraction of Quinine. Cinchona planta- Rs. 5,34,845. Of ... the net allotment for the year to proper and Rs. ... Ra. 4,380 were for the Botanical Survey includes Rs. 2,67,300 for the purchase of ... bark and freight charges thereon. The expenditure in the Botanical Survey proper was Rs. 2,260 short of the allotment. Under Cinchona the ... expenditure is Rs. 2,39,075 including ... Quinine at the Madras Factory. ... 50,000 as ... charge for extraction of ... ever, yet been received. No bill for this extraction has, how- under Cinchona will be about ... When the accounts are closed the total saving reduction in the quantity of ... t Rs. 2,47,490. This saving was due to a large ... arrangement effected with ... bark received from Java consequent on an ... Messrs. Howard & Sons.

VII. Staff.—During ... leave preparatory to retirement of Lieut.-Col. A. T. Gage, C.I.E., I.M.S. ... throughout the year. In the Botanical ... proper Mr. S. N. Bal was Curator of the Industrial Section. ... Narayanaswami was Assistant for Systematic Work and subsequently officiated as Curator of the Herbarium, Sibpur, in addition to his ... duties. Babu V. C. Pal and Babu R. K. Das acted respectively as Assistant Curator, Industrial Section and Head Clerk during the absence on leave of Mr. E. F. Vieira and when this officer retired from the 17th December 1924, were appointed substantively to these posts. After the ... we lose the ... loss in the death of Mr. P. ... Debbarman, Senior Assistant for Systematic Work. His quiet and unobtrusive industry combined with tact- fulness and a spirit of helpfulness to make Mr. Debbarman's ... whose advice and help were ... worth having. The ... Power in the loss of one to whom ... the work ... consideration.

In the Cinchona Department special credit is due to Mr. Russell and his Assistants Mr. Braybon and Maung ... for the thorough manner in which they have tackled an arduous year's pioneer work in Burma and to Babu U. C. Pal at headquarters for ... trouble he has taken and

ability shown in making himself acquainted with a growing volume of work in Cinchona and Quinine. All executive and ministerial officers of the Botanical Surv in both Departments have done their duties with commendable zeal throagkoat tbe year.

C C- CAU>*R»

Director, Botanical Survey of India.

Report of the Botanical Survey of India for 1925-26.

I. Systematic.

General.—1. During the period under review the Systematic Assistant has been officiating as Curator of the Herbarium at the Royal Botanic Gardens. The second Systematic Assistant's post has been vacant, so that the work has again been carried on in headquarters..

... have been identified for ... additions have been made to the Herbarium. The Curator ... and Eastern Bengal and collected medicinal and economic ... for the Museum, otherwise no field exploration work ... that this important ... the Botanical Survey should have been ... penult of a certain amount of field work ...

The ... of Indian Botanists to know more about the morphology, ... of indigenous plants especially of cryptogams such as ... of ... article, the most important of ... have also ... geographical subdivisions. These ... Burma ... important publications on ecology, one relating ...

Among general publications of general interest the following may be mentioned:—

Mr. Hutchinson's "The Families of Flowering Plants" ... the outcome of his ... towards a phylogenetic classification of flowering plants is a work of exceptional labour and care. It has an elaborate key and a list of families with constant characters which is helpful, especially in the identification ... in the field. This list might perhaps be extended.

"The Flora of the Malayan Peninsula" in three volumes by Mr. H. N. Ridley carries to a conclusion the work of the late Sir George King and Mr. J. S. Gamble ... the author had quoted King's numbers the rearrangement of the Malayan species in the Calcutta Herbarium would have been facilitated.

Miss Ida Colthurst has written a popular account of the Principal Indian Trees.

... by H. S. Inamdar, ... Mi T. D.

Parvle, (2 ^ Distribution of the Magnobacwt" by R. D'O. Good, K I)r. j p*1**; - and the Morphology of the Flower of Euphorbia " **" *I) Dd (4) thf "Morpholopcal Study of Monocotyle-dons on Agnes Arber, all ID the Annals of Botany. An intemting Sprague I*** Sue»tion of " .pec* " by Mr. W. B. TurnU and Mr. T. A. Botany " P«pn on tbr cUnaificaUoo of Dicotyledon* ID the Journal of writt /n fV4lutMf ^ tystemauau. DT Ralph Holt Cbeo«y baa Coffea. iHuQUQiting momwraph un tbt awiftoaic apeciaa of

It is also of terest to not « th*t «k» K'w •ntbontiea annou ceUM inclusion in the 7tk gv PPlrnM ^t of the Indei Kewrnat of refcrfocc* for the Wallichian B.vtb Heath ^^10 DOM ^ Oemral Sjitea (1831-37).

...ath of Mr. J. B. Gamble on the 16th October 1925, India baa lost a devoted Botanist ...mat. Hu " Manual of Indian Timbm " la a aUndaid work and ... ontnbutiona to boUnical bterature made bin known to Botanists th... (1896), hi... **i*ho*t Ind.a. Hu, Li* of the Dan^hng PlaDta Madras," .L ...otKl ^1 pn on the Bambua* if (1896) and hu " Flora of chief contribution ... part of which appeared before bia death, were ba... to Indian botanical literature. Ilia valuable Herbarium has, since his death, been presented to Ketr.

Eastern India and Burma - Attention la directed to " The Vefrtation of Burma from an Ecological Stand Pout' by Profcaaor L Dndley Stamp, Professor of Geology aadOeofrapbyin tWUnireraity of Rangoon which appeared just before tbsa report went to the pteaa. Frofeaaor Dudley Stamp's ... terbut to all ... Happ^aJ not only to the Botaniat and Fora... who are interested economically or oiberwiat in the Tegetation of the country and his classification presents a very cUar picture of the main types of vegetation characteristic of this region. A special feature of the book is its copious photographs, maps and sketches. The aerial photographs of the Delta Forests suggest that this method might very usefully employed for the preparation of stock maps of forest vegetation on a large scale. Professor Stamp acknowledges his indebtedness to Forest Department Working Plans. These, though published, are not available to the general public and contain valuable information which would, in many cases, merely require correlating and expanding to complete general surveys of the vegetation of a great part of India itself and it is hoped that the lead given by Professor Stamp may be followed elsewhere.

During the year, the Department has been indebted to Mr. C. E. Parkinson of the Burma Forest Service for a regular supply of botanical specimens.

The collections of Colonel Gage and Mr Russell from Tavoy, worked out by Mr. Narayanaswamy, have yielded several new species which will be described in due course.

Mr. Parkinson has described two new species from Tavoy, viz.: *PUfttonia tavoyana* and *I"»«**tkwi lo*g>p«luvculatui* and Mr. Fisher another from the same area, nz. *FAchucarpua quadrat***.

During the year the first part of the ^ ^ o BihaT §t1 OriMt k7 Mr. Haines was published which completes this valuable work.

The revision of Gamble's List of the Darjeeling Plants by A. M. and J. M. Cowan has been completed and is being published by the Government of Bengal under the title, "The Trees of Northern Bengal." Over 400 species from the Darjeeling District have been added.

During j ^ 2 5 t € nwaiiw of the Mount Evewrt Expedition were described by Professor Dixon in the Journal of Botany and the Lichens of the same region were described by Mr. Robt. Paulson in the same journal. Of the 31 species of lichens enumerated only two are new species.

Professor Bruhl and his associates are continuing their work on the fresh water Algae of Bengal and have published two papers, one on the subaerial Algae of the District and of Buriuda Island in the Chilka Lake of the Ganjam District and another paper on the Algal Flora of the Maidan tanks in Calcutta.

^•'tkptjt'"*••—M*. J- 8 .Gamble until his death was engaged on **t%*4 ^ . of Ut *K<n* of Madras. This part was published during this

** *. *t^v^* *nyimnn* Kuphorbiace*

^ i o | ^ Mr Gamble described the following filter sew ∙ * L ^ ^ ^ **n »outh«ra India *i-Cly/Hmrya onnmdloyane*, *C. Bourdillons*, C. I^MOI.i. *Cmmmmmm npmnvm. C. travancoricum, Actinodaphne R*" " "«*. ^. *BomfMUm. A Ln^mt. A. Tadulingamii, Litsea mysorensis. L.* MiMRif, *L B<mr4iUm%, L travancorica* and *Neolitsea Fischeri*.

From the same region he has described a new genus *Pseudoglochidion* and the following new species of the Euphorbiaceae :—*Pseudoglochidion anamalayana, Glochidion Bourdillonii, Pk^Umikm Narayanaswamii, Bridelia Fischeri, Ba* T^eaj ... *mrfmcmrf* and *R*.

Mr ... in the Indian Forester has described two new species, *Caralluma stalagmifera* ... from Vandular and *Ficus Aught* * from the Palney Hills. ... material collected in the Madras Presidency he has been able to publish a full description of the little known species, *Euphorbia cadunifolia*. H«f*a. Tht Drp^tsMrt ... indebted to him for contributing specimens to the ... to replace those lost at ... during the war. A new species of *Pavonia*, from Coimbatore P. Coms is also described in the same journal by Messrs. C. Tadulingam and H. C. Jacob.

The Cryptogamic ... J. F. D. Almeida and ... *•»• u. rawed Ik* •«•*•• •* Professor of the Indian ... Mr. M. O. P. Ayengar. The former in the Journal ... a detailed account of the

ferns of the High W.v mo«»Uia in the lUta. District recording one new 1*»«s flLfa. jhi**. The latter, who has been for some years engaged in the study of the nunne and fresh water algæ has described in the ,*»« ,o«nul a new species *Hydrodictyon indicum* from Madras.

Western India.--From India the following papers were published . --(1) Tbr r . w of (M . W.k in India by S. L. Ajrekar, (2) The Morphology »i «be K.r, I'Unt »ml of th. Rice Inflorescence by B. Mundkar, (3) The Course »« ^ V«culf huodJes. n *Achyranthes aspera* by R. H. Dastur and () The Atmorm.1 Sp.«pbylls of Cycas circinalis by Professor S. Ranunculus *vit.* *R.* *Muricnanus* and *R palifolius* from Kas ... described by Mr. R. T. Dunn in the Kew Bulletin. In U* J«urnal of the Indian Botanical S... *Trematodon brevicalyx* Dixon from Lahore is described in detail by L. X . Mathur of Lahore.

V»:-...hern India. The K«4^- of Trhn Garhwal, a \elaborate and instructive paper by IW ««*•. U-^evn «d L. A- K«»oyer ,. the Journal of the Indian Botanical Soaety justified its c aim to ^ , critical study of the ecolo ical factors determining the vegetation of the area and the valu« o(th, |iapw ,. e ^ . d by numerous illustrations.

Mr. R. N. .... the Forest Research Institute has published notes on the genus :Wmi.* «her«a he .ttempU to cUear up the confusion regarding t«- proper determ.iuUon of the lod«« •!»«•ol this genus. He Uv.» ""PI'M* upon Ihe *lup« o< the fnuu nther thn the presence ... ing the speci... also arjuan ^; further note, *,e pubU.h«l by h.m •«. bybnd r.r... M, h '"*«««o. with Keuer«l remark. o« W» hybrnU. ... vs. S erecta ... has described a new sp... ... Garhwl1 "»«** Kr. Bulletin.

I !* tbt... H Hu v ^ 1 o(the !n,J,.n Botanical Society R. K. Saksena and ... have recorded an *Ophioglossum*, var. *O. fibrosum* Schum. from the Indo gangetic plain and have appended notes on conflicting points raised when comparing their specimens with that described by D'Almeida.

II. Economic.

Although it is still too early to regard the Cinchona area in Mergui as other than experimental, the evidence of a further year's working goes to prove, that on certain aspects at all events, Cinchona is capable of withstanding fairly well the severe droughts and sudden downpours to which this area is subjected. These appear to be fairly frequent in occurrence and are a source of grave anxiety to the planter. Everything went well during the earlier part of the year, and plants of all species made vigorous growth. In August and September

J ^ * * Wry torrential rain fell, the downpour lasting for 22 day* ci H «^ding ^j ^jjf^jj previously recorded. Thf rain was accompaniul sL**** monsoon winds. The heavy wind* caused ha\or among plants to ?****J anchored to the sal and water logging of the noil consequent ^ **** rain increased the mortality and a repetition of the experie»< * ^ *Y°y waa apprehended. (Hi receipt of this alarming information Cal*n ka*t€o«d to the Plantation in November and witnenaed thf damag« which had been done.

Messrs. balder and Russell agreed that instead of riding complete failure by ha^ing the whole area in one place, it should he divided. Wit h this object ** ^^ Mr VMtT •PPro*<ihfd fhf Government of India with the "oiOrwÜoo that another ares removed from the hoisterou* monsoon conditioiis iihoiild be looked for in Tpper Burma With the sanction °| the Government of India Mr. Runnell wan deputed to fir.d another ^Ubleate for chin ebons cultivation. After a careful search over a wide area. <*rupying three months. Mr. Rupfell reported the discovery of a Wtable «te in Mogok in the Katha District This site he consid^ most favourable, enjoying climatic and P«I conditi<»« exactly m^ 1 ^ to those in the Bengal plantations. The question whether th. are

By the end of the year although there were still vacancies in the Mergui Plantatio«w». many of the** had been filled and the a#pect of the plantation Dujj^ *•• »ot altogether unfavoursble.

Plan ^tioL the y€ar t« * ^»* !«• appearance of canker disease in the N f c i J ? 1 ^ ttos at no Ume appemred formidable. The trouble WIP u by iBlpriFV<ld drainage system*, shallow pUnUng and by leaving belts of natural i U ʰ Tom the main direction of the storms to protect the plants from the Wgh wipds.

With regard ** htxniT, ahhowgh the health of the labow forre wv better than might ^ e b**n ^P****- dimculues were again eiperiencnl owing to shortage R«'nutmeiit of aome W) coolies touanln the en.J of the year temporan removed thus difficulty

Cultivation of Medicinal Plants.—Ipecacuanha cultivation II also still in the experimental stage. The plants «ft btmlthy and are growing well but the root is not yet ready for the factory.

Industrial Section, Indian Museum.

Some deposited * t U specimens were registered during the year and 304 were others **** U Jl * ^ ' """* °* *t* yriar ^ •f load mlterials. These ^*<tu^**' ••••. ^ M H I ^^^> •1•. dr«i tmi gene tour in East Bengal and Assam. Of were made principally his noteworthy are 101 varieties of cultivated iW, • wafer af ^omens

WiU? C7?O0fcJI ^"^ dotlMI, alible fruitu from Manipur and the Nafca by the tnd banket* and maU made of different .peciea of G*mm$ the different muibel

Th ^ whole of tbe exhibit in connection with tbe manufacture of JJ* haa been replaced bjr freak material.

hicb re*4rran«eiIleilt o**•* f^lety *• accordance with the new acbeme, t^* **• reported in th* Annual Report of 1922-23 baa been und«r-M* du nn* the y*" ^ «maiderable improvement in effect and educational T.la«.

Th *0Vc*bauling of apecimena wan continued and over four thousand *<*b were renewed and a new show-case has been added.

Experiments, on tbe preaervaiion of fresh specimens in liquids with a view to retaining tbe natural colours, gave satisfactory results in the case of ***** fruita and leavaa.

Informa*tion regarding tbe sources of supply, etc., of aumeroofl economic products were given to a large number of correspowdaafta, and exhibits were suppliriiod to universitiea and colleges in the United States, Canada, Straits ^ttlemenU and eWwhere.

The catalogue for medianal planta and tbair products reported in thr Annual Report of 1924-25 baa now be«n eonpieW

TV. Publications.

-me blowing workii have bmi pubbabed and diftribuUd :-

(i) ^^"oftheB^FtaniralSnrTPToflndia, Vol. IX. Ko. 4 Fre«b-^•ter Al** from ImUa by Nellie Ctfter, (ii) rUrords of tbe Botanical Surrev of India. Vol. XI., No. I (1) lift of 8pmaf and <«ffwra of Indian Phanerogam* not included in Sir J. I). Hoiiker'ii Piora of British India by C. C. Calder, V, Narayanaswami and M. 8. Ramaawami (2) Loranthacrv of Southern India and tb#ir boat pUntt bj C. K. C. Fiaber.

f. Ci^bo« htrk aai QdiiM.

During the Temr »l.S^^"7 Iba of bark were received from Java of which 24 **** wwH »HI wm afi«t to tbe Bngal Gurrnment Fadorr ^vJ^10 ** 242^51-9 (W. U tb« Hadrsa Govrniromt Fartonr it

^ w^^ ^^ V ^ tiii W - At Munjrppn Factory6M.IS7 UMI. of bark r * C?-rnirdlii||||||« wwnHI ^ QujiuwWpbaU and 9.769 Iba. k^N v rffcnf«t^ . At Naduvaftam fartorj tW whole of tbe bark %ialf **«•«!•* Iba waa worUl yif4Ang 7,W ka. ef QmimaA 14 **W 22,400 Iba. of CWkona Febnf^T.

***** *of Qui*i*f.-The* **total stock in hand on the SJst March 1926, ^ n t e d to 334,732 138 lbs. of which 110,386 670 lbs. were held at the !•*•* Museum in 3.329 original cases, 211,201 031 lbs. at Mungpooand 13'H*'437 Ib*. at Naduvattam.**

ffc stock at thf* Indian Museum is entirely Java Quinine contained 11 onpnal caw. Them; cases are of two kinds : (1) war Ume Quinine !v«d in 1919 under Agreement with the Association of Quinine Mamt-T*«*r* in Allied Countries snd packed in cases each containing 2.) Ibs^ ^Wnine Sulphate in 4 unsoldered Unsand (2) Quinine Sulphate received **« Agreement with the Dutch Combine (1921-23) contained in cases J * Kilos or 44 (192 lbs. of Quinine Hulphate in 4 hermetically sealed *• The 25 lbs. cases on mount of th«-container* being insufficient Ir hsvf nhown shortage, in weight due to the loss of Hater of, ry-ht**ti*n.. The loss, however, does not affect the medicinal vilue o(the **H but, as indentcr* claimed compensation for shortages, it »aa decided *l by the Government of India in 1924, to atop the issue of the war-time Ncked (I', lbs) <»«» until such time as it can be utilised in thu preparation of special products.**

Areas ofdidribmtw* The allotment of areas has been geographical, the whole « of Southern India including Indian States tberan rectavt supplies - town the Madras flncbona Department; Bengal, Bihar and Orissa JL7** Aasam including Indian 8utes receive supplies from the I ? 1 Qllclloo« Deptrtmrnt and the rtst of Northern India including y* States themn are aupphed from the Government of India stock.**

Sales of Quinine. - During the year 13,999 152 UP. of Quinine H* iaaued againat 12,159 Ibi dunng the previous year. Tba increase >• due mainly to larger consumption of Quinine in the Punjab including Indian States which during the year the Punjab alone took 11,565 1,834 lbs. «>• againat 9,73! Ib*. in the previoui year or an inmaae of

Cinchona Febrifuge. Th« demand for Cinchona Febrifuge waa persistently high on account of the cheapness. Owtag to the JimiUd outturn of this drug, which iMnthenatureofabyepwJucf in the manufacture of Quinine, it waa decided by the Quinine Conference held IB December 1925, that Cinchona Fabnfuge akmM bt itauad t. pronncet in proportion ... has now been *n»t|ad to give effect to thin deciaioo during the ensuing year. During the year under review 9,770 lbs. of Cinchona Febrifuge were manufactured at Mungpoo from the Java bark, of which 9,658 lbs. were sold by the Government of Bengal. The total stock of Febrifuge on the 31st March 1926, amounted to 8,297 lbs. of which 4.079 lbs were held at Mungpoo and 4,218 lbs at Naduvattam. No departmental distribution is undertaken by the Government of India for the reasons explained in last year's report and the Bengal Jail Department continue

» '*«< (kin drvK a« we I ai other minor product* to nil *reaa in th* * orthern India.

Revenue 6y Me *8*lt .*f Qm*i*e.-nt* total revenue daring 1925-26 amount** to R*. 3,90715 again*t Rs. 3,16,963 for the previous year. Of the total revenue R*. 91,354 were by CMD sales to local bodies tnd India* 8tat«* and Rn. 2,99,361 by credit sale* to Government Departments. The rnrenue doe* not include the sale proceed! of Cinchora Febnfttfe belonging to the Government of India which are in the first inst** credited to the Government of Bengal and ultimately deducted from t>e rout of extraction of Quinine payable to this Government. As Bengal N J*ld over 9,000 lbs. of India Febrifuge a further credit of the order of R. -*1.0U0willb«.duetotbe Government of India. Full details will be *iv*n when materials for the exchange account are available.

TL IloaadaL

*•• original bmlget allotment for the year was Rs. 7,07,000 from ^ i k R t .],74,OOO was surrendered reducing it to Rs. 5,33,000. The surrend'** awoont was distributed as follows :-<l) P«T of by R^ • t i c A%«sUot Rs. 5,000, (2) Purchase of Cinchona bark a J * . 0 0 0 and (3) £itraction charges Rs. 49,000. Of the nett allot- ment ?6» *•. 49,8M *mm* for the Botanical Survey proper and the Industrial Section, ej^ Indian Museum, and the balance Rs. 4.83.120 was for the (In- dustrial Df P«niiient. This lant figure included Rs. 2,85.000 (as reduced by the *ttrrender of Rs. I,20.<M>0) for the purchase of Java bark and freight f k*rgfa thereon. The eipeaditttw in the Botanical Purvey proper ^ R * 50,057 nbowing an *xc*m of Rs. 177 after re-appropna- tion of *•· 100 from Cinchona. Undet CinchcM the «pfnditurt waa Rs. 4,49,1 80 .bowing a saving *ai* Hi. 33.940. The »ving Wb chiely under purchase of bdr and extract** charges.

VII. Staff.

¶l J- C- C. CaJdfr *hM* eham t* Dilator thnrngbct the yc«r. -9 Bol ««ri Kurrcy *mnpm* Mr. *S.* »• W was Curati* ai tte Industrial ^tion, Indian Museum, ^ *v Nft7MI TT *» Assistant for Systematic Work and officiated as Curator of the Museum Royal Botanic Garden, Sibpur, during the year in addition to his own duti ^ ^•SJSJSJf SJSMSJft UWPSJBHP tS^ J. October ** * * • D C h l w i i AsMUal Curator ei c*pt from 3rd absence upon R. K Das, Head Clerk, acted as Assistant Curator and Babu K. N. Banerjee acted as HradCl^k ^ . m . In the Cinchona Department Mr. P. T. RSXMII sad Mr. A. Bravbos held charge as Superintendent and Assistant Superintendent, Cinchona

Cultivation, Burma, respectively throughout the year. Maun Sine was Overseer in the Cinchona plantation, Burma. All the executive and ministerial officers of the department discharged their duties with commendable zeal.

J. M. COWAN,
Offg. Director, Botanical Survey of India.

Report of the Botanical Survey of India for 1926-27.

I. BOTANY IN INDIA.

General.

Three publicity., of particular vdw to Indian Hotani** on three diffewnt branch*, of Botany were published during the TNT; "*»*» and Method* in the Study of Vegetation " by A. (i. Tandey and ... CWpp, published by the British Kmniw Veflrtation Committc*, Dr. J!!*****'* TV Palni* «f Britiiih India and C w U " and,a mia«d ... of • VitA ^atۥf 1^» ty ^ ^ There i» no doubt that th« first of fc«e works will 4i«ulato the 4udy «f Koi»logy in India, a subject of the franlcfl importauw to the econouik devdopmeiit of U* country. Ow koowW^ of the vegetation ii eitremely incompblt ... n printed y in thr introductioni to th« varioui PIOTM; in Forest Working PUIM which unfortunakly have until recently not been published for jptttral cirruUtioii and icattewd in variow JouinaU. Of the changes in the Vcgrlniion which auiue on inUrfereuoe by man we know even less and we owe a debt to those authors ... art out clearly, practic... ... communi... ...jj^j ... will nuke fur uniformity in in*e«tigalion. Thi ffrottd work ... d«criptioo« with ex^lleot illustration! not only of Indian ... **Uoftfcoaiof UM MauriUia, the UpkAm and Malaya ... re-written ... to date and elaborated with generic keys by Dr. F. E. Fritsch, b lxji.pt—H» t« UHW iHMrekiaf on U i u Alp*.

Mr. Hutchinson has written another interesting paper entitled "Contributions towards ... Classification of Flowering Plants". The second ... |Mt ol PNIMMT W. 0. CwV. "Flow ... WM Mai 4'MM At ^r d b tin rontinwd to ... tW tUn «f Siui n tfat Kew ... Ridley's "Additions to the Flora of Malaya" are of interest. The detailed accounts of the "MfWiipie of U» Wch East Indies" by Dr. D. F. V. Tliill ... ibr Dr. L. 0. Dn Bagar's publication entitled "Untersuchungen ... von ... und fossilen Dipterocarpaceen Gattungen" *iD be of considerable use to oriental botanists.

Eastern India and Burma.—Dr. Brühl has published a practical "Guide to Sikkim Orchids" and vilk U> ... scholars continues to issue bulletins on the lower Cryptogams. At

"A1K*oftb«LokUkUk«w,Manipur, Aneni, by P. Briibl and K. B. *•*• "onUint detcriptaona with figures of Iff Indian epeciet prepared from materials pmeeAod by the late Dr. N. Annandale, P.R*. ^ P«pert include "Indian Slime Fungi " by P. Bmhl and J. 8en, ,*•• Hom o{ the Salt Lake*" bj K. Bitwat and " On the occurrence of rf'ocimri*i*HHaM.Iiinn, in Burma " by P. Britbl and 8. Sen. Mr. C. K. —ther ha. cWribed 33 new .ptvje* from 8outh TenOMeri- and a new genus *«» Lu.liai; Mr. Ridley 10 from the Malayan Peointnla.

t h"iler* /•,/„ —Dr. B. Sahni of the Unifereity of Lncknow ^contributed t« the Journal of the Indian Botanical Society, which he became the Chief Editor thin year, an interesting account on "The Flo Ming Inland ai.d YegeUtion of Kbajiar, near Chambe in the North-We•1 IliiumUyap ". Hhagat Rain V»«fht ha. written an account on "The Compar«iiY<- Anatomy of *Opkiofloiim AtickUoni,* d'Almttda, t *Wffloinm* r./y.«, Linn." One new .periei ha. been recorded from th •Jr* N°th-W«it HimaUyes.

*Western I*4U.*—Dr. K. Blatter, C. McCanu and T. S. 8*bnit have contributed *« the Journal of the Indian Botanioal Society the fin* instalment of a mė. of li^j on "The Flora of the Indtu Delu." This is • falttaMc contnbution to onr knowledge of the flon of Ui. region. **r-T. F. R.d'Almeidahnteantinned hi. work on fern, and described a n*w tpecieii. *NtpirolepU ptei/romdoss.* Some note* on the structure of *Sympi*,* *fmUvfi* writien by the ewe author art interesting. Profeawr 8. L. Ajreknr, who ie engaged on mycologiral research, has written a paper entitled " Oeeenraiaone on a dioBnee of Jowar (*Sorghum vulgare*) me*ed Wr Aphncdk (oonidial -Uge of CUmcepe)."

Southern Indie.—At Kew Mr. C. E. C. Pitener has bee* continnin$_{K}$ his work on the completion el GoeihWi " Flora of Mndree^{M}. He bju also published a note on the Aoja wittai of *Pfftmsfik** «dmUU$* H, R. at Wight. ***>& in the Kew Bnlletie ha.a note on U* inland....!nn'iieiii of *Ipomea pro-carpea*'. Two new ipmn here been oWrribtd from thu tun.

Botanical Survey of India.

During the year endeavours were made to revive the purely scientific activities of the Botanical Survey of India, which for a number of years have been almost in abeyance, through lack of funds and staff. Although for the greater part of the year the single Systematic Assistant was again acting as Curator of the Herbarium at the Royal Botanic Gardens, Sibpur, and the Director has to devote most of his time to administrative work, a certain amount of progress was made by the end of the year.

The botanical laboratory at the Royal Botanic Gardens, Sibpur, was partially re-equipped for the identification and investigation of the lower

!<*»ai of pbui life and march on Indian Mo«w and Alg» wan begun.
^Cryptogmmic Herbarium, is which **» of the «p«im«M •» <*
*—friable value, WM in a state of confuaion and u l«ing rKM[ml11,TM
• W-ho**!. rrofe«wr Brilbl of CUratta 1 niverrtty han ondertakw. the
pw»M»tJ.«i of a « Cewu of Indian M.«ea " with a generic key and note, on
** morphology ud uatomy. Thi. wofk, which will..bortly U publiihed
* *• B«eotd* of U« BoUn.cJ Survey of India, will *gmtiy* hcHitato
• atarfy of Indiaa MOM. Con»id«raUe oollectiom of M[redacted] were
*** » S&kim and in Bnrma by the Director while on toor.

*« «imr«oii WM nftde U, the Cbakaria Sund.rUn. in Chittagong.
[redacted]Te .m of int«i«t, ae it. »«g^ [redacted] aracters inter;
mediate between tb^ of In* Mfttatioa of the Snndarban. of the
Gangetic DriU «nd of the mangraras of the Irrawaddy. Au ^ylocml
study *«• al«, made of the Fore** of the K-limp«W '«•* Division
in the Di^rirt of Drjeding. As the «*H of thi. work several
papers »»».now in the !»rt« and will .hortly apuar m the Reoonb of
the Botanical Sarvey.

In "* »«»*"«««i" •WiUe, U, Ue rouUic ,.lenUh,*Uon of abont
1,2,b PWOU for IWre.pu..denU in difer«it part* of the Indian Empire,
some 8-W« phnU formeriy eolleeUd by the writer in Chittajoo*.and The
Chitt * *« Uill T«1. dietmi* a* bUrn Be«Kal were olwufied ami
named. At the «„„ time the prep—*'." <* • CaUlofue of ChitUgong
Plants was begun.

The rate of growth of Cinchona and the prod«e»i«m of UA and
quinine per tree • * P»-". a « b which very Utie infor«ati.*.
is available, U. ^ u. . N^ of M^tv the f—l«- ot whieh will
be ready !or pabKetlMM in the near hrtare.

During the year 658 books and journals were added to the library
and tfr^tiE'it'tifarU» wWijid yhhntWM ha* to* i****"*
4. ^ ^ ^ «* boUatctl inrtiUMM fa !•!••• V** ** **• worW *•*
iV^L*•• fcl. TU Mm I W H* B"Uni«l 8»^«T •* Indk •••
[redacted] i ^ * **mkjln IKIU (mi oot-id« •»» aji » •^J/** U
necessary *◦ III'HM HM nvnb«r of copiw for di^Hfcrf*" ••ll * il l *

II. INDUSTRIAL SECTION, INDIAN MUSEUM.

The single gallery in the Indian Museum now aUiktd for tW
exhibition of the economic products of India—f
dyes, fibres, gums, timbers,
the products as well, is inadequate... Back of«iowM» K«4«rffli*Wt
no room for many products and processes of wide interest and importance, deserving of a place in the gallery, but also there is insufficient
space for the labelling and proper display of those already included in the
collections. With the annual addition of new specimens, the congestion

naturally becomes wor». Ai vapor gallery BOW *wmi m* ike oflot of Ike Botanical Survey of India would bt»r»ikUeifiooBiv«re found for the office elsewhere and it is hoped tUtH»aTk#pii«iTilito#o this during the coming ; m .

The investigation of medicinal plants and their product- ku iw*ir«| considerable attention and arrangements ••§ bûg «•*• for tk* coHr©. tion and Wmbtioa of tk* iafamatm aIndI/ sTaikbfe, CM U tko office of

quantities of iapodMl Mdk«l pkatot* UfMMiin 4HhMl localities in certain provinces, the collection and investigation of plants which may have a thera[illegible] ossibility of extending the cultivation of [illegible] were under consideration.

1^ Curator's t i » k i » M •mpM ckMj with UM ordinary routine work of tW museum. As usual, information regarding the sources of supply of economic plants and their products was given to numerous correspondents and a *t*tmimbk numhtf* of pk^is aad pint products were identified on behalf of Qofeniawit DcptrfcNtto aa4 U* general public. Seeds of various economic plants were sent to England, Italy, America and Russia for experimental purposes. The Curator toured in Behar, the United Provinces, Rajputana and in Bengal collecting about 500 specimens of which 400 were deposited in the gallery. A very good collection of minor forest products, most of which are of medicinal value, was obtained through the courtesy of the Officer-in-Charge of the Minor Forest Products Section of the Forest Research Institute at Dehra Dun. Among other new exhibits worthy of mention are wood carvings from Saharanpur, list length charts and muslin cotton purchased from the Economic Botanist at Dacca and samples of silk cocoons and silk grown and manufactured at Bhagalpur

The re-arrangement and over-hauling of the specimens in the gallery continued and over 3,000 labels were re-written, the descriptions being in many cases supplemented by coloured drawings which were prepared during the year. A considerable number of specimens were replaced by material obtain-J fioai tkr Royal BtlMic Otifeu, Sibpur. In February 1927, fikibtto iDavtiatnaT ikt woWboB *mi* manufacture of cinchona and quinine were sent to the Calcutta Health Exhibition.

•• CMOBHA AND QUMNl

Cenerul.

It will not be out of place to summarise briefly the position in India at the present time as regards the production of cinchona, a subject of paramount importance to a malaria-infested country.

Cinchona was introduced into India and plantations were started in the early sixties of the last century. Almost simultaneously the Dutch

began to ' nt in Java. In India over-production between 1880 and 1880 hi ve continued to develop ** mdwtr, till, with . « • • » • « «kt » « « • output, they now control its and prices.

nce 1916, India has been making a serious effort towards indepeu- ' ine are concerned and, dence, at least as far as her own den endeavours it is a sign of the times that other ou on the Black Sea in this direction. Russia Ulk. of grow pg cin * * . Coast, France is considering how much of her cinchona requirements may be produced in her African colonies and Italy, whose estates in Java are approaching tb. Urgiling *t«., will shortly be independent of foreign quinine.

That there has actually been cour i*«UTfly litU« •dwm* "» the extension of cinchona cultivation in IndUlas been shown in the evi- dence given before the Royal CommitftioD on Agriculture during its recent sittings. India remains in the podtioo of being able to supply less than half Indian demand for quinine while the prospects are that in ten years' time her output may be even less than it is at present.

The failure to attain independence must be attributed to several causes, foremost perhaps the lack of centralisation, the need for which was first expressed by Sir D.TM l'«n thirty years ago. The absence of a central department entirely devoted to the carrying out of a definite cinchona policy has made it almost impossible for any great advance to be made.

It has now been proved by experience that however well-suited for cinchona a locali y appear to be, there may be unforeseen or un- known factors site unsuitable for this fastidious plant The only safe method lity of a locality is to plant experimentally. Small plots of 100 or even less will in three years' time indicate the capability of . «8. tta, i, no doubt that much time has been wasted in Ind« on large scale ventures in untried regions. Had a large number mall experiments been made in places which have been explored and are believed to be favourable to the growth of cinchona, there is little doubt that b, * • th. p 0,luction of quinine would have been sufficient to meet at least the -- emand.

As a third reason the fact that no systematic research has been undertaken cannot be neglected. Our methods of cultivation have not been sufficiently improved. Although India and Java started with similar plants, the percentage of quinine in Javan bark is now much higher than in Indian. Every unit of increase in the percentage of quinine means an increase of about 20 per cent. in the total production and the percentage in Indian bark could undoubtedly be greatly increased by selection. We have made no sustained effort to shorten the rotation

JJP[0]* "or tbe period of ton or twenty *yrmn* durin* *»*•» land» follow ... *>J tba growing of a foreat crop, before a aerond crop of cinchona it produced apoa it. Tbere are no recorded programme* for tbe future or Working flefcawa for tbe cutting planUtiuaii; we natter know nor attempt U obtain front thorn Uhwx aaaximom yield. Onr planting and harvesting are more or lem bapfcamrri *I'ndtr* auch condition! wo cannot look for a auatain*! annual yield. Efonoav in European trained staff is very largely re*poo»ible for three dofeeta, for without » specialized know ledge of horticulture piich problems cannot be tacklad.

Reorganisation u m-edrd and ougbt not to be dolayed. If ae^om-plished soon. tbw i»red *he* no frar of a decreaaed prodactioii, raihtf we may confidently1% ci|M t that lajdia with lier %aat rei^urce* will be aKU not only to supply her own requirnDentN of oincbotu aad quinine but also to aid in supplying the a»ed« of le«0 fottnnaU' part* of tbe Bojpire.

Departmental Operations.

by F^|4orml«<wi f«« W,HJ tuiulUe for nncboaa W I I continued in Burma ... ". T. r i i i l l , Muperiateiidmt of Cinrbona CaHivaiioa *m* Burma, w^ ^^ aaiiriatr_ a roaaidera!4# area with rxyatirf reaaMt, reported f«t<mraMy <*m* a Ualit) aitaatod near Mogok in tbe Katba District. ^»» area wa» r Ml tod Ut«*r liy tbe Dirorior. It ia <*ertainlr a locality wbu b tbe ptoaptxU *of* growing riacktma with wcea! are good but there are eortain knotrn adv«ff wiologtcal fartorv wbirb makr it advisable to plant eiperiaientally bafavi atUmptiag operations on a large scale.

The Director *l*o iiaitfd tbe Aaajaalaia wbate tbe Madraa Govern-... d Forest ... V^*^J^*«ffm»oe ^m- rerr MitaUc for Ciacbona. There ... • aaaibar of <**oaiW» ao tbat boiw too. we *wmm* ... ^ eipmmenU befnre a doinite piuMMHiiil a* to ... of this area can be made.

In Mergui, weather conditions were more favourable than hitherto experienced. Rainfall was 116·19 inches and for the first time in the experience of the plantation, there was neither a severe drought nor a deluge.

The equable season has resulted in a better appearance and somewhat lower mortality in the 146 acres planted during the year. The plants, however, have had the benefit of a thick covering of shade as seeds of *Cajanus indica* and *Crotalaria striata* were sown thickly in the area. Both these species have proved themselves useful shade plants making a growth of 6 to 8 feet in one year and giving just the required amount of shade to cinchona in its earliest years of growth. For the recently planted area, however, a specially favourable site was selected on a north

to north-east aloft, protected from the «outb-w*et WIIKI*, lew <W-t!y exposed to UM fiem «• Md oa deeper pmuKl tHMi th« ^ formerly * • * * . Suck favomfcb fltomtMt eaeih found. TV plant.. <« ^ *rea did aot, bowtrer, a m p Ihe fBTtge* of di«mir . In common J * t k t mi of iW pUoUtio« they nt^ «-dlv atWked with «I*nk * "ta " , CoriUtm -Imtniadar, whi> tlU^ber orer «» 00" plant* were •illtJ by « raaker' wkile mmny mor* wore *f«r4«d n4tb tfat diMMt.

The aspect of the older blocks cannot be mu\ to be Mtitf^-torr. TKe original am panted la lflS-M on newly cleared i*>il «t™l ^^\y well but the •rea planted in the aabaaqaaat y«ar ekowa a very Urge pewent-age of vacancies. Tke eiaariaaaal baa gooe far caotifrb to proTe tbai contrary to ;,'|;,1t,y^M - MM tfchwb the altitude i« low, Ctmfhtmm +!***** •• tb# k v i Mtt»bl« •!*«*• for pUnting in Ixiww Bonn*.

t Hit —iâtbit Mtcirr i» tb* Cincbomi bybnd (Udftruim* J^nrir*) wbib ttMkMl OMOiUbU «peo« i» ^i»rio»« Itifrrian*. Jr« ^«Ob** ..bowB that it fe ah kor** ^ •^^P* I^^^K adapt on newly cleared land.

The gmaU-t eocmy of CIIM-IMNUI in Mrrgiu !• uiKloul^Udly the very hot >aa wbirb i. mpNmible for mor* ilraUi. ibao in-*'t part* and fungi. W*to UM only fttwde tree n»ed has been ErgiAnms imiic* which *»• pkoUd ja4 a. mutk fi»r a gn*n manure M for a *»ia-lf plant ^^ little pn4artion from tbraun. EiprrimenU baf« ' l^ei. nia-l-t,?.. % ••»•»? of ntber .pet** dmrin* tbe year. Acroctrr** ftm*. k n ^ l ^ ^ » « « - W-^- »«»• "l* door weJH.nt fair MMvesn ban ^ * * ^ wkb Grertllm ritmsts whirb ffnninal*i pr..fn«ip|y. By the best species. bowser, in OUrindim msemlsis and 50 arms kari. have been planted with H.

Mr. K«aaaU baa eaared no Hfoft to mak tiie pbnUtion a mux*m and has ha* to work under eonpidermble diAcultiea.

The labour force was on ... 2(M) Nepalese coolies in March, 1tM. Thaai witb a wtain aorobér of old coolies provided an adequate labour force for Ik; ak^lio. iJ We W«atk af the labour was on the whole good.

Cinchona bark imported from /.,« _!>«n tbt rear f7!. 77* IT It* of bark were received from Java of waarb 14\»7é-t7 lbe. wew aaai U. the Bengal Government Factory at Mungpoo and 12[illegible] lbs. to the Madras Government Factory at Naduvattam.

Cinchona bark from the Mergui plantation.—During the year 18,[illegible] lbs. of bark were collected from trees of all ages of which 2,7[illegible] lbs. were sent to Mungpoo Factory for manufacture.

Manufacture of Quinine. At Mungpoo Factory [illegible],716 lbs. of bark were worked yielding [illegible] lbs. of Quinine Sulphate and [illegible] lbs. of

Cinchona Fttirifug*. At Nadurattaai Factory 200,544 IU. were worked yielding 10,472 IU. 10 os. *4 Quinine Sulphate and 5,5*8 IU. of Cinchona Frbrifugu.

Stock of Q»f•!•*.—The tutal gtouk in hand on 9let March, 192f amounted to 957,764-70 IU. of whkh 100,421·88 IU. were heU at the Indian Uwmrnm in 3,103 original cuoe*. 259,725·74 IU. at the M"*Kpoo Factory and 25,617·09 IU. at the NadaratUin Factory.

As regards tU dripnaml of the warHiM QuMPt rafmed to in laat year's report, which tuu lopt weight by m••petition of its water of crystallisation, it ha* BOW been derided by the Government of India to convert the atoik into taMeta. The GoronMat of Bengal hae inaiauea at Mungpoo Factory now an up-to-date plant for the •anufftcture of tablets **d they hs?e agroed to take up thin work on behalf of the Government of India. It » eipevtH that a beginning will U made early in 1928.

Issue '/ 9««*««A—During the year 18J79-4* lbm. of Ctauae Sulphate were iaaned againi* 15,999-15 IU. daring the preview year, an increase of 2,6S0 Mm. dor maiol.v to iiK-reai*d coitf—ption in the United ProtI1lrf*- TW aham of the province and Indian State are : Punjab ItfSal !U| VtdU4 ProTinoni t597 IU, B-dor«ta« 564 1U., North-West Frontier Ho \\m.f RajpuUna and (Vntml India 9M IU., Kashmir 177 IU., Mhi Prorioee 55 IU. and Hrdfimbad in 8iad 44 IU.

Cinchona ¥rtir%f*ft.—luring the year umler rereiw 6,506 IU. were manufactured at Mungpoo and 3.0io IU. at Nadurattaai from the Jara bark. The quantities aold by the OoveruKat* of Bewfrf and Madrae during the vrar were 7,842 IU. and 2,000 IU. respeftirely. TU total stock °J ^*ifuge ou the 9U Marrh, 1927, amounted to 1O,489tba. of which V45 IU. were held at Mnngpoo aad 5,7M IU. at Nadnmtamai.

The demand for Pebrifuge c-onhnuei and, a* elated in bat ymt* report 'U e^^I0ttoffl1 '* t** ^rvf was attde to earh prorinot a avapertton te to ftL^r^>on <tf OuBama 5,961 IU. of Fitriftnai wero knel the India area, almost half this quantity to the Paw jab aloe*. The Bengal Jail Department continues to mm thai drug at well ee other minor products to all fa the Northern India.

Revenue by the sale of (/«ai*#._The total iwttwt during 192647 amounted 10 ••• 1,66,467 aguinet la. 6.96JI5 far the pmio«y«af. The fall ^r^e*f QniaiuohyBa.6 - the Ih. whieh leak pkei the the husaueaa^ af nW ««v M raauenaihie far the decrease in local JII ^ ^ MWtf why each sales to and Indian Sutei aaJ la. 1,91,107 by eredH sales to Government Departments.

The revenue does not ... of Cinchona Febrifuge belonging to the Governm it of Ind» and -Id by tW Governments of

M.*»• and Bengal. Tbeee an oredited in tbe iini iwUaoe to UM* local °<*«r*io«iU and finally adjoeted by detloction from the ooet of eitrac- •* of Quinine payable to them. Daring 1026-*7 Madra* -old *JMK> lbs. of India Febrifuge and the ooat thereof, *ris.*, Be. 10,<M>0, crediUble to the Government of India, hai been adjusted by deducting tbe amount from the twt of eitrartion of Uninine Juring tbe year. Bengal has •oKJ 7,942 1U. of India Febrifuge and therefore a fufther credit of R* 70,573 is due to tbe Government of India, which, however, will 1* adjusted by deducting thu nm from the eoel of eitrartio* of Qoinine due to Bengal.

IV. PVBUCATIONS.

During tb« r~ the following pmrU of tbe KeconU of tlie BoUiiical Survey of India •PP~wJ :—Vol. IX No. *, " Fieah W»Ur Algae from India " by Dr. Nellie Carter ainl Vol. IX No. 6, by Prof**** II. N. Dixon, " Mo*, ••olloited in (h1git " etc., by J. OarreU and W. Lillk.

V. EXPENDITURE.

The original budget allotment for tbe year wan IU. 7,1>9,<K>U from which *•. t,M,3O<7 were nurn-noVrfd mlucing H to Rn. 4,50,70U. Tlie surrender* wa» distributed an follow.: (•) From Botanical Survey Rs. 1,100 under Travelling Allowance—vot*l, (••) from Cinchona \j^ *•• *.»l,800, »*., («) anler Purvftwee of Cinchona liar* Ra. C^>000» (*) omW Freight and other Cbane. Re. 18,.*X»t (r) under *w r«* for Kxtrmiiion of Quinine Rt. 51,000 «n-l (*0 und« Travelling Allowance voted IU. fv|oo. Atklitional allotinenU nerceaat) to meet excess expenklitnre during the year were Re. lf.r»00 for the Botanical Survey of !|^U proper and f«* (Cincboiia rU. 3,500 all umler Travelliiig Allowance ^n-To4e4. The mitred grant VM tboe reiU^ed to IU. 4,81,600 *which Rs. 58,530 was for the Botenical Survey of India proper including the Industrial {Section, Indian Muarum, end eV 4,02,970 for the Cinchona Department. The total eaving in the whole Botanical Survey of India Departnift, aMOJoted Ui Re. 71^01 due chiefly to ^ pwrrhlee of CmrhoM bark from Java and eavingi on extraction charges.

lit c. ^ iTAfir

he rem i V ^ Me cWgeM thneU* nP Ie f Oth May IfM, when ... Dr. J- M. CWu of the Ionian Fereet Borneo IU charge as Director from ltth inly till the end of the yew. During the intervening period Mr. G. E. Shaw, Quinologist to the Government of Bengal and Mr. S. N. Bal, Curator of the Indwjlrial Section, Indian Museum, acted as Director, the former from 31st May to 4th July and

*• WUer *Inm ZkiolUk* My. Mr.V. Niwyum" «• —— *-" -Tnjrt—]iiiTiikiii *Meininn* —n ——*— '*of the Herbarium, VN -iiwii, GM*M, SibfOT, täll Slat J«nMry and went on leave f|^ MtU F«*r«rT 19il. JIT. U. Chlfii A-i-UM Cantor, Industrial Section, InJ»n M•««.,.•<] IUb« R. K. D», H««d CUrk' throughout the y«w.

On tW Cinukom PUnUtion Mr. P. T. ft»sell was Superintendent of Cinchona Cultivation, Bum, a«|* fr«* I* M*T *• 30th November, 1926, when he was on leave. During his absence Mr. A. Bmybon, Assistant Superintendent, acted as Superintendent and Maung Sine, Overseer, officiated as Assistant Superintendent. Chandra Lall as Overseer. The A«i«Uiit S^ariauwlrai Mr. Bnyha, whose services were transferred km from tU Beapl O*nW^r»' ««TK« i« 1HS, <W not find the conditions of .mir. «rUMr Md w«il on long leave from 17th March 1927, preparatory to r«4ir«ianrt rendering altogether over 5 years service under betk G^vernments.

All members of the staff kavr worked satisfactorilv.

J. M. COWAN,

*Director, Botanical Survey of I*d* (Offg.).*

Library.

Report of the Botanical Survey of India for 1927-28.

J- fotftnatte. - A feature of the year ha* been the rw.um]>tion, fomia and pmwr* of work at headquarter* would permit, of field •*nr«y work and a eontmuanee of thi* activity ia alao to be recorded a* the time of writing this. Thin resumption hi* been rendered possible *>• the filling of the pout* of Curator <f the Herbarium and itant for iy»t«matic work and the netting free of Aiaiftantn for systematic work to perform the dutie. properly pertaining to their appointment«• Thui all three nulwdinate officer* hate recently had a period <* Md work. Mr. Hnnivanan wa« deputed to the O«ro Hilhi, Assam, from which he ha« brought back a carefully ptwarred and represent^*ve collation of *m* I.IM» tpecimena oompriaing abo«t 2W species. "fW main work of Hleiitification on thi oollection has been ... ed, but more detailed ntudy m neoeanary to entaWwh new ... or o*««r interesting botanical fratun» not already reoonl^I. Mr. Srinivasan, whow intrrrtt in Phot*»graphy give* him an addition*! ... teoftogical work, ma^le a «i>erial ntudy of the Nullah ... r th* Tillage of Tura in the tiaru Hill Dwrrict and he w ... to tptrtalbe in thw branch of field work.

During the y«*r onder review the work of th« Fiwt HyMematw Assistant ... to hejM|quart4'ni where in addition to the normal routine of ... ao<l in<x>q«>r«tHHi *nd dealing with botanical questions from • wkfe *mfc of oorrenpoiKlcntii he brought U> near onmpletion his examinatio»j of the eiart g*nigniphic*l diathbution of th« Malayan collectors Wray, Kun*t4er aod 8«>rtechini. A paper comprising the results of th» examination in in oourne of preparation »»d has been promised pIbo« in the Jownal of the Aiwrtw rkiciety of Bengal where the materials lot the Malay** Pfcoinfal* flora art almdy published.

In addition to his routine duties as Curator of the Herbarium Mr. Biswas continues his algological studies started in the Botanical Laboratory, Ballygunge. An analysis of the Algal Flora of the Chilka Lake and a paper on some fresh water algae of the Malay Peninsula represent his chief investigations in this line during the year. He has also had some of the Indian Avicennias under investigation.

In order to provide more space for the ever increasing collections of higher plants the cabinets containing th.- H... Liverworts, Algae and Fungi have been relieved of their ixmlentu whk4 have been removed to a spare room adjoining the garden office but even with

abinets provided apae. i. *Ml* *r|»tly required and th ^expedient
[illegible] icmorlil provides U» Uat chance of incorporating *Wto without
[illegible].

II. Botanical Divisions.—A very considerable amount of taxo-
[illegible] work especially on the flora of the Eastern portion of the Indian
Empire it dot for reooid. Mem. Craib, Geddes, Parkinson, Fischer
and Dandy h*•» nunvcow dewriptioiit ol *mm* or *nn* plants in various
contributions to *Xkt* Kew Bdletin and Mr. *Tukimaa** presence at Kew
has [illegible] Burmese plants
[illegible] Fischer has
had the very difficult genera *Hydnocarpus*, *Taraktogenos* and *Asteria-*
[illegible] under examination in connection with enquiries into the oil values
of their seeds. The affinities of these genera which have many obvious
points of resemblance, are recognised by the Burmese iar all thrw an
[illegible] ' Kalaw ' with or without qualifying suffix. A new part of Prof.
Craib's Flora Siamensis has appeared containing the families Connara-
ceae and Leguminosae.

Besides [illegible] rare plants from South India interest
[illegible] Journal
[illegible] Sandal
tree, [illegible] nomenclature
of Santalum and the aliad paak/«ta«w bada •* to • discussion of the
distribution of Santalum in ladia. Mr. Fischer seems to doubt whether
this important tree ' truly indigenous with us and bases this doubt on
the fact that [illegible] regular India in close
[illegible] to ««HiT«Uoa aad «• UM fact tkat aitboogk tk* taw ia wry hardy,
[illegible] repro-
duces readily by [illegible] ha. faBad - i - - » y hi [illegible] the
truly indigenous flora as the influence of man recedes. There can be no
doubt, however, that if non-indigenous the date of its arrival here is lost
in the distant past, and the sanctity of the tree to Indians and its use
in their religious rites also would point to its being no recent introduction
[illegible].

[illegible] ooatriUliaM to bouawal literature concerned with
[illegible] [illegible] [illegible] new
revision d Cayba Faafi and Blatter's
[illegible] asw anaaai Iroai the Hi(b Wavy awajajaajaa,
[illegible] production, however, appeared just after the above
[illegible] C. E, C. FiHaar't Fh» of the Madras Presidency,
[illegible] [illegible] Mr. Oaaahla'a work. The families Ulmaceae
[illegible] tha « a* Whxn the style of the earlier
[illegible]

The botanical results «i the recent effort on Mount [illegible]
represented *hu*, [illegible] Dunn' descriptions of several new high altitude

plants and Dr. Bru&Yi guide to the orcbidt of Sikkim will supply * long felt want to thote to whoai the variety and beauty of thete Himalayan plants ma^ a special appeal. The text is arranged on the fc»y tytttai to allow °f rapid aad eaty determination and the elimination of technical terms wffl make for the popularity of the work.

Dr. <*waa't analyw of the vegetation of Kafempong. being aa ecological account of the Poreat Division formerly under hit charge, will shortly ìne from the Prest. It wiU form an exoellent companion to his Trees of Northern Btapl, a iwritkm of tàt m̃* of tree., thrubt and climbers found in the DarjtafittJ ****** pabbthed by the late Mr. J. S. Gamble halfa century ago. The Mtive iiames, always a puule to those *»»«quaiated with the facility a Lepcha or Nepab collector hat in supplying t*ea* are *<xrtM\y* roDected aad will prove a help and en* couragement to amateur botanista amongrt the planting community of the district.

Father ****** in collaboration with Meavt. McOnn and 8abma continues fc» itedy of the Flora of the Indus Delta. Mtam. Burnt and Kulkarni have aa intereating paper on a line survey of gram land with reference mainly to rainfall between Birar and Louavla in the Bombay Presidency. Mr. R. N. Parker, I.FA, hat taken charge of the completion of the late Mr. Duthie's Flora of the Upper Ganfatio Plain and the issue of another part of this work is to be expected soon. The Indian Forest record contains aa article on the Himalayan tirrtr firs and spruces by the same author.

Father Blatter ... ***• a* the fint of what may he a two volume work of a syst T^vnmfBBtat of thr whole of the Kaahmir flrvweta and anot T ••*• «l Mr. B. 0. Oorentry'i wild iowm of Kashmir a j * •• t"*atti?t maBner the aatorhrome pietnrai of the com- Of ^ *— o«wrtiriil planu fowl m thk part of India.

Marte a f J i UlMlioil « * « ^ » *• afimanliim completion by Prat With ILL? ^^ * Aautic Pahat laft by the laU Signor Bmari dealing 4. ^^ AM volaaw of the Aaaafa the way m dear for tho of the "* *• Bltfkfll>t ^

deals ^ l i / 0-* * 1 ^ AaWtpaprf m thalawtart ol At yaar the ma

groups of pl T 1* will bring together in a way attaatyâtdl iar km Dioscoreas ... a knowledge resulting fitjmtlife long study of all the ... world excluding Africa and give geographic infor- of plants. ... never before been collected for any eastern genus the Cruciferae ... Monograph dealing with groups of ... in these reports ... have appeared since last taken note been made. ... For tW pwfaration of these, Indian material has examination ky »W Mtfen. Al available information concerning the Mosses of India and adjacent areas has been brought

together h Dr. CmU. The mamucnf* • ready *km* tie *Vnm* ami awaits i U turn mhcn landing work already in type iamat.

III. fil*"W*lfactioiL-^^c 400 apecgaaw f t'i collected for the 9**ltr y during the year under report. The coOectioo was made by the C j^*tor.*h*n he was on tour in Central India and the Bombay Presiden y' Host of the specimen* were oil nodi, industrial oik and medicinal ! * « • wUat tome were gumi and reain*.

The re- •nmnfement and overhauling of the tpaomea* in th* Gallery continued p!7 duht> « tb « 7*** •wi *bout 6,000 labek were rt-wntten, the descr of plaJIU btr>og m m*oy ^"^ supplcll>ftillc<i by co^vcd drawing A ^ ^ c h were prepared during the year.

Te ohibit of ciaoftoaa and ita producti explaining all the details of '»* manniactuTf of o>ntne and other §alti waa made ai the 7th Conf » « of the Far EaMcra AaMciation of Tropical Medkáne, which 1927. Jl? heM * tk « CalcutU School of Tropical Medicine in Deoaabtt here tt^^l fahl'blt Wlu ^ BM^ rompleU of iU kind ever nnt np interesting trouWe uit*n w*« <ully rewarded by the Urge nainber a| T^V*"tor» who apmt time ovrx it.

Regarding the inv«t4faucm of medicinal plant* and their prodm**, arrangements have ... mation available in the Library and files of this department.

Information regarding the sources of supply of Economic plants and their products was given to numerous correspondents tad a considerable *ofhi ^ 16, - i Ž ^ •** PUnt pwdw* » « • MmiM oo behalf of (feven- ^ j ... and the iiraeral public. Information on or material was supplied to various applicants in different parts of the world :—*Cannabis sativa*, *Canavalia ensiformis*, *Derris elliptica*, *Melia Azadirachta*, *Achras Sapota*, *Corchorus capsularis*, *Caesalpinia Bonducella*, *Crotalaria juncea*, *Eriodendron anfractuosum*, *Gossypium* sp., *Caesalpinia digyna*, *Smilax* sp., *Artemisia* sp., *Trichosanthes dioica*, *Datura* sp., *Hibiscus* sp., *Linum usitatissimum*, *Leycesteria formosa*, *Stipa* sp., *Datisca cannabina*, *Aeschynomene aspera*, *Carthamus tinctorius*, *Carica papaya*, *Cucumis sativus* and *Citrullus Colocynthis*.

The Curator gave a series of six popular public lectures illustrated by lantern slides during the autumn of 1927 on "Food and Medicinal Plants" in the Indian Museum. A similar lecture on some Indian Oil seeds was delivered by him in March 1928.

Arrangements are being made to print a Catalogue of the medicinal plants and their products exhibited in the public gallery. Most of the materials for a second catalogue of food, spice and fodder plants that are exhibited in the Gallery, have been drawn up and it is expected to be completed by next year.

The entertainment of ledgering clerks for the bringing together of literature on methods of cultivation, distribution and sources of supply

^ W*at« of mtdicimal importance, came to an end at the dose of the year ^ the wr.t*r's opinion work of this description in DO substitute for a *v •* the proper tense of the term, nor does it help much when the practical problem* of distribution of medicinal plants, the times and places »t which they can be exploited and qnnationi of the best methods of cult ivttion come to be settled. Such work, if to result in the development of the medicinal resources of India, call§ for the botanibt and chemist in ** fieW **** m ^ experimcllt ^*tio11 '<* tne wrvioet of the ^^ horticulturist. Whilst, therefore, the accumulated experience ^i **1 in literature Rains in being drawn together by the ledgering this work of iUelf doea nothing to forward the development of fJ^, Pj*nt resouroes. It is felt that in the entertainment of Utlgcring ^** ^* ^Qger of side tracting the real work which must I* done ^tent resources are to be developed as they can and should be.

IV. Gfochooa and *Qoinb*.-Bark* . During the year 307,059 lbs. of bark «re received from Java, of which 154.540 lbs. went to Bengal ;^2f18 lb* to Mmdn« .The Government of India's own pUntations Burma supplied 57,920 lbs. to Bengal, of which 43.261 lbs. wore harvested during the year. There was a small stork of 6,541 Iba, left in plantation stotrr as a carry over. This together with 462,770 lbs. Java 7** **] 19,979 lbs. Burma bark at Mungpoo gave a total carry over of 4*9,290 Iba. All cnitaide barks going to Madras were worked up there during the year. At Muafpoo 286,831 lbs. of India bark were worked up to yield 13,196-5 lbs. qmistftt sulphate and 4,169 lbs. Cinchona febrifuge and at Naduvattam 165,774 Iba. Java bark yielded 8,772 lbs. quinine sulphate and 3,078 Iba. Obohona febrifuge,

Products.—The total *Qowmmmt* of India stock of bought ami extracted products at the sad oi tfce year was (a) quinine sulphatr 361,495 lbs comprising 90,016 lbs. held at tke Indian Museum, 241,576 lbs. at M.. 1 7 ^ ^ ° ° *** ».9(M Iba. at NaduvatUm. awl (6) Oncaoaa febn fuge of which 8,912 Iba. w« held at Muagpoo and 8,824 Ibi. at Naduvattam.

Issues of qiunis* sulphate during the year amounted to 18,261 lbs. against 16,679 of the prevMNM faar. The increase is .due to aa tnitfat for Government of ladia stoek ia Madras which took *2fiM* lla. *fkm* issues were distributed *m* fallows :-Pmigab 12.164 lbs,, Uutod Provinces 1,900 lbs., Baluchistan 322 lbs., North West Frontier 250 lbs., Rajputana and Central India ... Kashmir 86 lbs., Delhi Province 2,M.^ Afwi *g————"— »—'— **n* turn,, ^avway "Oft^"* * » CiocfcoM D^rtMit lor distribution in their area this 7*+J*** *"*>** *Kim—mtUm* of febrifi 3,838 lbs. against 5,961 lbs. last. The reason far tkis fall is popularity of the cheaper drug is not clear. Combined stocks have mounted to 17,736 lbs., or sufficient for over a year's normal distribution.

As in t

** *• W^ PMt ** ***** Jaib Dn*^™* distributed febrifuge
11 *«toal !! "f" Th6W wai ^ d»tnbution of India owned febrifuge
R— ' ^ ^ m gaim; in uLit, fl demands.

J^ted^*the** * I1***.—The actual reoeipts during 1927-J8 A ^ W o i L 3,35,W ty the sale of 18/25! lbs. sulphate against demand froJ Madras on FTM— T«*r. The increase is doe to an abnormal Rs. 98,089 were by cash • ^ ^ t of sl»rt stoA t h » Of Che receipts Departments including payments "^ "^ ^ 1 ^-°» kyy« d * *° OovenMent ment Departments by Bank drafts in the case of GOTO*. include the proceeds of "" ** United Piofineea. The rerenue does not the Local Governments Cinchona febrifuge sold by of extraction of products from I These •" •dJn^J kj 4tJs*lion from the cost ments. During 1927-M •• Ind» iebriluge was sold by other Governments but a balance . Governfrom the 1926-27 a. 18,030 remained for credit to Central revenues Rs. 3,53,156. •ooo«nt bringing the total proceeds for the year to

Plantations.—^ ••••• nfasimislM Tiew was taken of these early in th prov facts and figures could be fully gone into these cause for hope and further effort rather than m m far despondency and a closing down of . Success in this area will for certain depend on the suitability of the season and especially on the distribution of rainfall and it was, perhaps, hasty to j«lg. tfce possibilities of the area as a whole from one suffered from a shortage of labour oombiaed witk •afavoanble weatWr *earn*-ditions.

Experimental work has now reached a stage when one can speak more freely. The Mergui reserve will never in the writer's opinion be free of difficulty for the Cinchona planter. Large harvests such as one gets from the Java plantations will never be reaped from it. The problems of cultivation here are quite different from what they are in Java and equally different from what they are in Bengal, but there are many areas in the Bengal plantations that have continued and paid under a poorer crop of Cinchona that is the average crop in Mergui. On a basis of comparison with an area in which Cinchona cultivation has won through to success the Mergui reserve cannot be closed down. The greatest difficulty lies in bringing the plants through the dry season of November to February, but normally a small amount of precipitation occurs in the last week of the year and given this, the planters anxiety is largely allayed.

Shade planting, thorough cultivation and surface drains for the excess rainfall of the monsoon period takes Cinchona very successfully into the dry period, and the problem has resolved itself into one of finding the best means to retain the moisture ftfed hssp ths sjnM OBBI W

catch crop in the first months of the year. In Ifergui the rotation: period will be shorter than it is in any of the Indian or Java areas, but even at early agei am esftMsaly encouraging factor is the high percentage quinine content t4«a«sr1. When one gate bark of an average of over € ~** *U., aa recant analyssa show the Nergui bark to be, every endea- ^* ahouJd bo mods to ovejoome the ramaming difficulties to the suo- **Jul r ^ ^ w ^ ^ UBdtr H, JUsseil'f competent manage- *** th. dnlealtaes of the inonsoon period may be said to be already successfully mat and if the cnrafnl aypismiun of knowledge gained by experiment, scaralinu ploalmg nnd mdartrr will solve or lessen the remaining dMasitmt then Csmmomi m in safe keeping. But it is not wise to R * * " f t * » ei this mspiliiiB, and importance to the vagaries , * ^ * * - Prudence dictates that the risk should be divided. An area " 5PP W Barmm wl c n *** •^nT obvious factofs to recommend it to the Cinchmu planter awaits a stable policy on the part of Government and should be relieving hWgmi of its sole responsibility for future India bark supplies.

Difficulties in the cultivation of this exotic will be present wherever one tries * b* this si the better reason why sltampts shrwH now be made to find **d ptore now areas. Th-s *in* the essssjee of the advioe given by the Royal Commission on Agriculture. It is advioe based on the evi- dence °* T ^^ y in h r l men who have had much to do with Cinchona in its earlier history and no one, who now has to carry on the work begun by these pioneers, and has knowle4fs of the seonrfi Malaria » in this country •ad of the need lor an ample and snrtamsd supply of the means to combat it, doabts the sonndnem of the Commission'• advioe.

V. Financial.—The total Bndfst aBoimsnt for the year waa Rs. 5,48,000 of which Ra. 66,000 (isMfadmf Ra. 1,000 for Kngliah ohaifm) were for the Botanical Savvey proper and the Industrial 8oation of the Indian Museum and Ra. 89,500 for Qndsima. Ra. 2,20,000 wejo provided for the pwthase of Cinchona bark from Java. The total iff snili- ture was Rs. 4,48,615, tit., Botanical Ssjrvwj *fHfm* Ra. 53,IU and Cinchona Rs. *IMjm* lamvmj a saving of Ra. *HJM*. Of this saving a surrender of Rs. 90,000 could not be accepted owing to late notification. The saving fell under purchase of bark Rs. 29,820, cost of extraction of Quinine Rs. 45,104, Plantation and other charges Rs. 11,467, Assistant Superintendent's P*T RA. 0J42 and T. A. and other Miscellaneous heads Rs. 7,347.

VI. Staff.—**. C. C. CnUsr retoned *irxm* leave on Slat November, 1927, and resumed charge as Director. During his absence Dr. J. M. Cowan, M.A., D.Sc., officiated as Director from 1st April torn November 1927. •» ·«. M. Bei, HJfc.. PkC, was Cwalor of the Industrial Section, Indian Museum, throughout the year. Mr. T. Norn- Yunnavami, M.A., First Systematic Assistant, returned from leave on

2nd November 1927. Mr. T. D. Uririv—. MA·· was appointed as Second Systematic Assistant from 1* November 1927. Mr. U. C. Pal, was AMHUM C««U», IadMlni tate, I»di" Museum, throu j out *• X*r Md beU cWp «l «• O^mwnt of 1-di. £>•••*"•: * *• ladíu MuKum eioept for two mouth* ia Deeembw IWI t^ »»«u>ry DfcM wtMaMrfLK. DM. HMKJ Clerk, acted fcr liim. Mr.8.B. ^ «j > «e««l M U«MI Oerk during th- ponod. ^ . .

Ja t U Gncbo« I W *« ·M^ Mr P. T. R " - * ^ J j W ' as Sr PWMteiident, CfaahMMOdtivatioa. Bun». tfcroogfcoot yeiie. The I** of U>« AauUnt fapmnUndent remaned v«c«t throughout the >«». Mwng 8iM WM *Ortmm* tfcw^mt tie ye«.

All the members of the staff worked satisfactor y.

C C. CALDER,

Director, Botanical Survey o/ India.

Report of the Botanical Survey of India for 1928-29.

I. Systematic.—More settled conditions so far as staff and finances are concerned have requital in considerable progress being made at Head* quarters and the collection* in several directions have been improved and added to. Two member* of the staff were on out survey work, and both at gardens ami in the Museum the collections have been enriched by the results of their labour* in the field.

Mr. Jh^u*y*naswami ha* added to the collections from North Travancore °y • tairly extcmuve tour in the district north of the Kallar River. The tour was somewhat marred by difficult weather conditions and the exact direwion p**vioualy mapped out could not on this acconnt be strictly adhered to . Part of the route Uy within country already re-M| ^^ *hJ* collection* ,n the Herbarium, but part was new, and in rich ^•'•ywuuwami ha* brought back in a well prese/red state with haw^ llolei * collection of nome thousand specimens. 8ome of thea« were sent to K*w m conoertion with work on the Flora of Madras at present under preparation there.

Mr. Srinivasan, Second A**»Unt, worked at Headquarters throu^ii-out the year except for some field work in tne neighbourhood of Madras during short periods of leave. At Headquarters he has bian engaged in the examination of his Oaro Hsll ooMectiHSM aSW in a study of the aims and methods ** eoolofiral resaonV At opportunity for field work lines of research for P^poaed to allow the different asaistanU to specialise in which tb^y show aptitude and inclination, and Mr. Srinivasan has •ptot part of the year befitting himself by study for the branch of botanical r**-arch—Reoloftjr-that ^ wt*h<* ultimately to pursue. As the groundwork of Ikii tt«dy is beat uud in a jreneral study of systematic botany. Mr. flnnivaaan has spent part of the year going over the herbarium collections *in* ptvparat^m and tniissf for the more necessary field work tkftt ha« *to* folio*. He haa also had under examination the specim» ^ o p U s « i n Garo Hills, a district selected for his work ^cMsit Mitvid •• *tunmh* ^>t4rms of interest for the ecologist.* ^ **** *+m*i* wHkii «omj*ratively easy reach of Headquarters.

The Curator of the Herbarium, Mr. K. P. Bowne, in addition to his normal routine work, has taken for immediate study the distributions of the wild Conifers in the Indian Empire, and has been called upon to examine and report on the Calcutta water filter works Tins rtwiha *km*

the work Mr. Bamae haa done oa the Algae of this part of the worid. His exa O o ^ ⁰ * * " of the Fnahwater Algae of Manipnr, A M * and of ; * * • Uke fumkh auterieJ for two further fortheoninf papen.

W* **MltoaJ DtfWom-A oonaidenble amoont of Uxonomic bl *°«t7 7 in *eomutim* with the Flora of Bum* and Penimaukr K * doe for recen L PtoL Cbib ootiooee hie rantribvtaone to the Flora of Siam with doacriptiooa of aa iinuuallj laige number of MW species found amongst the oollocti ona of Dr. Km. Ffcom vario us parts of Burma Mr. Fischer has described, amongst others, two new species of Hydnocarpus, the outcome, possibly, of his examination of the genus as a source of an important medicinal oil. New species of *Cissus* and *Dracontomelum* are now known from the Tenasserim basin and Mr. Parkinson hat an aapmW daniptton of a hitherto imperfectly known Bamboo, ^MdMOfia (Manny, fint brought to knowledge in Mr. Gamble's ' Q> »oograph of the group in the Annah) of the Garden. The material (or this kat hai bwn collect*! in the Dawna HiDa, Tmiitin and in other parti of Burma. Prom Mr. Parkinton'e ooUeodona from the same area nae been found a new Legume, *Gymnocladus Burmanicus*, of which a complete deeeription haa beat fttva in a running la* of eon-tributions to the Flora of thie part of the lapire.

The Lushai Ri" ana, a eeat of mkHoaary efort, haa iaand regular collectors in the R" W. J. L Wenger aad Ma Pany aad the fra»o(their interest is •videot in the deacriptioa far the lest taw of new or rare plants amongst which wr find a new *Omrtmrm* and *Begonia* bearing the name of the country of their origin, and new *Strobilanthes*, *Didymocarpus* and *Mussaenda* named in honour of their collectors.

An examination of the Asiatic material of Gentianaceae by Marquand has resulted in the description of quite a number of new Gentians hailing from India borders. The explorations hi Tunan, Szechuan, Tibet and Burma of Messrs. Fernet and Kingdon WaaJ have been responsible for most of these alpine additions.

From Peninsular India Mr. C. I. C. Fischer has a new orchid collected by Blatter and Italberg in the H«h Wavy mountains and a new aroid *Pothos ornatus* from amongst Barber's Malabar collections.

A continuation **^* 1— * Madtaa, Part VIII by «a* same author, dealing with the ** O *U* Irridata» belongs to the period under review although referred t year's report.

Mr G. O. Allen in Charophyte notes from Saharanpur, published in the Journal of the Indian Botanical Society, records his further observations on this little worked group of plants, and several other original papers in the same Journal prove a growing and industrious school of Indian workers doing good work in many diflmt branches of Indian botany.

A continuation of Bktter, 8abn» and McGuins Flora of the Indus Delta, parts 5 and 6, leads to an interesting comparison of the vegetation of this delta with that of the Sundribuns. An examination of the composition of the ind^uous floras of the two areas bean the interesting conclusion that tWe » little tronnd for the hitherto accepted belief that the Eastern deha far surpasses the weatern in the richness of its flora. The authors ** •»•• wuaon *tor* assuming that, when better known, the Flora of the Indus Deka will prove numerically richer than that of the Sundribuns. One W01|U have thought that the Sundribuns area, the damping ground of sp^ •brought from such different regions as the Oangetao plain and the Eastern Himalaya Chinese Burma divide must surpass in richness the boUnicaUT isolate! Indus Delu. The authors can only find an explanation * i*lliTM Hundribunt poverty in the belief that the soil and water conditions of the Ganges mouth have not be*n favourable to immigrants, but ii teems possible that the geographical limits put to tho two regions oUJ ^uire revision and a different ooaparisoc might result from a fr*fr '>ti»T>rrution of what area botaoioally oonftitutes the Indus Delta, wi iat ^ ^indntuns. A oomparia0D of such anas in respect of the richness *oi* ^1T flon* would seem to postulate a complex of climatic and edaphic likes in the two. To secure these likes one or other area may »«quijv ultinutely to be enlarge*! or reduced. NeTertheless, the paper it full of rich material and will suggest to the interested Ecologist other problems and lines of similar work.

Local F

Beautiful F£? U?e *wt**oo*v** wl useful additions in Father Blatter't ...wati o, *Kuhmil* •*• * Coventry s'samd sew's af attractive autochrome Pictuw» of iU wdd flowers. It if to be kopad that the expense of this last ^ DOt bring ite production to a premature close and that amongst India's wealthy patn>iis of the arte and saeooas nay bo found someone with ^ ***** •*od* «iU to help and sumasat •ppma. tion of the artistic work liii ^ah d •rvintifir to tee that such useful and beautiful • suitable object for rapport.

III. *

* *MlMi4aI

...ted by the Curatattoo.—More than NW spocuaens have bees ... and of .. lofdimn «** kmrilk the Pun|ab and tho Kaaha&ir til ^«eoj ^ "** ^ HIIMIII Have bts* rapslemJ for exhibit- ... ^ sed ear 0* this holecttou. ths mott lnpofUnt are •pecuaeos of Match manufacture *** WOT\MI Papier-mache work and a f uD exhibit Populus nigra and from the indigenous woods of Bombax m ... aricum, the raw material and Pinus excelsa showing all itAgat at *mambtfim* (mm collections were *° •*• finished splint* an.1 match Uxes The. othat baskets, etc** •• w^T^^*1 W^iacto in ths ahap of oikeeds and oth*r bills, and %a^L *m* •*»* ***** «l mdt dmgt of the Kashmir the plants. ... of BoUnkalsi specimens of medicinal and other econo-

V* ^-arrangement and the over hauling of specimen* continued during the year and about 6,()00 Ubt*l» were re-writtcn. Aa usual a number of herbarium »j*cunens exhibited in the Gallery were replaced by coloured dravringM of plauU prepared during the year. A new show* case has l^en added to the Gallery to take in the more important Industrial ^« exhibit. A oomprf henaivf exhibit of Cinchona and ita producU Jwining all the details of Uie manufacture of quinine and other salta at ... to the Ross Experimental station lor Malana Survey at Karnal. Another set of exhibit* of Cinchona and *its* products waa placed <* view to the Public in the Health Welfare Exhibition held in Calcutta in March 1929. A number of tpecimena of medininal and industrial value were presented to the Bengal Allen Medical College and to the Registrar', Calcutta University, for their Commerce Department Museum.

Information regarding the sources of nupply of Economic plants and their products was given to numerous i.....*m\mmlmU* both from India and -b "ofe'in*"*' "^ * """i^'rable number of pkn» aad plant products public *|tinVd on khalf of Govemment DepartmenU and the general various Information on or material of the following was sappbed to 'Pplicants in different parts of the worifl :-

*Ephedra vulgaris, Samtalum album, Amnm Cdmmu, Dolixrpa Sissoo\ Denis rp., Canca Paf*m\% Datum* CSSMS***, Pssb-*phyllum Smodi, TtrrmumaUo CkthJm, CUmmplm Hmfimin, Hydnocar Vm <mtktitmimhcm$, TmmbfmtH Kwnm\ Nation lachys Jalatmammi* J^MM fmsilii GssssMtf *sp., Acacia Catechu, Aristolochia* #p., *MiUm/kmia hortensis, Withania somnifera, Swietenia Mahagoni, 11* paraguayensis, Boehmeria nivea, Psychotria Ipecacuanha, At ... heterophyllum, Papaver somniferum, Holarrhena* *wWKf9&aW9Kt&rWKm9 u^^mi^m purpurea, Myristica sp., ... AUwriUs* /snlU, *Uwmnm vulgare.*

^ The cata' M ^Wd *j!T*.* * **• nvtfirinal plants already in manuscript is to ... the materials for a catalogue of Pood. Spioe and Fodder plants are almost ready. Matoriak for a caUlofrttc of *Tmhm* pknts exhibited in the Gallery are being drawn up.

IV. Cinchona and Quinine. – *Bark* Dunng the yw 114.57! lbs. of bark were received from Java of which 118,99? lbs. were sent to the Bengal Factory at Mungpoo and 96.673 lbs. to Ik Madras Factory at Naduvattam. Tk* (hmit ... of India's owa Plantation m the Mergui District, Burma, had during the the ysar i a stock of 116,129 lbs. of bark ... over. From 7k Wblcfc IO9.M0 IU werr harvsstsd ansj #341 lbs, carried leaving a balance of ... stock 82,464 lha wstr smrttotl the Bengal Factory At Mungpoo Factory 33,063 lbs. m the Hmstisi store as a carry over. <*t of tW ta^ai sterk of tN J9t *Vmx* * India

lbs. of which 581,768 lbs. wm Javm and 102,441 Iba. Bun*. 140,277 Iba. (58,916 lbt. Java and 81,961 Iba. Burma) were worked leaving a balance of 543,932 lbt. at t carry ovct. At Xaduvatum Factory out ,J?'573 tbt. Java bark received during the year 78,506 lbt. were ... leaving a balance of 17,067 lbt. at A carry over. Thus at the ... tke tot*l sto< ^ °f I"*'** government bark amounted 17,067 ... lbt, comprising Java bark held at Munjrpoo 522.852 lbs. and lbs. at Naduvatura and Burma bark held at Mungpoo 21.1*0 lbs. and *t the Xergui plantation 33,665 lbt. At Mungpoo Factory 8,417·5 lbt. of Quinine Sulphate and 3,130 Iba.of Chnchona Febrifuge powder were obtained from 14O/J77 lhs. of India bark. At Nmluvattam Factory 5,048 lbt. of Quinine Sulphate and 1,35ft It*, of Cinchona Febrifuge were obtained from 7K,5u6 lbn. ol richer India bark.

Stock of Quinine. - The toul Government of India rtock of Quinine Sulphate purchased as such and extiarted from Java tntl Burmt Uric at the close of the year wnn (a) Quinine Sulphtte 339.H26 lbs rompriMng 82,123 lbs. held at Indian Museum, 242.111 H>*. »t Mungpooand 1\.V.2 lbs. at Naduvattam and (6) (inohona Febrifuge 22,216 Its. htkl 12,042 ** «ongpoo and 10,174 lbs. at Naduvttrsm.

Sale of Quinine. - During the year 32.134 lbs. of Quinine Sulphnto were ... due to ... 18,251 lbs ... the ... The ... India stock ... Mailra, Cim-hona Deptrtment Uking over 19,360 lbt. from *t Xaciuvattam for distribution in their own am. Kxcluding the stocks sold to Madras the otMOsption in Che India area come* to 12,775 lbs. during the /ear afainot 15,751 lbt. during the previous y«tr showing a decrease of 2,976 lbs. This decrease is msinly tttnluu)^ to a smaller ... in the Punjab which was 9,367 Iba. against 12,164 lbs. previously. The shares of the provinces and the Indian States in the distribution were Punjab 9,367 lbs. United Provinces 1.792 lbs. Baluchistan 326 lbs., North West frontier Provmet 274 lbt., RajpuUm and Central India ... N*. Kathmir 44 Iba., Whi Prannot 125 lbt. and Madras Cinchona Department 19,360 lbt.

During the ... Febnfuge powder were distributed ... lbt. in the prtvioiM year. The ... Department's stock ... Bengal as they had ... No stock of ladk Fobrtftfe was Ukeu ovtr by ... distribution. sufficient •took of thk product of their own (or

Revenue ... Ba. ... IMMi th# aetaaJ nosspu ... against Rs. 1,36,1... 'V •W Mb of M,1M Ib. of QnmiM MpkaU ... demand from M... one year. The increase is due to an abnormal ... took over 19,360 lbs. from the ... As stated above Madras Oockmt IVpan... bdit OOVWMOM'I tlook ot their

'^fofdirfribationm their own area ari paid in part Rs. I*MW ^•odtkt balance Rt IJI^IO remained payable » »«^°- 01 7* *<*ipa Ra. 2,38,503 were by cash ».*• and R*. U7.M1 by credit 10 Uoverwuent Departmeata inducting paymeiitt by Bank Drafta in the ** * Government Department* in the Uniud h ^ i m &«»• the T«v there wu no uic of the India Febrifuge «tber by the Government of Ben^ml or the Oovmment of Mftdm.

F^^«i«M.- A y«tff fteady pronwM in «l*rin>«t in the nursery and fi^W markf mtiii definite iUtr* retched in our knowledge of Cinchona under South Burma condition*. TV mo* important rauit achieved » • knowled|fr of what Cinchona already free of dtteate will withstand m the WIT of advene weather condition!. The end of the year saw * *<*f period of rainlea weather during which, bttie by little, a large rnZ•** <* *" P**»t reached alao* leaflW coalition. In order to out«**iat the riA of cellar diieaie, AaOow plttta* had bee« carried of * b * « *. Md Ike toriaee mtinf combined with the long abaence man"J^ threw M mmu n7 heary ttraiB 'm the parched plant*. That L <* thorn *k*m^— i.^-^ :KMU liiiiiinh va« to he fipected, but that a whole area of Cinchona should meet tail ad?ene condition successfully by leaf UL\'m fomethiiig entirely new in th» cultivation of Q*nu*'* n«t to the pUnUtMW coindoVd with the tenninatioB tmn tl^0,1 o* drought. Within a week of rain falling a tranaforma thi» u!!^f*q<ured ^ be teen to be believed had taken place, and from a picture ngbt to the end of the rainiin October Cinchona rtood oat nide «n< healthy vegetative growth. Tht mck proloagfd cultivation of drought ihouid'be eipem-wd at afl ii di-twbing. There ^ for thi. area nor for cootiguooi ami of anUhuf like iu ^ « ^*n ceruinly he looked «pon at ahMMl, brt the record h.^* ^^ing mfearfally throagk it and mAmf mA phaifn-certain / j ^ n o« wtt^r hnnf re tappbed ihoin how thif crop can in delicate ^•tion. b^fc j) lhe r^poutwn it hai famed at aa attic, Since / ^ 4«mlt tonv.

since the 2hiT»t»o of the nd hark ^tecim vat abandoned, and shallow tions in t^ ^^^lan tad aa amnlt dramaae havt formed haaii <considera- Cinchona ... system of cultivation, much progress has been made with Cinchona in Mergui.

The finding and propagation of a robust Hybrid already gives promise of greater success and suitable shade crops both far Und to keep it ml and for Cinchona to shield it from the direct tern•*«h» " * « W bound and their fullest utility proved by experiment and exploited.

The advantages of fairly steep slopes with a northerly ... gently sloping or south facing hill sides have the last two years' work, and hen

repeated loose rung of thr *muimt** aoil ´• an iadjfpen*sble operatm far success. These site Uctori mdioafte that at planting exteoda 8outh-eastward to the highe relevuiocifof (hemerve.we mty expert to ftac* conditions **"* kvourahle. ** Cinchona. But the mu loawa of the whole area * aAft?a<iv P*«>'«d . It will grow Cinchona and miy grow it at some pro^t luid|lf proaent conditions of world *pnom* Imt it will never be a first class *^ for the purpoee. Much is oertaia to depend on the. fortune of to*aoiu. *nd wbile we can reasonably expect lo have further gains by l* * kU l * ^^vatMW lioth in reapvct of the operations ami the times of carryin* th^m o«t, and |raim» frum the aorlimitizing of the different species, wr muj* weogniar the error of fix'a« lo OM i m m aad of making the wkolp Government *oi* Imha effort drpewualoB the nmmrie* of the South ,lllniu Minute. *Mcrjfui* ran take. and. until better arvat are proved, oIU*t <xmtinuo N) **ke it« part in a unifted arhen^ for an all India supply. lnl ce ^ u impoajiUe to maintain a npplr without the bark now standing the rpf ^ut tfcrrr ^^ mu,iv atller ArrM wllrlv ^^ experimental culti should be going on v*^«>n in a umill way and to give proof of auitabilitj sibility it aboukl wiUl • view to rvlirviajc the Uergai area of a *tmptm-* cannot be over- 0Ot ^^ to bl*f ak>O€l · Advioe to prove other ar.ai The difficulties of an m* assured. The diffirultir* of production arc aoluble. of co-operation in India's *«lniinUtrativr and finanrul kind doe to the atiffne* production up. Failure pree-nt unatable political aUle, aho«id not hold reason is good enough •» quinine pfodocibn it imMenaihke. *So* bank of India's future to e s n > ^ the ww of a blank cheque now on the hold it remains advisable health. In a«it of Uff|r rea* n« of quinine now seem suitable. **> rxpenm *nt and prove wherever th* conditioni may for the present be felt by reason of the lm v l « ^ « «-l W * i . the altogether exorbitant ftwt of i»o« •*tnckB* caMoi be *tor#***«. Ker should it be forgotten tJlat m <«'-*l'«i^ attack even of a moeVma* awl financially restricted ktTV< IPMiiit maUna >onU r^uk in depletion of the reserve within a period short h fMpahM with the tim* required to develop home production. The failure for 2 years of the planting programme on one of the Bengal plantations, and the as-yet-unproved value of the Anamalai area opened out, ist now and very markedly to the folly of relaxing effort elsewhere. >Ur are piialiti l^fcrnn h Mhet directions. The competition •* othfr ciwpi for Java CmHiwi laad aM the continued control of prices and world production are forte thai *mm* Government with any degree of responsibility however remote far tha health of over 300 millions of a malaria stricken population can afford to disregard. And there is the greater value in repairing them that planting pays and that suitable areas undoubtedly exist awaiting the scientific experiment and proof that Government alone can afford to undertake.

S* ecnea of aaaJyak of Buna bark auapkt enowi thai we uuy * *** al apod quality at an eady aje. Maturity it reached at an **» in thcee eooditkm* than in the Bengal or Sooth India plaata- * • • tet to ultamate form modi quioker and it atene not unlikely Kw £ * • • • J be aoaae eeaaanal Tanauioii in qujnine eonteat CoDeo- ^i_^ Malytii diffiering af to tone, age, fpedm and part of plant are » j y > « M ngularly let the purpoae ol fchiimuiiiiH *• beat ataaana lor cropping.

The results of a year's tolid work and of all the r«e« th^ Ktre prwed- el it in this effort seem for the moment in danger of goinf kat thiooaji failure to overcome the financial and other difficahaee aajodated with consumption of the drug, and it can only be hoped that the forthcoming examination of responsibilities for all India quinine will lead to a more settled and liberal quinine policy, and that ^ uMane nuy be found eatie- factory to the large interests of pubfie health no lam than to the Inandal interests of different Governments ifc. ItbtB«e,parhant.tocana kaH and reflect whither all this leads. We eeam to hava aired away from the spirit of the effort of three quarters of a century ago when the object was "a cheap and plentiful supply of febrifuge to the poor" and perhaps it cannot do harm here to IMII the odgiMi yihrifciipifl «hj«» «pea- sible for the Cinchona efcrt. Tk pstant facto bwwn to al vlie-ve experience are that the poor euoot *flord tk df* * *• ptoa Mbd, and that Charitable dispensaries kiw to ton tfc« ikm«ncfa« >w»y empty or with doors inadequate to their needs. There can be no worse advertisement for quinine, *mi* em. its f M M to *m*m* m «b to allay the fever that Government quinine is blame ---

V. Financial.—The total budget allotment tor th» |Mr «M Rs. 4,80,000 of which Rs. 61,100 was ___ every proper including the Industrial Section, bdka M—«, w4 R*. 4.18,900 for Cinchona. The actual expenditure WM Ha. M.917 (or Bifiw.l SUTCJ Proper and Rs. 3,46,844 for Cinchona, that is, a totol «l It 4,OS,7«1. The total saving accrued was Rs. 76,220. Out of this saving Rs. 68,000 was surrendered to Government leaving a net saving of Rs. 8,239. TV surrender was distributed as follows : (i) from Botanical Survey proper Rs. 1,700 under Pay of Establishment and (ii) from Cinchona Rs 66,300, viz., Rs. 60,000 under Purchase of Cinchona tojk Mi to. «^00 unkr Fay and Allowances of Establishment Non-voted. *fm* net -Tin«.tu. Rs. 8,239, fell under Botanical Survey proper Rs. 1,900 and under Cinchona Rs. 6,339 and was distributed under several items.

VI. Staff.—The writer held charge as Director throughout the year. Rr. S. N. Bal, M.Sc., Ph.C., was Curator of the Industrial Section, Indian Museum, Calcutta.

^•» (yMiaMtie i^to«li Awllfc** tfc» rao.

Mr. U. C. Pal was Assistant Curator of the Indwwud Section. Indkn Museum, and held charge of the Government of India Quinine Store in the Indian Museum throughout the year, and of distributions therefrom.

On the Cinchona Plantation, Margui, Mr. P. T. Russell held charge as Superintendent. He was without assistance throughout the year and has more than lived up to his reputation for able management and trustworthiness. The difficulty and value of his work and the degree of success he has obtained are well known to Government.

All the other members and the Clerical establishment have worked satisfactorily.

C. C. CALDKR,

Director, Botanical Survey of India.

Report of the Botanical Survey of India for 1929-30.

1. Systematic.— The endeavours made to revive the field activities of the Botanical Survey, so loaf kept in abeyance through lack of funds and staff, have been vigorously continued during the year and the seepe of field work now extends from the borders of India on the North-We*t and North-East to the extreme limit* of Burma in the South-Bast and into the *rthenn<*t I«inU of the Peninsula itself.

The * * again a rapidly accumulating mass of collections at headquarters piling op fajtar than the officers can digest it but from which new and interesting finds ate steadily being extracted and added to the already incorporated records.

Mr. Narayanaswami, until June Mill Senior Assistant on the systematic side, continued *ork on his materials from the South of the Pefjmmla. Several hundreds of records resulted but the immediate examination of much of his material has been interrupted by transfer of service. It is, however, hoped that hie association with the lx>Uny of this part of India will not be lost to the Survey and that the cessation of work on these South Indian collections is onJy temporary. He has taken with him to his new sphere of activity a set of hit own plants and as he is nww within easier reach of his areas. South India svvey work may yet, H is hoped, profit by his past experience in this leU.

Mr. Srinivasan, *ow Senior Assistant, has spent only part of the year at survey work proper, as during the abeesm of Mr. BeJ em fern his services were required ui the Imdwtnal Bectsoa si the ladiaa MSBBSJBJL But he has continued his work ott the Garo Hill pknto and the following remarks from a preliminatfy n«4e OSJ the vagsUtisn of the area is indicative of the type of »ork done.

"Collections were made spreading over an aKitodinal range of from about 800 to 4,000 ft. The general vegetatioa is A mixture of the deciduous and evergreen types. At elevations of about 3,000 ft. various deciduous *pcil; Quercus, ... «esoeiated with such tr««s M ... Generally ... el the hsjhet altitudes. ... up to about 4,009 is. Bambusa and Ageratum conyzoides ... an undergrowth, while pure formations ef Phragmites occur in wet situations. ... among shrubs in frequent evidence aheejt this elevmtiem, •>, up to about 2,000 ft. are species of Randia, Canthium, Clerodendron, Daedalacanthus, Phlogacanthus, Ardisia, Brantheman and Acanthus. Strag-

t

ging over these and tfher «nall trees of species of *Callicarpa*, *Linociera*, *Litsea*, are to be found a large variety of creeping and climbing shrubs, such as *Elaeagnus*, *Dalbergia*, *Holmskioldia*, *Dioscorea*, *Smilax*, *Stemona*, *Hedyotis*, *Combretum* and *Entada*, while various herbs spread on the floor of the jungle. Of these the most common are species of *Polygonum*, *Blumea*, *Bidens*, *Phaylopsis*, *Boenninghausenia*, *Lepidagathis*, *Scoparia* and *Tragia* with grasses and *Cyperaceae*. Trees in this zone are represented by species of *Albizzia*, *Gmelina*, *Grewia*, *Sterculia*, *Trewia*, *Shorea*, *Dysoxylum*, *Amoora*, *Bombax*, *Alstonia*, *Acacia*, *Beilschmiedia*, *Aporosa*, *Litsea*, *Excoecaria*, *Wrightia*, *Aglaia*, *Cedrela*, *Glochidion*, *Turpinia*, *Phyllanthus* and *Vitex*, associations which show close relationship with pure Eastern Himalayan tjrpea.

At higher elevations the vegetation is closer and more luxuriant and several large trees of species of *Mesua*, *Pygeum*, *Schima*, *Gynocardia*, *Myristica*, *Quercus*, *Hydnocarpus*, *Aesculus*, *etc.*, occur in association with *Litsea*, *Diospyros*, *Lygostrum*, *Garcinia*, *Villebrunea*, etc.

A net work of lianes in which are prominent *Entada*, *Artabotrys* and *Buettneria* spp. is often seen hanging in large loops and coils from *Nephelium* and TtWr taller trees.

Among the genera of herbs and shruby undergrowth commonly met with in these higher elevations are *Strobilanthes*, *Artemisia*, *Polygonum*, *Leea*, *Linociera*, *Elatostemon*, *Laportea*, *Maries*, *Sonchus*, *Crepis*, *Adenostema*, *Ophiorrhiza*, *Achyrospermum*, *Plectranthus*, *Gomphostemma*, *Gnaphalium* and *Chloranthus*.

Limacia, *Dearingia*, *Beaumontia* and *Uvaria* represent climbers while epiphytes like *Agapetes*, *Coelogyne*, *Peperomia* also occur. *Raphidophora* and *Pothos* abound while *Piper* is seen clothing many tree trunks. Several mud banks on these higher elevations show associations of *Curculigo*, *Ophiopogon* tad f[illegible].

Of parasites *Loranthus*, thoug[illegible] e higher elevations, is much in evidence while species of *Balanophora* •eev on *Buettneria*. A transition, though not very marked, from the open dec[illegible]hfVllafSJifl the lower to the closer evergreen vegetation of the higher altitudes noticeable."

Mr. Biswas, Curator of the Herbarium, was on tour in the Bombay Presidency early in the year, and towards its close started work for a survey of the South Burma Cinchona reserve area. Collections have accrued from this area for several years but it is proposed to systematise the collections and survey [illegible] lude representing all seasons of [illegible] flora of the Malay Penins[illegible] ions to Botanical knowledge w[illegible] there tium and the work on his collections that Prof. Craib has un ertaken,

make it ^erif»bh that work on the Flora of Southern Burma and parti- ... m area be brought into line. That it will repay the lid tfu° ^P61**** "• «•*•» and t*e proximity of Cinchona camp ... ivy iun«le **•* Cinchona *ork« entail ... ce to the collector that is absent in heavy jungle conditions, a chance that is not to be lost.

From h* fil* •D°rt tour Mr. Biswas has returned with some 2,000 specimens **** t**WC **"*" Dow ,nMB **"• •**• *n Accumulating mans of material t^d y to yield iu boUnical tramre to the systematist and itn ecological uu«rau as Uie idd ... ulimu and photograiihk work progress.

In all barium d ^ W6C0 B»ouo **& •»ww specimetui were received in the her- were lift. Uni1^ ^ ,lear< ^rom*Dfnt amongst accessions fiom ouUidc and ^ ^ W°B prawned specimens from the ttwtHlwh 8tate Museum ... u ^4t*00*1 "usettm> Washington, and a set of namad gwrnu from Prof. Hitchcock of the Hmithsonian Institute, WashingtOB.

The chief distribution, so far as number of plants goes, was a iti of 927 Eastern Himalayan, Chittagong ami Madras du|»lK ates *to* the Depart- ment of Tropical Forest Botany, University of Oxford. Many specimens have been on loan. The *Juncaceae* have been to Stockholm, the ... to Berlin and tile Houthern India *Cfpcractw* to Kew in con- nection with the Flora of Madras. These will be followed st an early date by the *Gramineae*. To Kew also by way of loan in the first instance but possibly for permanent incorporation with Uie African col lections there, has gone a set of forth Afriota pkaU collected by l>r. Roxburgh early last century. The collection is of historical interest and it more appropriately housed at Kew with other African collections than a* Saharanpur.

Mr. Badhwar, the newly •ppotnted Hercwl Assistant, hsj heeti mostly engaged in gaining acquaiBUM» with the coiisctMM at headquarters and in local collection, out in addition to wttfatj ip his mass material previously gathered in the North-West, he has started the systematic collection of the grasses and is to specialise in this *™p- Bos* alter the close of the year he was deputed to examine the qnerfion of 8sntafo bearing *Artemisias* in the North-West and will be almost fully engaged in this work for a year at least. The problem is one of considerable economic interest at present. The young industry is developing but difficult botanical and biochemical problems have arisen to hinder its growth, and it was imperative that an officer with knowledge of the area and with technical experience should be on the spot to watch the yearly fluctuations in Santonin content and to plot the distribution and pre- valence of the best yielding varieties, and generally to gain knowledge essential to the development of the industry. But in addition to this

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in the collection of Kurram plants to that the collections *<*k, in which the survey proper it chkiy iatawated, it «* likely to suffer but rather to gain by Mr. Badhw't temporary fcp«ta- tion.

Mr. *Wlhw*j hat al*o got ready in collaboration with Prof. Duo*. specialist* i* the group, * paper on the MotM of the North-West Himalaya in which m?v«r*l #pecie* new to Science or holding the interest of such plants, «*e dealt with for the firvt tink.

II. Botanical Divisions.—As of late years taxonomic work has been mostly on material from the leater^known areas of North-Eastern India ... Penintula and there hat been rvrealed a considerable number of new or interacting tpeciet than it otual in a year's work. Many aew tpeciet hail from Hiam, the retult of work by Gnib, Dandy and ...Uea on Dr. Kerr't and otheit' eollectiont. Mr. C. K. C. Kr, p *•• *»eral additiont from Luahai uut of material collected by ... the colUtiont of Parker and Parkinson have given sum numerous new ... onl* »t the .South Burma Flora emphasising its affinity with the ... Flora ... hdo-CW^.

... er paru of iadia make up the onumally ... flow ... •p^ciet or noonk that have Uen noted amonpt ... «Jurin^ the veax.

... than ua«al interest and impoct... of Indian Botany have appeared during the year.

In ... of his reasons for bringing up to date »">taaital knowledge on the Indian Bambusae, Father Blatter refers to the ... for research existing in ... for the forester at veil at for the pun botanist, forests of I... and intricate problems in connection with the bamboo ... are brought nearer their solution. HM paper published in the Indian Forester will h^re a ... appaal lor, apart from the volumes on Orchids, no volume W tht Ammk «i ife Koyai Hoiaaic Garden has excited the demand that Gamble's monograph of the Bamboos published some 30 years ago has done. For the Indian forester few groups of plants hold the importance thai the htathoo doet and Father Blatter's revision is certain t# appeal as Bath to the Forreter interested in the bamboos of his area at it will appeal to a*d help the systematist, engaged often with scrappy material, in solving tht identity of the bamboo specimens sent in for determination.

No one who has had to work on herbarium material of the genera Mallotus and Macaranga can have failed to feel how unsatisfying is such work in the absence of intimate knowledge of these genera in the field, and it is, therefore, doubly welcome to have the Malotus of Northern Bengal set in order by one whose wide interests and keen powers of observation are equalled by his opportunity for field botany.

Mr. Shebbe ... in a manner ***** ^ *** •* uaeful to the HyMematist in the herbarium an it is to th* iomt *)oUnuit int«'*1||t«i in the identity of these pluuta in the field. Th* Malataa form, from thr numerical joint of \iew at least, • not unimportant Hruient in the forest* of Northern Bengal.

Another ^ * * w aumbfr of tne MwntnwK-h being Knuth't revision of the *** Uin i^ has appeared during the \«ar. The nhole se\en genera of •lna to j ! * ^^^ mit o in the one \olume and the genus *OzaUi* itself ... oct.vo pages compnaing nearly K»» sj*ecw*. The mork follows the plan o* P^vious volumen and collects together for the botanist and espe- interested ... fullent material yet <ompiM on this group of world wide plants.

Probabl fc»r tip ^ Do Wor c m tO ^^ °^ botany that has appeared iluriL^ the flo**ruu» equal ln ""I ^*11411 f ne linlrx LonrionertM* to illustrations of ^ pUnu. ^rns Rnd fern nlli^ The want whnh thr Index tions, th "^ *o mwt ** r^^irt^s w^^ni-es to plant name* and descrip- Icenum b ^w mc*k. an emen<leil and enlarged edition of PntzrTt in i1 1 ^ il%IUP4ir wn, ^ill fulfil ** regardn plant putim* *Or\r* vr»lumr com pnaing tome 84,0UU rrferemen and four more are to « omr. It *. % ork tktl *dl be a standaH in the libraries of all botanical and horticultural i ^^utions and iU ap|ie«rance supplies a want that has long been felt ... «Wvf IP th« ac*U«red lit or** tun- of j lint -ography. The ^ferences are of post Linsjina date but owing to th* high quality of **** ^lrturPfc >n certain earlier works, the** are given, and amongst other KuD>paius HerUriiim Aniboun#e and Rheedrs Hortus Malabaricus %lU t**^} ^11 stud«nu <(JnJian Botany.

III. Industrial Section. During the year under report about ... gallery specimens **" b**n rrHlllfrrrti in thr CdUrtiMi Kegi»ter of which about 5(1) specimenj ha\f been exhibited. Moat of thrje specimens as of ... mrdlclIlil1 V*J^ •»» ««• coSlected by the Curator during his tour

mens, about ... from the \J; 4410 l^nt apsjcMfM have bmi collfrted b> the Curator and other ... T! 4lwJ tk Manipur Hills in Asaam and from Chittafonjc ... parts of »"^at Bengal reprintir>g about .**> sperirs the collection is being worked out.

As usual a number of ... ^^um *wpcmmm* #iiubit«d in the Gallery were replaced by colour ... ^ ^rawmgt of plants, prrptmi dunng the yrar The re-arr V > | ^ ... and ... year and %boni A ^ and < verhauiiDf of ipffiBrtt continued dunng tK.

... case has been added to the Gallery 10 I*k10 the ... exhibits.

A graphs *»*|**I½WT« exhibit of CUKIMNU aad iU prodseta witk photo* and de ^F>U<aill« th« method* employed in the ouMration of Cm*o*a -41** of !h« manufacture of Quinine aad other tail*, wat placed on view to *** Publlc •» ** Health W.-lfare Kihibtiion held in Calcutta in March 1930.

Information regarding the HOUTCCA of supply of Economic planU and their products **» given to numeroui correnpondeoU, both from India and abroad, and a consikkrable number of plaats aad plnat products were identified on behalf of (Government Ilepartaerti aad the general public. Infurnution on matenali of the following wy supplied to various applicants in diff*—• —^ of tbe wofW :—

Nrqnjitu R»sburghu, Wall.v Boekmrria nitra, Hk. «*WJm., Sida ^Hu^9 ^urn». LtUara pciynntka, Jua, Orewia sclerophylla, Wall., Mukia •onrVW/a, Am., r«rTMH fillMft, B«m., Crataegus Oxyacantha. Unn.f GrrrMea $f., TriUcmm vmlfm*, VB.9 JV< bum-bium *V, OairTmuf #p.(CVw Papf, Iimvf Jteii IMKro-phylla, W*n., CrfpUmU^fia frtmdt/Lwm, Br.f ^IrvfS BtUmdomus, Linn., Adonis ...

Citrullus "*>ry«Au, Hchnd., Ckknt&m fkmtlmM, DC., Mund ... Linn., Terminalia Chebula, Retz., Panicum sp., Setaria sp., Psychotria Ipecacuanha, Stokes., Mimulus moschatus, DoufL, Lwimigm fafin/nru, Rovb., Plantago amplexicaulis, Cav., Bnfihrima tmbcm, Lam.. Amy-pium sp., Cynodon dactylon, Pers., Hibiscus Mutabilis, Linn., Eriodendron anfractuosu*i. rc-.t PrrJk ociieWff, Low., Artocarpus integrifolia ... ., Zizyphus Jujuba, Lamk., Ananas sativa, Linn., Semecarpus Anacardium Linn., Plantago sp.

The catalo ... to be printed ... pt, is awaiting and Fodder pu ... no*brr >M (ortmn|[• (.uJogof of Food, Spices catalogue of T... now a*so ready in manuscript. Natariib far • ready in manuscript are being drawn up and it M «rp«*t«d to be ready in manuscript during the ensuing year.

IV. Cin... abroad oM? *** Qrf*M,-&r*. So bufc wai imported from year Ori tlj'u m>Urut *cco«l>*- Bark karvwt wrifknkrnu dunng tW drya ^ had bJ urnu pUautioM aaovml 149,749 IU. which thmftjh the year. There was a carry U ri v a lh« ·>• aWva hy •!!< *•— at th« cw4 of at the Burma plantation j • w •» »••• Ha. fc»» ** yaw lfW-» 1930-31 amounted hark atom, « that tk* «o«al ratir orw to to I75W" "»· thow^rfilT *y k«»k.

No bark was despatched during w l «Mi fc» Barms to aay W the Indian factories. m ingpoo stocks of Java and Burma barks carried from

1928-29 wW 5CE,«T2 H*. aad tlfm aW Ai the latter quantity was worked •? d«Ht* thr year m»d of the fan» «.!» «* •«•*•* * ** end of It»3ii 4<M,725 IU. Java bait « * «wy • * * to I « ^ I - At Naduvattam the year started with a stock of 17,067 none was received and" ml! was rated. H M » tl» total cany orrc of India bark to 1930-31 wan 67M,6M 11*. of mkkk 494.725 lbs. *ava lay at Mungpoo *»J i;r.!W II*. Bmwm lay at Ikfgw ft* ** above-mentioned am* • ! • of Java mad BOTU baric* •»« * «••«••• 1830-75 lbs. Sulphate a*J 4« lfaa. P^hh«e mad ^» IU. Sdpfcie mad 480 lbs. Febrifuge toul 3090 lha. 0 ||1a ir awl f» lba. Febrifuge were extracted. TW 17,1*7 lba. Javm bark rxtrart^d ml Naduvattam produced I*U20 lba. Quaiar Mpbalc aad »H IU. Cinchona Febrifuge, so far as t^ S^phate is concerned nhlifdy a MIrr yieU ikaa Mungpoo as their bark was richer.

Stock of Quinine.- I V total Q u m f i i #f !«*»• * • * •* Quinine Sulphate purchased aa avb aad **tfarwd fm«i boaw a*d foreign barks amounted to 319,626-3 IU at the rod of tV yrmr. T*ii ***** by 71,341-6 lbs. at the Indian Museum, 239,471-9> lba. at Mungpoo and 4,611-8 lbs. at Naduvattam.

Stock *C*"*«Ni F^r^oar. - TV total Pt.*k of India Frtvih*» mi the close and 10,44.. iba. at N^Ur.tUav

Sale fP** inthe dilmat aV« la of ladia Qraaw dam was a total sum of 23,312 lha a^aivt &l54 lUbatyw. The kite figure, however, included a special onkr of mm* I«M» fc. f ^ » fcy the Madras Cinchona Department. Tr— I—|iniiMi — ff»iAnJ by the distribution » tW India ami of 12,314 lba. dung tbe ytmr against 12,776 lbs. in 1928-29. TW abawnof tW pfovuw mad ti>€ Indian States in the distribution *"•*. Puijab t.»0 lha.. United Provinces 1,700 lbs., North-West Frontier Province 357 IU. nmlinbiliii i5l IU., Bajputana and Central India 730 lfaa.. IMhi Province 46 lbs., Sind 6 lbs., Bushire (Persian G«|f) | ft. ^ Madras Cinchona Department 10,908 lbs.

Sale of Cinchona Febrifuge. - There was no taking over and, therefore, no sale by local distributing Governments of India Febrifuge and the stock of this product, therefore, continues to mount. During the year 3,770 lbs. of Cinchona febrifuge powder were distributed in the India against 4,458 lbs. in the previous year. The distribution was done by Bengal, all from their own Stock of febrifuge.

Revenue by the sale of Quinine. During 1929-30 the actual receipts amounted to Rs. 5,70,231 against Rs. 3,86,144 in the previous year. The receipts include Rs. 1,91,810 paid by Madras during the year, being arrear outstanding from 1928-29 account, and exclude Rs. 86,000 due

from that Uuvenime.it. being the cost of 2,998 lbs. of Quinine sulphate remaining W »« ,«i,] in 1W-.11. <H the rmiptB K*. 79,547 w« by cash sales •*! IU. 4,90.8*4 by credit to the 0 W « * Departs* including ptymenu by Bank Draft* in the *cut* of Govern** Dtp*** ments in ^ United Province*.

Plantations.—There » nothing fr.*h to add to the history of these and all VB« renurki made laat year both for and agaai* " •• "•* ^"* good. *•* >>*r under review waa not unfavourabk far CbAon, wit again experience emph*i»e4l the inadviaability of coocaiitratiiig all the Cinchona effort in the one area. The Cinchona Department ha* had to expend eff*t here that roukl more piofiubly and certainly with greater scientific advanta«e have been dirtribtited over at let* half » widely separated area*. It ia, perhapa, in«vHaWe tbftt caution should mark Cinchona* |wliey while queationn of pu^IK heahfc and the bearing hit J **• O» them h.iiig between a Central and Local Gov« ernments, r^ntH,0 of rflort in on€ ^ vfoK T»|Ue for Onchona tem»] experiment ha* now eurtly annejwed, *m* not necwaary to thit *tarn*-tion. The diatribution of effort need not be much more exp*B*m *tmm* the concent r*^»n *Q<1 the lietier caution eve* dicUtoi it. TWM f«W tions gain sniplia^ when :t ia realM that long and invaluable Cbchona planting direct tTt/**1*^111* w rapidly i<»niug to an end with the tattioi M *m* true of large of f*P^riment"(»mplet.ng terviw. H an>ihinf at aM • expect i ^ ^ n a tIuMuitlutiiowiathetimetobiwleathtbMiiol ment, J UI Pelting. The very wide interest shown by LocalGofW-bo W ? m<! *^y engaged in planting and by Native State*, ahow* *eek phases ^ t^y a|| ^ t^ r||rhoom ^^ ^ eltooded. Scueoly a

information without enquirv from «»ne or other aource for *mi ui* far as to methods of cultivation. Often the enqdry *mutMm* from areas where Cinchona would fitand no chance, but even whew ii does stand a 'ha** against the natural conditions, ignorance of the special meth^U n*^ ry to cultivation militates against success. Of all the many millions of Cinchona seeds di*tnb«ted yea^Hy it is questionable if ten in a million rver reach a bark yielding state and those that do gain it by luck rather than by good management from the planter. But the interest is there and is widespread. In no way can the future of Cinchona in India and the Empire be better cared for than by the establishment now of small experimental areas capable of development on an economic basis when the experimental stage is passed. The cost of such experiment may well be infinitesimal compared with the ultimate money gain and the gain in health by having ample means to combat malaria may easily cease to be referable to money values. Whether or not caution is necessary it cannot be wrong to push ahead in other fields with the same experimental proof as has now been obtained in ample degree for the South Burma reserve areas.

. J.•pmtion,.fAeDepartment,nBonn.l»«,w*J^ n confined f immense *<*Wa. Another plant, the yHder of a ^ «%££*, snd Jl **«.««* to India, health. lu» l*e» .«<W«» « £ £ than u or J» *»Wrul w no* .v*ikMr for the MMm* «,. of « I*'*' ion is in contin ion etine luduAn. Work.., Bm. in t ... of a century in the legal trial ... extending over . quarter ... and the fight ... rses. But it J> now from the exptfimenUi rt^e and . plentiful supply of this ^ U . druji ctn u«w »t any time lie with Gownmeat.

... year was Rs. ... Survey proper ... Rs. 2,48,600 for ... the Industrial Section, Indian Museum, ... Cinchona. A surrender of Rs. 40,000 was made from the total allotment under orders of the Government of India in connection with the Haj ... Botanical Committee. Thi. wa. effected by «J"™* *• * 33,700 J> »Uotment kr Re. 6.am and the Cinchona allotment by *• ... run*. Thu, the reduced allotment for the y«« after surrender •M R.. 2,70,000, of which R«. 65.1«» *" (or tl* B o ^ W " 1 Survey proper ,Bd the Indurtrial PectHH. Indian Hwnun, «d R^ 2,14,900 !« Cinchona. The actual expenditure wa. fc.^ Botanical »WT,T proper and R.. 2.06.«* for Cinchona. tUt », a tot^l of Rs. 2 «U -->*»• ' The a»ving under Botanical Survey V«**»™\'™ J J g « Ci^koM Ba. 7JN. that •, a total of R.. »,69» and wa. 1^*^ »*r MTcnl item..

VI. Staff.-Mr. C. C. Calder heU charge throughout the rear. Mr. S. N. Bal was Curator, Industrial Section, Indian Museum, ... the year exceptinator about 2 BMtk bom 19th (ktober to 23rd December 1929 *W h. went on lea« and Mr. T. D. Breuva-n, Systematic Assistant, •rt^forhim. Mr. 8rinivas«n a*ailed himatM of leave from 20th June *• 27th July |9». Mr. V. Narayanaawam. left ... ment from Ut Jon,]929 fc j^^pt the port of Systematic ... the Madras Agricultural Department, retaining a lien on his appointment in this Department. Owi ... caused by Mr. Narayanaswami's leaving the Department. Mr. B. L Itadkwar wa. appointed Systematic AssisU at on probation from 5th November . Mr. U. C. Pal was Assistant Curator, Industrial Section, Indian Museum, excepting for about 2 months in February and March 1930, and held charge of the Government ... tribution «f i L H * Q«'«iiie ftore m the ladiaa Mwm» MI « * Mr. R. K. ... Head Clerk, acted for him.

On the Cinchona Plantation, Mergui, Mr. P. T Russel held charge as Superintendent throughout the year. The post of the Assistant

Superintendent, which w ! « « kept T«*nt BOM Mr. A. Braybon left, was filled up temporarily by the appointment o! Mr. ^ G. Richards of the Bengal Cinchon. DepMtment fnw 7th December 1929 in view of Mr. Russell's proposed leave early next year. Mr. Maung Sine was Overseer in the Cine hoot PWotttm thmotfwot th« ^·

All members ·i the fUff, both Eiecutnire and Ministerial, of the Department worked satisfactorily.

G. C. CALDKB,

Director, Botanical Survey of India.

MGIPC—M—III-7-8—86 it 30—650

Report of the Botanical Survey of India for 1930-31.

I. frttBUtk.—While in common with other departmenU the Botanir*l Survey has suffered from the long continued financial atttn-gency *ith its anbaequeut partial disruption of organisation and cur-tailm*°t of work, it h*a, within th* limited meana *t it* disposal, and with Us 8m*il overtaxed ata(continued to maintain something of the tradi,i handetidown to it from mere prosperous tunes. Particularly has thas been the case in the sphere of its economic botanical activities.

Mr. Ir*.D. Sriatvaaan, the aemor aarhstlAt for systematic work, cam. finned h* rritksl study of the flora of Ike Oaro Hills- His ooUectiajM number •••ae 2,000 specimens, comprising about 800 species, and the results of kia field work ennch very conaidersbly the material now avail-able f*•• floriatic and • ecolojrical survey of the ares.

Reference to the work of s preliminary character which has been dee* on the collections continues to show the intimate raUtaonship whieh exists between the Oaro HilU and the true Eastem Himslsyao Tegion as represented by Bikkim ; and it ia interesting to observe that while the old conception that Ike regie* of the Sikkim Himalsys h a s t i i s i the matryx of several endemic—I groui* of pUnU of s c s o s s s Bsjtai Chinese and North East Indian diatniition hsa ha<i to give way to the claims of the region further East, sepststing Barms, Assam and Szechuan to n l>r*t*nt both eertioiis, tkeOsro H Û V lying much south and detached front- the maul |1M #f Oeographical distribution, tend rather to the W••^rn tfcaa to the Kaflsjm osmplsment. Akhoujrh much remains to be explored before an area representing the most natural meeting ground of these Asiatic floras can be fixed, it is certain that, to a fuller understanding of the probtsm ol pwaf aÍaHàWtass, sn intimass knowledge of such detached areas as the Oaro Hills furnish viU be essential. It has been with a view to linking up the evidence from this part of the world with that from similar exploration work undertaken of late years in the rich floristic areas of Ww than Benoa and Biechuan, as well as to provide material for an ecological analysis, that these hills have been selected fdr study. When the work will be carried forward to some degree of completion seems uncertain in the present state of financial difficulty and of uncertainty as to the future of official or-ganization for it, but Mr. Srinivasan, who now leaves the Survey, has by assiduity and unsparing effort gathered together a mass of evidence that must weightily influence further work whenever this can be undertaken.

The hopes e*pressed in ft prcriooi report that Mr Narayanaswami's transference to the Madras Agricultural Department would not mean a loss to Survf j work have Wn t«.l-ed ui» double sense. His transference has P~ved to bo temporary only. m* duimg the period of his absence he has carried out extensive exp in the little known forests of North CoimUtor*. Kolle^l. Bolampatti ranges and in the Anaimalai Hills, and has accumulated considerable material for a plant analysis of these ranges and for an estimation of the part they play in th, unio,, of the flom of the East and West sides of the peninsula.

Mr. Nara interesting «o,., reprinted in the .hoi- of the N* * ^ ™ ? ' of the district, locE more or km . —ing place in — distribution of Eastern and Western Ghat species. At the higher elevations the familie . Euphorbiaceae and Rosaceae amongst *"• «nd throb form. «d the Asclepiadaceae, Gentianaceae and Hypericineae among herb^eout vegeUtion mre most prominent. The agi ShuU am tbe frontier of Mywre »tJpical.

The »•**«*» Ldb natoraUy into IOIU types represented by a deciduous «crub at low CU-V.UOM .-Ijoiniim «nd merging into a semi scrub and bamboo area. Above this . between *^00 ft. and 3,000 ft., some open deciduous forests with trees of moderate size and a carpet of undergrowth grasses reaching \uiuiiMaot during the North East monsoon. Scattered sholas occur brtwwn 4*M> ft. and 5,000 ft. represented by tall evergreen trees with iccompanjiAg colonies of mosses, ferns and other epiphytes, which formation is in turn succeeded by the grassy hill tops devoid of all the taller vegetation. Hi a gradual procession from a dry hot climate through * cool nrnni atmosphere of middle upper elevations 10 ^onditiont in which only carpet vegetation can survive. The occurrence •t ewgrwi foral U dirwtlj ckp^ncUnt on heavy rainfall and ^>Ci ^ I'^tWif ttf uitk vnrHAtlon in tlv Anaimalais at comparatively low elevations is attributable to this factor.

Mr. Badhwar, officiating second assistant in the Survey, continued and brought to completion, so far as the Survey is concerned, his investigations on the Santonin yielding Artemisias of the Kurram and North Western India. Very valuable results likely to be of far reaching importance to the future of the industry have been obtained, and, in view of the great progress made, it is for regret that the investigation had to be brought to a close on account of the urgent need for retrenchment. Difficulties associated with th» time of production of Santonin in Artemisia and with the methods ol drying and extracting the harvests have been cleared up, and valuable data established bearing on questions of geographical and altitudinal distribution. TW edaphic conditions suit-

able to the drug yielding varieties have also t>een studied and results obtained Wtery to determine the course of future work if cultivation is ever a^mpted or, if attention is confined to the natural supply, then on the treatment of the crop by grazing and cutting. While it has been ignorant of the facts nom brought to light that ha* hitherto hindered progress **d that has been responsible fur much financial loss to col* lectors and to the firms importing the raw material for extraction, the knowledge acquired by no means completes rnhat must be gained before success * ••eiulul to the industry. Although the services of Mr. Badhwa? may yet not be lost to this young industry it cannot but be for regret that *•* promisjqg offlcial work should have h*J to be brought to a close.

Mr. in the niBW*a» Curator of the Herbarium, made a further attempt early ft! U»Z^T *° P^Hrate the Cinchona Reserve in the Tenassenm area it forms Burma. The portion visited was towards the Nam Sap and The collection ^complement to the exploration work already undertaken, and Mr. Biswas is rich in grasws and bamboos in which the ar«u abounds, able '•a' interest in the lomer order* of plant* resulted in a v%lu-t^d aTmV011 of material of thi> kind also. All of it is of interest relative to the flomennjr plants, attention has but sparingly been given to the Cryptogams it is not unlikslj that fads »»w to Science will result when fxaau&staon of the material ceousMSttes. En route to Burma he visited j** CWkaria Sundntmns at (Aittagong and the Sand ways Islands on the Arracan Coast. The flora of the former area has of late received attention but it wras with the intention of clearing *uf* some points regarding the Avicennia associations of the mangrove swamps of this part that the visit wras paid. The results of his examination will be found at an early date in his publication of the Systematic position of the Indian Avicennias.

The sea shore m Cox's Boamr ifsnos lurniahes an area particularly lending itself to study by the leolsfbt, and the camera has brought, in a manner that no description oaa, an appreciation of the wonder and beauty of dune and desert vegeWtioa. Good light has favoured Mr. Biswas' attempts at this form of ^tfl*f the traewes of nature in their own environment by the dunes of Cox's Baxar. and a toeto ler esjsh botanical work has resulted. Fresji hjs tours including ose te Assam in collaboration with the Coratsr of the Indastrial 8estioo, to wfeftt reference is made below, Mr. Biswas has brought back several thousands of specimens.

The normal activities of thsHerfasmsvoftheBojrti Botanic Gardens were maintained as usual ••••^^BJBI «BS SB9SSI is extending every year and the difficulties involved. °^Ta!l'*>T*fag eabissi asoessBS^eeissi iaj it remain throughout ^s %• i• —*^ «err apsnBjejsssi so different institution partment were freely

tough

and n y &kle « * ' » connection with all aerU of botanical easily

the ... rial.

Spe^L"*o(evidence in caie* bearing on the illepl «w*wation of drap.

terial *o* taken M opium or ganj* producing planta «re *k» """d "•"

Wt «n<iuirie» of this nature.

Co-

and the * ? " in 1 * i fa otl >« «tieutific department* titt been freely given

of travel their aid invited and obtained. Distance and e expensiveness

library °«lftatft aguiiint the rich collection! in tfce hcrt*rium «nd

MM one could with, but

I«di,n g*48 tlwughoirt the y«w. In oonnwrtion witk work on the

Mr. Parkinson of the Korwt IVpartment fpait MM Use at

critical material ^longing to hit own collection! and rendered tone

much prized help to us with locally grown bamboos, while Mr. Kanjilal,

also of the Forest Service, ... of *hk* leave

at work on the ... section of the herbarium.

The need to divert

accompany fort

badly, «nd ^"""W "nonopaph* bits the maint«»n« of tke *Sttarj*

tary period J10 l> urrha*' rf 1-oUn.cal l.tmtu» Uyond the most neces-

sary sense, ... hp pdB Me- T1»u»«rydo« not lead in the ordi-

irreplaceable ... U>0b tnd r«iodio»k witk tke exception of certain

ing and who ... umes, are always a ±,*&pm* lof workers whose stand-

^ »*«d for them in tke caoM of raeaith »» known.

... ons towards a knowledge of Indian botany during the year

should be contraction ... » «*^». «rf • * i» ii ler Kfjirt that tk«

a provision by the way ... <«wtriM and all Governments consider

it in their own interest to make the loss is partly made good by the

young and enthusiastic body of Indian botanists being turned out

through the gradually enlarging scope for specialisation «(tkt Indian

Educational system. Some of the work done by these men is now of

a standard that is gaining recognition in the world of botanical science,

and there is no doubt it is always gaining in importance. But this is

the better reason why the historical collections that come down to

the new school should have at least the same care and attention and study

that was formerly given to them. In the eyes of the scientific world

of to-morrow it will take much ""I* tkt* a pfaa of financial stringency

to justify the neglect to-day of ... eable objects of art

and science that have come ... as treasures to* n . ran of bota-

nical collections presents di... ^ — « - •• tfc ... attending the pre-

servation of art objects of a ... rtile nature or fragile and susceptible to

change, difficulties that are —*b**mnimdfp**ptmmA* in other histo-

gical or in gnokigiiiil Material. Their nature rentier* them pwuliirly £ susceptible lo tal» ravages of time and of dimite, and to numtain them m * *at« fit for study demand* labour and unceasing attention.

^biiaked material dealing directly or indirectly with Indian botany ? * * ^er a wide variety of subject*. Of a t-.xononiio kiud, Mr. £ * C. Pb-herof Kew has numeroui dea ·ription*of now or luterestmg -ds, mainly resulting from exammatton of material in connection with the Flora of lUdrw, o| wbich a new part has appeared during the year. This brin* the flora down to and inciudiug the *Cyp****** and there remain now hut two more puts which will deal with the large tally of Gramineae.

Mr. Fischer'f new *ipum*, A goodly number of which bdoug, as might be expected, to the leaser known hdl district* of tho [jeninsula, an\ - *Impatiens Barnesii*, *Impat*^M *htieorm*, impUie** *U* ifiriot. «nV *caulon cuneiforme*, *Kmx*d>m (fombln, &»rpu$ Jacbi, Fn*bn*tfl» ag. gregata, Fimbristylis* ™**nt*,. **and** *Fimbrulylu Samymi**, the **last** from a T* *• Tmraa ore colleniorw of Mr. Narayanaswaiiu. fie has alio ^TiJ"^ .4s»]|4Qf M belonging to the *Cyper** ·** *»[J] reprewited by single »P«ies .4. *Gambia* from near <K>tacaraund.

Burma has added New rela rullia1 *Hurnsteditia sulphurea*, *Crypto-coryne albida* ami .S^nM Miff, a new genus of tho *R*¹*-* ** represented by a single species *S. oblonga*, all described by Mi. R. M. P«ker, and four new Gentians *Gentiana bomareoides*, *Gentiana sinkuensis*, *Gentiana membranacea* and 6'fnda^i *croHJurdtoU** vs* «»'.«f*J!«'« g»ven to science for the firvt time by Marquand in the «mm *ol* his work on the asiatic, particularly chin«ie represenUtives of the family. Mar<|tt%iid proposes to rename as *Gentiana confusa* Clarke's *Crawfurdia affinis* of the Flora of British India, as the specific epithet "affinis" has already been employed for a north west american plant of the genus to which this species of Crawfurdia now comes.

Out of Upper Burma, from seed raised from a collection made by Kingdom Ward, comes a new •pram «(IWNM, i· *hypoleuriana*, interesting because aberrant as to type. Its description, very fully drawn up by Airy-Shaw, shows that it departs even hrtfc* bm U- t/JM than does its nearest ally *Berberis sanguis*. Tanaka m U* itmti of Botany has given specific rank to a tilye amia, the only one having rusty hair on the vegetative organs. This was collected by Parkinson and now bears his name. He has also new combinations in nomenclature in descriptions of *Atalantia roxburghiana* and *Atalantia spinosa*, both species of fairly wide distribution and of *Paramignya Beddomei* and *Severinia monophylla*. From the Eastern Himalayan region, Marquand, in his revision of the old world species of the genus, has those

*• i ^ * * " B, Hookeri*B- ^rifiiki' and B. haMata all renamed (ram u of the older Indian boUuuU while Parker hat described ta, AT nepoUnsu from the same region.

A*am additiort are represent**! by Oeuliam Panyae by Mar- yd by Ortkmphm oWuJcwu and .lwrrf* WflV^ bX ^" c^. *med after IU tinder, tho second found by Weiigef and the third Kingdom Wari't collection.

A new C'/Tr^Vkl> c\ fdyartka, generally growing on a species of Randia and a new Begonia, B. ... lia, have been described and figured by Blatter and MflCion m the Journal of the Bombay Natural History Society ••*» the Journal of thr Inlian BoUnic^l Society re* Wo ^^' ^A fpeeiei oome from the Mtlutuleahwaf Diftnct A the Ghats.

Professor j°r ^<b coutinu«* to add to the tinmcnAe number of new »pe- cies already / ^ ribed from the coiiectionf oi Kerr and others in Siam. The publication of Volume I, Fait 1 of hif " Knumerati<»f which haa recently appeared, deals with the families Ranunculaceae to Cornaceae. Al- though dealing with an area strictly ouUide the limiU of this report, his work is 0Ut *it .hould be in the handt of every botanist who has to deal ...

^tl^ '."^noe ha, bwn made to work of s systematic kind only, I kxj?**1*1 to lh» ^»«^T pUnti. but th lower groups also have !f ^^ UU *** * ••••••tly mcrf Ming body of workem, the results JJ *k*t * / * •*• ••* msntioncd here, are adding to our knomlalge ^kiio^ "f*k * Pro'- Kaahyap on gioupt of the ThaUophytes ... and the recent puMication by Dr. Brühl of a Cenoss of ths Indian Mosses, besides bringing tfigrther in unified and handy fo m exist- ing knowledge of these plants, adds very materially to this knowledge. Mr. Badhwar's work on the same group has not yet been published, but this is ... the attention research has already gained ed in the ftJ^T °°^PC^Uon of Iratluig European authoritiei intere*.

Nor has material for local floras been neglected as the running lists for a revision of the flora of the Bombay rWt-y-lfc.Jomnl.1 the Bombay Natural History Society and similar papers in other journals show. Of special interest because of tbt wiakU advance made in coloured photography which it proves, is another volume of Mr. Coventry's "Wild Flowers of Kashmir". Shades of blue, yellow and white predo- minate in the flowers selected for illustration and all could wish that the expensiveness of the process did not set a limit to the number given. The examination of the U...tales of Indian ...fmtm±*p*n*mm*m the publication, under the editorship ml IW. A. C Mrwnnl. of th* laU Prof. Pearson's work on this isolated group of special interest to Indian

botanists. The publication is divided into chapters dealing separately with the [illegible] habit, [illegible]tribution, Ecology and Taxonomy, the morpholo[illegible] Inflorescence and flower, and the repr[illegible] discussion on the inter-relationships of [illegible] to other group[illegible]

Two papers published during the year are of such interest as to claim the attention of [illegible] Professor Blatter appeals in the " Journal of the Indian [illegible] " for united effort to bring Hooker's monumental work on the " [illegible] of British India " up to date. He recognises that a complete revision of the Flora is still far off and, asking the question of what can be done in the meantime to bring it up to date, he answers as follows :—" We can gather all the material that has accumulated during the last 30 years and write short monographs on the families or genera embodying the results obtained by previous botanists. Those results may be descriptions of new genera or species, notes as to the distribution of species, revisions of genera, changes in the arrangement of genera, transfer of species from one genus to another, suppression of species, combinati[illegible] of new species, nomenclatorial changes, etc." By way of illustration of what might be done he furnishes a short revision of the *Malpighiaceae*, a family with a limited number of Indian representatives, and material for which was readily obtainable out of recent monographs. Amongst the younger generations of Indian Scientists there must be [illegible] willi[illegible] workers whose eagerness in the cause and whose work [illegible] veteran's summing up of the botanical need of the time.

Of even wider inter[illegible] presidential address to the botanical section of [illegible] Association when he discussed present day problems on Taxonomic and Economic Botany. The address is pregnant with rectifying ideas and sums [illegible] what many were thinking without being able to express. The mass of experience on which the speaker could draw brings point to his argument wh[illegible] he seeks to illustrate, and to attempt to repeat here [illegible] length [illegible] thought might be to deprive the reader of the enjoyment [illegible] itself which may [illegible] Volume of " Nature "

II. Industrial Section.—During [illegible] year under report about 200 [illegible] have been registered in the Collection Register, of which [illegible] than 100 specimens have been deposited in the Gallery, the balance being kept in reserve for future use. Most of these specimens are of medicinal value and were collected by the Curator during his tour in the Naga and Manipur Hills. Botanical specimens collected during tours are being worked out and a preliminary report has already been submitted.

Although the tour was mainly concerned with the acquisition of fresh material for the Gallery and for dirtributk*, opportunity ~ **"• hJ combining the efforU of the Curator of the Herbarium was those of the Curator of the 'inriutftrial Section, to furmak ft[illegible] account of the wealth j ^ ^ i t h particular reference to the economic pomihilitini of the am *• ^velopment of *m* of tbe smaller plant produrt induftriet.

Suggestiom of particular interert relate to fruit cultivation, and amongst * : * » * • natural occurrence of alible grapei of dv quality would *em to point to the powibilitie* of cultivation of this kind for those ^ *•• ' ««w«ary knowledge and capiuL During toe part 20 years there has been gnat advance made by tko local OakartU market in the quality, V«rtity and variety of fruiU oiered to tne pobfo, and though some of UIM ie due to tbe greater factiitiei that enit fat long transport and for coiiittoragenotabtUe bat been gained by iapiuving the quality of tome of tfe BK, . ^ y o^ local kindi of fruit.

There "• no doubt of tbe field that bee open to expe«n*» and imtiative in ** production of better fruit culture in North gaetern Indin. The supply of (Arnnget hat been enlarged out of ai enmfntujnn With the former meagre ODnawnmeiiU. and although ft nwomi mtlumty, mjaj of plum cultiva w * r . . . . ti_* rx__t# shows what reaulu may be eipected in tbif line. Tbe reoews of the Eastern Himftliyt off^ a variety of shelter for fruit and vegetable ciltivation that w only jtut being reatieed, and the report now citad abowt that in the Mtni p ^ l!l!Ll •onditioni exait for certain cultivation! that would still further enrk-k the Ka«ten India market

The special interest taken by the Curator, of Iftte, in the medicinal exhibits at the Museum ien, • ** to drmw " • * tt * otio11 m l * rticttiir t0 " ^ the area offered of these, and thelietofntoaiirf a medicinal vnlmi occurring wild that has been drawn up of«»pound for the belief thnt in this direction also there is room

The Drugs Committee has served to focus official attention on the almost unlimited field that offers in !he nek i o » and varW conditions of India for the production of medicines of plant origin and the botanical enquiry undertaken forms a modest contribution ljr«g within the survey's means to the knowledge necessary for advance in the matter of supplies. In the present state of economic distress *-^ Ak^MHM nf nnnV able employment for the educated, the writer can think of no directions more likely to repay effort than those of fruit production and the exploitation of India's medicinal resources. That advance in these matters has been so slow is certainly not due to the lack of opportunity offered by nature. The gulf between theory and practical effort can perhaps nowhere be more profitably bridged than here.

As usual [illegible] herbarium specimens exhibited in the Gallery were replaced by coloured drawings of plants prepared during the year. The rearrangement and overhauling of specimens continued and about 5,000 labels were replaced by printed ones.

A new show-case has been added to take in the more important fibres.

A comprehensive [illegible] of rinchona and [illegible] Products, with photographs explaining [illegible] employed in the cultivation of Cinchona and details of the manufacture of Quinine and other salts, was placed on view to the public in the Health Welfare Exhibition held in Calcutta in March, 1931.

A number of [illegible] exhibited along with Timbers on the [illegible] were replaced or renewed.

The [illegible] of Medicinal plant exhibits is now going through the press.

Information [illegible] regarding the source of supply of economic plants and their products [illegible] correspondents both from India and abroad, and [illegible] considerable number of plants and plant products [illegible] Government Departments and the general applicants [illegible] the following was supplied to applicants in different parts of the world :-

Hibiscus Abelmoschus, Linn., *Hibiscus cannabinus*, Linn., *Crotalaria Juncea*, Linn., *Corchorus capsularis*, Linn., *Boehmeria nivea*, Hook & Arn., *Agave* sp., *Linum usitatissimum*, Linn., *Cryptostegia grandiflora*, Br., *Zea mays*, Linn., *Andropogon Sorghum*, Brot., *Cannabis sativa*, Linn., *Triticum vulgare*, Vill., *Caesalpinia Bonducella*, Fleming., *Gossypium* sp., Linn., *Artemisia* sp., *Argyreia speciosa*, Sweet., *Ravenala madagascariensis*, Sonn., *Carapa guianensis*, Aubl., *Salvia aegyptiaca*, Linn., *Derris* sp., Lour., *Datura* sp., *Solanum longum*, Wall., *Panicum* [illegible], *Atropa Belladonna*, Linn., *Swertia Chirata*, Ham., *Cinchona* sp., Linn., *Santalum album*, Linn., *Myristica fragrans*, Houtt., *Artocarpus* sp., Forst., *Hibiscus subdariffa*, Linn., *Paullinia cupana*, H. B., *Paullinia sorbilis*, Mart., *Cleome heptaphylla*, Linn., *Mimosa* sp. Dc. *Lallemantia Royleana*, Benth., *Withania somnifera*, Dunal., *Herpestis Monniera*, H. B. K., *Brassica campestris*, Linn., *Eugenia Jambolana*, Lam., *Xanthium Strumarium*, Linn., *Agave sisalana*, Perrine., *Barberis aristata*, Dc., *Gymnema sylvestre*, Br., *Psychotria Ipecacuanha*, Stokes, *Cicer arietinum*, [illegible], *Croton Tiglium*, Linn., *Momordica cochinchinensis*, Spreng., *Coptis Teeta*, Wall., *Bauhinia variegata*, Linn., *Ipomoea digitata*, Linn., *Papaver somniferum*,

Linn [illegible]

"*** of***, Wigg^ Ainu preodonus, Lim.,* i o n i *Cutrelu [illegible] Calotropis procera, Br., Hydrocotyle asiatica, Linn.*

thrS ****** •* Q»*i»BV-flffc Bo baikwu -ported from Burma rlantations amounted to 131,533 lbs. There was a carry over of 175,928 lbs. from the roar 1*2*40, at (he Bum Plant**** bark stores. Some 307,327 lbs. of bark wen despatched frem Mfffii dving the year to the Mungpoo Factory. Out of thk 21(^904) D* rached Mungpoo during the/vear «•* *• * * " • * W « i lba. wai <m (he way. Onlj 1-4 ^1-32 ^ kT »t the B « M Pkatvlieav torn • a eany o>m to

Mungpoo stock of Javenbark carried 192M0 wat 492,035 RM. This is 2,100 lbs. leai (has that *firm m* flock kel ywr. Tkeemrac- counting for this HHNpa«(ty wai duccTffed by aamilafs *wk* calcwatioii of kilos to pounds

stock of Burma bark carried from 1929-30 was 343 lbs. Amounts of 69,002 lbs. J^ a«| UUlflba. B«m WHb w« w« W <Wiap 1930-31, leaving •t thr ml ol 1MM1 413,0711pm. of Java aid *XOiJM^* lbs. of Burma ^vkt M » rwy or,, u m i l-l HM» wat BO itock of India bark at the Naduvattam faviary. Tkv the total cany onr of India bark to 1931-32 was 630,256 lbs. of which 433,573 lbs. of Java and 104,526½ lbs. of Burma barks lay at Mungpoo, 134 lbs. lay at Mergui and 92,022½ lbs. of Burma baik « « : Ai|Ma4. FTOB 170,173 lbsi of Java and Burma barks woiM d Va«peo Factoiy V N k of Quinine Sulphate and 3,266 fta, rf CbtfcoM *tMhft* w extracted.

Stock of Quinine.—The toUj tin I—ill of Mb Stak of Quinine Sulphate purchased as such and extracted from home and foreign barks, amounted to 205,561 lbs. This amount lay, in round numbers, 64,200 lbs. at the Indian Museum, »MW i«. ai Mokjpw aad MU k at Naduvattam.

Stock of Cinchona. /^r^rW.^TW Mai oHdk of ladim Febrifuge at the close of the year amounted to 20,000 lbs. hold 10,226 lbs. at Mungpoo and 10,462 lbs. at Naduvattam.

Sale of Quinine.—From the different stocks of Quinine there was a total issue of 19,987 lbs. against 23,312 lbs. last year. The share of the provinces and the Indian States in the distribution were, Punjab 16,161 lbs., United Provinces 2,008 lbs., North-West Frontier Province 346 lbs., Rajputana 414 lbs., Central India 200 lbs., Delhi Province 104 lbs., Sind 6 lbs., Baluchistan 207 lbs. and Persian Gulf 12 lbs. The smaller share of demand from Madras, distribution is to be accounted for by economic conditions and the ab-

V the P^*0*0** '• W1**-—Tb«« •»• "» Uking over and no sale tfc, ^J**1 touting Government, of India Febrifuge and stock of 11%. <yp. Oct| t*M**fore, continues to mount. During the year 5,091 against ^f*** ftbrifuge powder were distributed in the India area Bengal -'"70 lbs. in the previous year. The distribution was done by *n torn their own stock of Febrifuge.

*Revenue by the Sale 9f Q**i*eVunnfi* 1930-51 the actual reoeiptt amounted *.*• 4,43,073 against Rs. 5,70,231 in the previous year. The receipt *! include the balatot of cost of 2.998 lbs. of Quinine Sulphate Purchased by *h* M<Mirii ^f1vw», >M1t d" "1* tnf of the total previous year, Out credit to Gov rB<*ipl- *•• 91,8* were by cash salea and Rs. 3,51,704 by ...... Drafts in the case of Government Depart menu in the United Province*.

Plantations. r*• rtd* the gOT WHKli ^ t ^ plantations in Burma, then w Bttfc ^ «y that has not already found eipression in previous reports. ^ uncertain future of Government's policy in the matter of bark production has refl on the plantations to • degree that leave* the one trsined ofioer now remaining with respon^ and duty beyond the rapacity of any oaj man. During the firBt P*rt of the year Mr. Rus^rll continued to discharge the duties of ^pmntendent,' and that aflain are u weU as tkty are in due almost en^ ^ hl- efforU *lld to tfct smdl band of tnind workers who have Ulowed him throughout his career. The new ei« tension opened out to the west of the existing plantations on a stntck of land differing from ttc m*in *"* in Mp6ct ^ tn th< naturc o, ioa, has proved one of ^f ^ *o far ^P10.^* •«• •* • tim* wbsequent to that with which frportihould, " ^^iPe*kiDW«<w-wu^P0^ ed to have stood the dry weather oonditioos better than any other.

IV. Financial.—The total Budget •JloUnpnt for the year waa Rs. 3,17,000 of which Rs. 62,200 (including Rs. 1,000 for English Charges on Stores, High Commissioner's budget) was far*• Botanical Survey per including the Industrial Section, Indian Museum, and Rs. 2,54,800 for Cinchona. A surrender of Rs. 12,300 was made from the total Budget allotment thus:—Rs. 641 from the Botanical Survey and Rs. 11,659 from the Cinchona allotment under several items. After surrender the allotments for the year were reduced to Rs. 61,559 for Botanical Survey and Rs. 2,43,141 for Cinchona. The total actual expenditure in the year was Rs. 2,98,967 (excluding English Charges on Stores) viz., Rs. 57,634 for Botanical Survey under Botanical ... The saving English Charges, ^* *I1QL ami minhtf (^MAMM) Rs. 4,318 under

of .*• *titt.*- Mr. C. C. CaldeT held charge aa Director, B ctanial Smvey Be^ 1 1 tklolIl^oot the year. Mr. S. N. Bal WM Curator, Induatria! ...d, l r d i " M«"*om, throughout the T W. Mr. V. Narayanaawami, the senior H?rilUln«t^ Aiwtaiit, who left'thia Department in 1929, was allowed to retain a lien on his a ointment. Mr. T. D. Srinivasan was the First 8>"t#llial*c AsMFtant and Mr. R. L Btdhwar WM to Second Systematic Assistant throughout the jenr. The Utt« wu deputed to carry on de °» Artemisia work in the Konom Valley in May, 1930, and was l*d*T^li011 throii^nailttbe J^ .Mr. U. C. Pal waa Afawtant Curator, of ^l** ^* ticn, Indun Moaeian, throngbout the year and held charge of 4' Gcv^n>mrnt of India Quinine Store in the Indian Nuaeom and *iitTnllItio11 of W""1* '^H^ '« the latteT half of the month of I. B J931, w**o Mr. R. K. Dan, Head Clerk, acted for hhn and Mf. fitnjf acted aa Head Clerk.

On the Cinchona Cmchciia Pkntation Mr. P. T. Rnaaell waa BvperinteiMlentr Cinchona Clllt«^ationf Burna, except for 7 monthi from 10th April, 1930, to 9£ K°vf»berf 1 WO, when he waa on leava. During bis abaenee on leave Mr. L 0. Rirharda, the AaaiaUnt Siipftintendent, acted aa Superintendent ir d ty. Hinr, Overam, officiated aa Aaaiatint 8«perh> tendent in i<kiitioft to hMI «)1ln dut>«- M' · Kichaida rmrtfd to hia substantive tM<»int«mt in Bengal with t-flect from the afternoon of the 26th March, 1931. Since then the post of the Assistant Supera-tendent, Cinchona Cultivation, Burma, remains vacant.

All the members of the atafl and the clerical eatabliahment have worked quite satisfactorily.

C. C. CALDER,

tHrtdor, Bctamicol Surrey of India.

MGIPC—M—III-J-I—4-7-32—400.

Report of the Botanical Survey of India for 1931-32.

I. ByttematiO.—The abnence on leave of the writer during part °* tht year combined with urjrent demands for retrenchment left the £ opportunity for field work which ha* had to lie restricted to * * * Haiti poatible. Work ha*, therefore, been on the main confined to headquarter* and haf been primarily directed to keeping the permane*[1] collections in aome state of repuir, to dealing with material alre•dy accumulated and awuiting attention and to answering the numerous references that are normally directed to the Depart ent.

t^t. a lu ^ey of the work airomplMied (or Indian boUny shows H ^ ^ ^ V fields effort has not been so restricted, and a goodly - 7 * •* interest^, papeis, the leMilt of the work of an ever-growing body of Indian botanists, has appeared over the period and is due for review.

Mr. C. E. C. Piarher contiuues work on the Flora of the Madras Presidency Vitiated by the late Mr. (fumble. A new part, Xo. IX, has appeas* in whic} the families *Commelinaceae, Palmaceae, Pandanaceae*% *Awe*, TrturtJmc**, AU***ct<*> Apvnofetontceae, Potamogeton*••», A'aioaWte?, *Etm^Utm* and *Cypeructcr* are dealt with. A change ban been u*d<* m the an»u^"^ot prerMiuJy mapped nt »• that the part MM(published stops short of tke Gramineae, leaving two parts to be published to deal this large family and with the index and other appendices.

In the rjf*) * * ptblukad tW treatment of the *Eriocaulons* differs considerably from that recently given them by Prof. Fyson in his examination published ia Ike /•«••• •'lh* Ild"n Botanical Society. Several species been reduced and new combinations made. In all som• *««ty«'- H^«>» ad M i|wd" •" T recognised but tk* M T U «r,.tH«. »W «"" ««n^ lk. Eriocaulons will probably leave the number to fortunate error ing to the personal views of the worker as to what constitutes specific rank, and it is likely that here, as in —T «.ibr unstable groups, an intensive study of living material in field will prove the best method of approach to a knowledge of them.

Among the new Asiatic Gentians described by C V B. Marquand appear several belonging to India or areas immediately

adjoining- In th* conne of bif work Marqvand baa reduced Wallich'[1] gw«a *Crarfurdui,* originally baaed on two tfeptlaaa species, «a ita treatment aa a penus diatinct from *Gentiana* could no longer ba Maintained.

In **i«|«ence of tbe redaction new epitheU aw unfortunately require* for wvfB apeciea ai tbe specific terms were already occupied by species of *Gentiana.*

New species deacribad ai»: —

*Gentiana ***t*riunA'*$ Harq.% Gentian* homareotdes Miff.,* Gentiana sinK«IJM .Ifary., *Gentiana iochroa Marq.< Gentiana* subocculta *dfy.f *Oemtiana gilrottriato Vary., Gentiana macrau-* cens Marq., *Q******* Parry* Marq.%* tbf lant from A«aam, tbe otbm from Burm* «r 8ontb Eajt Tibet. Benidw tbeae a rooiideraUe number of new Taxittiea baa been eaUbliabed.

The opportunity ^ tiamine tbe Knmi^ rolWtkm in tbe Lund Herbarium tbro^b tbe loan of <perimenn to Ke* ba* resulted in interesting /^^nration* bein^r made br Mr f. E. C. Fwber on several Indian fP^*^ fi»* dearribed br Retsiun in bia Obaertmtionea Botanicae pu ished at Lei ... ». The 'discovery' of this material and iU exaroination irJiratea tbat tb* assumption arrived at from certain of ReUiui' u.Mription* wa» erroneous, and it follows that nomenclatorial chan... become involved with well-known specific names le...ing to syn... my. In a complete published list of Emif't npr«imen» «ent t»' Betiiua Mr. Fischer, corrects tb« boUnkml iinf< according to *mtaUm* practice and ... «U ^ i" riptiont arUailT os tb* akiiU. Tb. ... i. valuable aa abowinf *htm* aWhp- ... *rt»*l matenal f mi»|r tbe type Woaata.

Koenig ... ^ to tbe Dajiitk Medk^l Miaaio. at Tr^... ...dia, from 1768 to ..., and was subsequently employed by the East India Company ... Madras where he was associated with Dr. W. Roxburgh.

A revision ... in 1848 has b...

certain ... Kirbt tbe mtatHffi fmaa tbe lew Index '*4* names are M^*** ** iwiptioaj t* later woria of oiWra. Tbeaa of the Index Kewensis. The 'Itinerary Notes' deal with plants from Khasyah, Bhutan and from between Shikarpore and Peshawur.

In the Decades Kewensis Fischer has described a new genus of the Cyperaceae, Acrocephalus from material collected by the late Mr. Gamble at Ootacamund. A fHajrit species named after the

coll I*** at present represent* the genus. The genus is placed betw "^ Mariscus and Ascolepis.

A ftiM neW8 Peciw o,5cir /~J ,roni Madras, S. Jacobi, is also recog-uTl' by fisher in early collections confused with *Sarpus ari%cuW* >»ot ..lnn., ** We,* M ,n new m*te,,a^ now to **and. ^he P*ant wli q !^>n 1929 in water along the margins of permanent tank* of ud K *? Mr. Jacob of the Madras Agricultural College and was sent y him to Ktrw for comparison,

fo Prof mib continue!* in his contributions to the Flora of Siara UU d *o ^e **r&* num^r o* new •p*'ri'« already deM-nbetl from is ^Kion. The Kubioceir with which he ha< mently been dealing of P j.**1** a particularly rich family, l^rt 4 completing Vol. 1. W^'01* ^"awnsis Knumerutio bus been published. It deals .he flmiliw RonaceiP to Coraai-cw and contain* over UM) species of which about a fifth are new to the Flora.

Plants dew t0 Ail(l*ni continue to he published as the reiinU of work on ^ ^r supplied by Mrs. l'arn and Mews. Kin^osi Ward and Wenger Of parti. uUr interest"from 1h« arsm are a n*w Jasminum and Mwilillia ^^ ^Hected by Weng^r and a aew Impatiens—*Impatiens cvthmmotdti.*

Among con^ibution^ to the Flora of Banna in«ludin|C *** and little known plants an *Opluorrhiza ervbesens* Wall., from Taw, Z,^7 C. K palle-V: '«"«'« <""vjw (Wall.)Fi«her: .lr«-m fcr«Mfirei.i Lower Barki 90U *:U"**!*^"' merjmen$i*C. &* Tarkinstm from urma.

A Burmese climbing Uambuo, *Klrmachloa dtU*r*i,* sole repre-sentative of a new ^ nus».dwpibw| bv Mr R .N , ll|irkert lr material fr om South Burnia.

A deals with ft. lteU^ Tolttn^ «« ^ r«-nieureich by Badlkoftr Sapindaceae.

It is not always easy to rwuUU Bom««cU*«T« ia we* • manner as to secure uniformity of U«tm,»t .ml >e» pt^rr. the ™lu«. ««l convenience of long-established rg.ton»rr iw « « « P « *•* Mtor known forest trees. ary by

October number Mrh «»olluw,B|r of ruk .r. r.T»w«l by M'- l'«rk,r, " Ut out the difficult o' ifo» iadiw Foiwur n »• •««"!* to "*"* forest officers and others ^ • 1 u«l«iin for i«fonM«io* U> b» rompiW lor how strict application Tbf l»t rwti*vtd it of interest as showing names for some of the rules may affect now widely accepted nation of the list will the commonest of our Indian trees. An exami-of the rules of botanical show how likely it is that a strict application nomenclature may be received

T^M botanists with some of the puttied dubiety that has chamc-ri«ed the faulting initiations elsewhere. It is disturbing, foi in-lanc«! to know that theoretically, we mean *Bombax Ctiha* when we talk of iuch a well-known and widely distributed species as *Bombax malabaricum,* and that the Mowha tree, Baesia, must henceforth become Madhuca.

TheT* will be appreciation of the stand taken by Mr. Parker, for the r*tention of <uch a familiar uame a» Albiuia stipulata and gene^ agreement with him that acceptance of such changes uiigbi well •**it a monogiapbing of genera. The start that the uame *Poinceana r<ipa* has established to designate the Ooldmohur tree is likely to withstand the theoretical claims of *DtUmut ttg\A* to supplant it.

Wh*« on (he iubject of nomenclature it may be noted that the Indian *West«r ha* d« ided to follow in future the practice, adopted now in *\eral quarters, of spelling all specific names irree-pective of tbeir origin with a small lettet.

Borgesen diw-uiwo in the Kew Bulletin some Indian Khodo-phyceae especially from the shorn of the Presidency of Bombay. Very little *°rk at Ml] h»n been done oft India sea algir and it is many years> iince » paper of significance has been published on India. |iY * ^»*"HL». An interesting and fairly comprehensive list is ^ *!? <Uirri pt! «" dTMTM «P. and the Inlerwtil1 ^ oUervilUo11

AUhJ m tb* "•"ftioiia of algu- trom the North end of the It* O' '••-. »>*«rka, Okha I'ort. and Karachi, seveial specie. AVt2 %fcirk «• tfe tanif M or cloatly reUU4 to ipeci« fnm •••.•Itkough in the hot belt between the* two regioni the •r*iei appear to be wanting.

W / rr«n<is KM. MkMA ...i^r^ii** iA^ifationi> on the oocur-rence of buttresses in Rain Forest trees. Several theories have been advanced to account for the pmeare of these pecaliar structures, and the •mmii of the author tend to raise objection to the supposition tkat wimU ariiDg on hmiry cn»wns eiert a direct action in the incip**t prowicliofi ol Ultreaiai. tt* «» ^ ^ ifc * ^ ^ these structu^ r**aia* ia .UM, but their occurrence « maafrore vegetation *•» as * iUm forest would ^m to suggest that the chemical *•* Pkywcal charartm of the ftmlum in which tuck trees grow has something to do with buttresses. K«rt»*r, the *mtm* theory of the root as well as into the development ej tation to toU !T "uJlPort tW TICW that this ftnsrtiw »•••r a reaction ^ ^ t i * a rat^er than, as has ii(k#f1o bffi t«ppMl4f the roots of mangrove species aa4 tW alliaaot at auiffttt

with Rain ForMt re P«**nt«tiven tuggest a root peculiarity related to 1ta ttedmm. The subject is referred to here a* an interesting proble 'or Indian tttudents, for much material prenent* in tbi* neighbo «rhood (Calcutta) for further Mud*. Itae observation made by M Francis, on the buttressed trees of Australian rain foresU can i corroborated in lotal material, namely, the observation relating to the attenuation of the main axis of large buttressed trees towards tlie base—(hie need only refer to *onie «perie* of Itdian Sterculias to bring the peculiarity to mind.

Tk *

Inc|ia Pull lication by Col. Chopra of The ludigenou* Drug* of mav i,ex ^."**. incivaM^g deiuaud for a more suMmned aud systeMnli, ? 0ltMt*on of Indian medicinal retourcw reudern timely the d ^ i o B | . y l) r. Hooper, late of the Survey, of notes on Persian rugs. These collected all Ilama J ("" an and Darlinfrton in the bafaar* of Teheran, ing BQU and Kiruiand^liah duúnir a tour for the Umpire Market- indeed rd ln 1^!). The 1M» ronUini nothing new. It ro«ld, years 1**. Dr. Hooper remarks, have been drawn up a thooaaad slowly ^ Ahu Mansur but it in of interest a* nhowing how ho W "JoM lD ^ irillllJ ^I»«tation of a plant in the Kant die*, at aU for in t*V that ^P111*11®!* g»»n« rredenre in WeMrni mediriae, w^ do * .tat *W*** many species the medicinal properties of not yn ^1j|) t^m ^ ^ goropejlB phariBaoopoeiaa.

T'

tion of jj Ull,olll ««ig organisation to rumuder step* for the presenra- to the endeavour made in India to natural FaUI1* and Flort « Afriri lfBdi •I*"*1 illt€W!il ^ jumptaiDg for nimilar prescr- vation here. While interest in the aubjari of pfcaerratioa of natural Fauna and Nora of India is general it is dificdt to orgaaiat the effort on a sa^cifntly wide scale aad eren were central organi. sation aiming H prwerTltion on *>m* worthy scale agreed to-^aad it may be — the PHcti ^ tMy %iittln ^ lnmt r<l|ltiml organiMtioB is Mraaaarj the Ht^jti U:ml d»fficultiet to cartj it out mu*t be great. Although considt| ^ diL far lrLieT— ^ tllf IndiaB ^Tf10^1*01 mw* to send o J ^ P ^ tia, .opt' may lie ia tht iiriUtioa to Iadia the preservation to the international gatuer.ng .a f da on where going to have th of UUr», p4rticuUrly in r^.ti«i to Africa is not yet too late to form extensive national reserves where nature is perhaps can have free play, but the destructive hand of man is ever busy and the formation of such reserves cannot be delayed indefinitely. No body of officers can do for this object what the Forest officer can and it is good to know that the subject is receiving the Department's attention.

A aтAy
H. ChTJ o* thf P0Ot tube rclee oi Podocarpus chinenais by suppose «dhuri and A. R. AkhUr shows that there are reojonj to mycelium · Glanced •jmibioeis hctwoen the host and a sterile fixing Inhllbilill « th* tubercles but further work on the nitrogen interpretation 11111,6* of tfce fun ^ " would seem to lie required before the U fully estabIiahed.

R. H. Dastur **d O. A. Ktpadia of the ttoyal Institute of Science, Bombay, ave an interestin examination of ta « »natomj ol climbiug plant* in the Bombay Presidency. Tlit nature of the inTeatigation itwlf is not new, but, based as it on mmt€ al thAl AM not preTiously been examined for structur ad«U ^ *1 P^uluntiet atmx-iat*] with the climbing habit, it and **t*rit) Continni thf muit« prtriouiily obuined in other ^ ^ anrnT * ' ^ Cmfe§ ***** " conflirt o , T fr lf *o tre W**0 " JWr p !|/miloai ln ^k^ning» that take place. An examination of •^iUo "1**"11*" lha< pUnlS of th § kind gnW* ttlldir COllrol" ous a" lo (^ir t»imngs might yield anatomical data of value for comp trx* with what has already been obtained, and A comparative study is sugges

Blatter a<d *K,*UD ^Vf fully dwribed and figured two Mf Utricularias frt>ln ^e Western *UhmU—Vtnc*l*nm tquisetteaulu* and *Utricula* ^ *otfHoifxrma.* T. C. N. 8ingh ootinnes his studiet on the teratology of Indian plants. He deals with abfjornialitiea in seedling, **f, N^n and sccil IU some eight fairly common Indian species. Mr. ktlkat Beluri R*iu(» ku made certain additioaa to Uf ist of *%%%, tJr*U* aPP^nnK ia I>u«hif* Flora of the Tpper Gangetic N oajii^.11111 •^hbourhowl of lVhra Dun. These planU have have •pPt/Vro111 ^ "ork fitljfr by orersight or becmuse they ^ti^11*1^ in the area mare the collection of the data for lU

JS 5S?f UttrU1 S^U0H.~During the *jmr* undar report

Jrj* th ?*• '^kibiud in the Public GallerT. Further working botanical specimens Elected in the prerioui year ia awaiting completion. No Uwir coti111 }*unA*rUkn hy ^ Curitor for want of funds due to retrenchment of eipenditure. Additiomt of new specimens to the Gallery and other improvemen effected until financial conditions im ... necessarily confines itself to in ^ allery. pro»*T •Pk^p «-cart oi tk# •p^»»«i tktt are exhibits

WH ^ tht IT11* lU •MWaWtut of aafetj Batches won the ... Quinine *^ CiBofcoa* ptWurti wort added ... •* tUt a tk OoJlofj.

About 5.000 labels for exhibits were replaced by printed or typed ones.

As usual • number of berbarinm apecimtnn eihibitod in th« Gallery Wer* "^placed by coloured drawing of plant* which *bow the fruit « *nd the leare* in their natural bearinr

" A CatUl0*™ of Medicinal Plant Exhibit*" in the Gallery has been ^ ' W and nwterialt for another Catalogue of Food and Spice Plant Exhibit* are almost ready in manutirript.

Informa *lon r*ir*rdiD|r the aonrren of ftnppiv of fcnnomir pknta and th • eir J*0^110*" wt* |riT«i to numeroun coTTf*ponoViith both from India and abroad, and » oonsiderabl* nnbor of pUnU and plant products were beatified on behalf of ftiiiiMMUt DepwtaawiU and the general public.

Info f--ion on ***•"*!• of UM followinir wma rapplied to a number of tpplicmaU '• * *ron pt • o' tlf world :-

Mallotus Philippinensis, Muell., Podophyllum emodi, Wall., Aconitum heterophyllum, Wall., Arachis hypogaea, Linn., Pyrethrum sp., Boehmeria macrophylla, Don., Mushrooms, Zingiber officinale, Rosc., Carum copticum, Benth., Psychotria Ipecacuanha, Stokes., Pennisetum orientale, Rich., Strychnos Nux-vomica, Umm., Teraktogenos Kurzii, King., Abrus precatorius, Linn., Digitalis sp., Papaver somniferum, Linn., Nelumbium sp., Derris sp., Hydnocarpus alpina, Wight., Lathyrus sativa, Linn., Artemisia sp., Vicia sativa, Linn., Edgeworthia Gardneri, Meisn., Mimosa pudica, Linn., Hygrophila spinosa. r. Anders.f Carica Pap ^a, Linn., Trapa bispinosa, Roxb., Coffea sp., Thalictrum foliolosum, DC., Caesalpinia sp., Ipomoea Batatas, Lamk., Myristica fragrans, Houtt., Plantago ovata, Forsk.

III. Cinchona and Quinine.—Bark. There was no import of bark from abro ^ °* Oo^aimantait «^ent durinpr th-.mr. Bark harvests ... ng the ... as Plantations amounted to 177,061 lbs.

^ *i* li; , Illcl»<li*#t tha atock carried orer from the previous J * ich *•• «•• toUl «• tho Plantation. Aowed IH.IK 1»H. ... Bengal Government Quinine Factor at Mungpoo (but the entire quantity was on tha waT when U» rear cloned) Unrinf at the Plantations a ilork «f 114.176 Iba. M a carry ottr to 1MMS.

Mungpoo stocks of bark carried over from the previous year were, Java bark 433,572·7 lbs. and Burma bark 104,520·6 lbs., lktt is a total of 538,093·2 lbs. as opening balance for the year. To the stock was added 91,912·6 lbs. Burma Wi* ktafiM h • totJ ef 630,011·7 lbs. During the year 90,IOO 1W., rf Jm fc«fc wt.

?**•* Wrńg 404,472-7 At., Ja*» bark and 198,430 Iba., Burma H l W t i i , i toUl cloriag balanceof 600,9117 Iba., u * ewy over to 1932.13.

Th» total rtock of India Government bark at th« doae of tke 2* *•• 778,1087 lb.., oomprlMd of 114,176 Ib... at tke Mergni 5J*[1]**"*. 600,9117 at tko Mungpoo Factory and 63,019 1b... on way 'ion Mergni to Mongpoo.

During t[l]" ? • " a , 1 0 0 *••• of JIT* Urk *"" Wt>rW *** 1,536·4 Ibs., of Quioia* 8alpkate and 469^3 Iba., of Cbehona Febrifuge wer• txtmcted. Tkia amafl «tractio« b dw to tk« wrroBder of the »«jor portion o! tke grant unbW Extractio* CWrgM M a consequ••w of the ntrenckmrat campaign.

of t?!!*<?«^«"«-Ai tkf CIOMof tb«yoar the Mai GowuMaJ r *[4] stock of Qnininc Sulphate pnrrkaaed at reck a»d •xtractad from Java Md Bum. Wk. .mounUd to 290,148-928 Iba., of wkick 67,352·874 Ibs. Mungpoo and 4,611-828 Iba. at Fad«vatta«.

Stock •/ CIMJUM rcon/MM.-Tko total ateck of Ciw*o«* Febrifuge "*[th]« «!«• •» tb. year amomntod to 29,963 1b... of wbick 19,401 Ibs. *m bold at Mugpoo a>d 10,462 lb.. «t Hadarattam.

Sale of Quinine.-THTU* tbo pa* under r V[t] J Quinine from the diferent «tork. . — t o d to !«.«« Ib«. ag.,iat 19,987 Ibs. in the Previous y ea. Tb. akat« of tko pn>T»«. xn the distribution w«• P~jab 9,M1 Iba., Unitad Pronnc« 1^38 lbs., North-West Frontier Prori... «W «».. B.jp«Un. 438 lb.' Central India 412 lb.., Mki ProriK* 1» lb... Bal«ch«ta« 212 lbs., Persian °«W 11 lb.. ..d Madm. 4.000 lbs.

Excluding the quantity taken over by Madras Government the sale of Quinine Sulphate in the India area comes to 12,952 lbs. only. This decrease in the sale is accounted for by the absence of any indent from the Inspector General of Cinl HoepitaU in the Punjab and by a smaller total indent by tke Medical Store Depot, Lahore. During 1931-32 the indent from the Inspector General of Civil Hospitals, Punjab, was nil against 3,500 lbs., in 1930-31; and the indent from Medical Store Depôt, Lahore, during 1931-32 was 7,000 lbs. against 9,500 lbs., in 1930-31.

Sale of Cinchona Febrifuge.—During the year under report the demand for Cinchona Febrifuge was heavy, and 194 lbs., of India Febrifuge had to be taken over by the Provincial Government. It is anticipated that a very large stock of India Febrifuge will be taken over by Bengal during the ensuing year as demand for this product continues.

Revenue by *th< S*** of* **gmniitr.—During 1931-32 the actual receipts** aiUouilted to *•• **3,17.010 against Iln. 4,4:1.073 in the** P^vio

U **by credit sale. The credit sale** incluci<M **WnienS by Provinces.** r*fU in tlle imi€ of **Uwnroent Departments in the United**

The cost »' **1W Hw. of Cinrbui.a Frhrifu^ •«k«'n OTPF by the Uovernment** of 1WnK«l. **ni.f Kn. l74^i wiil I* credited by thai Government to ^e Central Revenues during 19.-0-33.**

Plantation—^n **pursuance nf the general M»II«-\ of rt-strirting Government** a'i>4jv **India pnnJuttion of Imrk, no exlenaion ot the aiea opened out rnuft made; plants going out bving merely refill* of areas** ... \j-wa<i\ **HI ruhivaliun The nrea lu«t o|*ned out to tlit* west of the** r*»**erve has doue very mell during the \ear which in some res**

-P*-u iU!fc i^,, the bwt oi M ior rinrhoIIB.

IV. F

*•. 2»8 Q ^aUCial- ~Tho **t«tol budgrl Jlohucnt for the >ear «as** ei>%'0 o| mn»^h K» *M,m)* **(lurluding K». 2,00() for English** Si 8u^ St rWl Hlffh **Commiwifmer'ii liu.lgvt) na, for the H*tta-** *Um P^^1" **including the 1IIJII-IIIM! Section. Indiuu** b j 1 ^ I and U".iJ;J7**.lW for (imlioiiu. Surreuder o! It*. 77.Mi** 1 °»c] s rUUk the toUi **budget allotment l»emg** *IU.* **ti.448 from the** St % •un^T"V **pr0|*r *nd H* 7I|I9S frolu rimho1111 . TLerfl mii** t«" IS<>tl!r of 1U *l,im ,,U* •<<,,lllDl of Knff|lin **rbnrgri on** [TUrH t» ii.-1fter **•wrreuders the allot men t« for the vear werr** (y*1* K|or^' °'i:4,J^ **'or liotannal Survey (including Charge., on j/Hout,.** •*[' "*D (,o|**nniiRaioner'i account) und li*. lu"»XMrj for** L4^.otU * *?•' **wlnnl expenditure in the jemr was** ... **including Rs. 61,864 (eicluding Knglmh Charge* on Stores Bota**Si gJJ^**' 13 °» ««xiunt of 1X>M or (iaiu by Ki« hange) for **under Botanical Survey** «nd Rfl. I.G.J:G9Q *fa* ***Cimckom*.*** **Tke ne4 sarinf Cinchona Rs. 1,** ... **of India proper was K». 1JW nnd under** ... **was reported to Government of India.** **under severa! lUSBH. A** surrender of It*. 2,278

V. Staff.—Mr. C. C. Calder, the permanent Director, BoUnicm) Survey of India, was •• >-^ **'ro» 30lh May t 28th November, 1931, when Mr. G. E. Sh*w ktU rha^ •• Oficking DirtHw, Botanical Survey of India.**

Mr. V. Narayanaswami, the Senior Systematic Assistant, who left this Department in 1929, leaving lien on his appointment, reverted to his substantive appointment in this Department on the 4th November, 1931. From this date Mr. T. D. SrlD1Ttii0 wko **was acting as First Systematic Aasi«Unt bt<Msf 8»«J SysUmatio**

Assistant. As a consequence of this reversion the services of Mr. tt. *L.* Hudhwar, the probationary Second Systematic Assistant, who was deputed to carry on Artemisia work in the Kurram Valley terminated with effect from 5th November, 1931, under instructions from the Government of India. The post of the Second Systematic Assistant was abolished as a consequence of retrenchment and Mr. Srinivasan was served with three months notice of discharge from 16th February, 1932.

Mr. U. C. l»al, was Assistant Curator, Industrial Section, Indian Museum, throughout the yeor and held charge of the Government of India Quinine Store in the Indiiw Museum and of distribute of quinine extent from 1st April, 1931, to 12th August, 1931, *beii Mr. K. Dan, Head Clerk, acted for him and Mr. S. b. Banerji acted as Head Clerk.

In consequence of the retrenchment campaign the followiag po*U were abolished :—

Upper Division Clerk, port, of two Plant Collectors, on* Duftry, Industrial Section, Indian Museum, one Peon and temporary Bearers for the Industrial Section, Indian Museum.

The Government of India decided to abolish the port of the Assistant Curator [illegible] decision was arrived at for the [illegible] of this Officer the post provisionally retained. During the year Mr. K. Das, Head Clerk, and Babu [illegible] Upper* Division Clerk, retired on superannuation. Both were able and conscientious workers. Special mention should be made of Mr. Das, who rendered over 36 years of Government service and held responsible positions for many years. By his retirement [illegible]

On the Cinchona Plantation, Mr. P. T. Russell, was Superintendent, Cinchona Cultivation. Burma, and Mr. Mg. Si««. Overseer, throughout the year.

All the members of the staff and the clerical establishment have worked quite satisfactorily.

C. C. CALDER,
Director,
Botanical Survey of India.

MGIPC—L—III-7-8—4-4-32—400.

*^ePort of the Botanical Survey of India for 1932-33.^

I. Systematic.- The activities of tbe BoUnical 8urvey w.»re again curtailed through causes that have become too general and prolonged to need •Pacifying and work has spun had to be confined to tbe herbaria at Sibpur and Calcutta. No ofhcer of the Purvey could go on tour ; so w... iuu ^i11*^ °*d to relv on such outaide help as could be got for repitniah-r^ V^kctions and for tbe prorunng of material asked for by cor-by otk ent# '^* 8Ucn ^e P' w»en it can be given, w readily rendered % i* ^oTernm^nt Departments, Universities and by individuals b* the*?rtUne of ^ ***•**, but however willing outside helpers may ... train 4PC nUDT ^ueitioils ^^ can on v ** wett ^ economically by ...tin. L*1 botanist in the field, for he alone can take in his utride, when ...s his general collections and notes, the interest required in looking after the diverse needs of all the correflpoDdcnt* who call for help. Yet while the r%*^7 courtesy and wilUngness to contribute very seldom fail us w **<* th^J11101 ejeaps tbe feeling that we call very often for assist °Q ^om m •^ Btrtly the time and enercv but tbe aMIiti of thoas fined to kl! ^T* COIW ^ wl T iil*·to the good, therefore, that, con-... as ever ... uarten as Survey officers have perforce been, there is in India ... widening snny of workers—the result of the modern tendency in India as elsewhere sway from tke arts to technical and scWmti^o training—ready to co-operate in the work that the Survev stands for.

2. There is ... food deal to review, some of it mork with special re-... ^U \J^** iom€ o • more gensral kind ytt haring a more or less ... 7 ^ I ... n ... botany.

3. At ... ne—quarters A ooosidefaMs amount of work is doe for rs-cord. Specimens determined amofiDt to some 3,377 sheets. It coal-... work on the Naga and Manipar HiU plasts. 8ocoe 2,24C sped-mens have been rjiosi?sd aad 1,40*2 distnhiUd. lUqnesU for tfct supply of seeds and specimens frsjsji sUarsot parts of Europe, America and India have been complied witk, Akowt 330 sBinisisn wets sent out on loan for monographic work.

4. Mr. Biswas paid a further visit to the Cinchona reserve area of Southern Burma where he specialised in the collection of herbaceous plants. Particular attention was given to the ferns and fern allies, groups that have been relatively neglected by students of Indian botany.

5. Mr. ^' ^·^" ^i8c^ercontinn«« his work on the Flora of the Southern Part of the ,>PnilwuIa now in progrtM at the Kew .herbarium. The large and fc f,'®cll,t family Gramineae remains to complete the work which *-oul(, prove M %&2uable a standbv to the botanist in Southern Indi- tipp^n* (onipanion from the point of new of date—The Flora of the Mr. j.j f*mnWtic PUin-does to the botanist of the Northern plains. recentl. eF a,S0 de8cribes iome &«* species from peninsular India, one one Col) co!lect^ by K. Cherian Jacob, a Hof.ea named after him, named. eC^(l lly K*nga Ch*nar in the Niljfirw, an Eriochryws similarly in Cochin while * "hwt from Wrwlau oripnally collected by Me^hold Southern r* noW namec* I*whno setoaa. Three other new praiwes from Southern India arc al80 reported :—Iaachne M^boWii from Mytore, Isachne Angladie and 'sachne Bouraeorum from the Pulni Hills, all new to Science.

6. ll u

a kg fe.i M*>"ur*nathan • Flowering PlanU of the district supplies **< UB need for a local flora dealing with the planU of I^draa City who wi^enVlrona: ^^ book is primarily intended for the amateur around him * V[1]^ w*v·to recopniae the commoner species of planU to all and f " u i type of publication that could with adtantagt of it me othe °\ ^ o4U8e of botwucd itud>, ** «P«ted for the di ***• the VRfr towns of Indit The Mme tuthor with Mr . Gravely JJ^t and j. lnd»*ii t|WCMt of the genus Carmlluma, and their arrange- fc*°b*rvtt7Cnpti<*i ^^ flfllWi gWn imnMiwlv. froni the fact that %** ^ *ild .T* ^*Vf ^>ffn m ^ enot merr,>f on drv b«%rl>snum material * Un^jJ> *" j u t n d from material sucosiafuily cultivated for sexeraj 7. ... conditions.

... species of flowering planU from ike South Indian bigk* lands are noted on b')' Fyson. Two are new, Osbeckia Kosca and Noto- sia thevarow... K\ ******

foun<1 Kro^ moDlb«r of the aerodendraJe*, KcKa«ory»lop»is indict. ... ing at the C-oorUllun Falls in South India, ui described by •olf of the ^nn*'" o, BoUhn w ... contribution to «u»ung know in ;V*o,<hy««* «w given by Bbcnd-vai* from material > HT *u|"»ir.

^n a,.

agail!"?1"11**" «« th# Flor. o(«« tb* Ut» Pwl. Cnib numbers i Lom K m ,' «»B«*oMk MM IS Cbatliiiuus tbott ...uned •nd L!." «"1" LWIKUM U 4 • »tw PMdwM*til This must be an ... as new during his drawn up by Prof. ... the last descriptions of new plants from *.. His work grew in v ^ sub, a one time Curator of the c b p w Herbarium. feared, he has '«» bZ* I? h* •«IW«W it ui u bf .«««to have criptions of plan ILZ?. ... completed. His voluminous des- criptions from Siam has frequently been referred

»• tow, remits, md in hi. death India baa lost one of the meat A r^Uhed systematistt interested in her botanv and that of tbe ad-JI(*nt extern kingdom.

.'•• Wenger's collections in Assam worked up by Mr. Fiwher provide tbe source for recognition at Kcw of several more interesting and little known or new plants from thi.« ar-a. Sonerila Khaaiana has its description eUborated and tbe new s|>eciei Bvponia Wengrn, 8trobilanth«» trichoj)horu-, SoneriU villosa and Lepidajrathis hyalma >ar. are fully descnM. Other species new to the area include lm|«t»M puberula, Acer Foreatii and Wardii, Desmodium oblonpum. Pnmm yunnanensi«. Lactuca mnrrorhira, KmWm (larkii and n'vri.flor.. 8«"*•• nervona and paniculaia, 8trol.itanthe» plutimous, Elsholtzia -isitt, DplN-bunjw Kuriii, Hhyncanthus longifloru. and Polytora wallich>iana.

11. Th* Assam Flora under preparation partly in tbe fiekl, at headquarters in A»«m. and at the ftbpur herUrium ia now]«saiug througnh "»6d. of p. c. Kanjilal and Mr. A. Daa.

NHi,BUt«« and McCann continue in the Journal of the Bombay *W Hiitory ***y tDf.r nyuim o(th*Um o(o Bw lav ing 1 ^ 1 Th orch^ »re at preaent under revision DIMI-I l»-ad-cescriptive of th PknU, their localities in the Prrwlrnry and distribution •>«'»her* ID lnd.a. Beakiea tbeae the BalMmmacrae, Rutace Jo— ?* "'^ Astlo|.UMl.c««e are alw under revision. In the same ! » C T '''*"" * «on»n»,ution of Blatter and M.llard. " l^utifwl •nth. •Teca" "hk Mr. R.B K»Unk I T.8.. r«ntinu»«K h'» ">k«-r.-st d^J^op •ha. pveI1 cop.^, noU-», u* Fern.of ihe M.haUk-.LmM

13. Bl t ^ ha. tUo pui.ii.hfd in thf Journal of thr Indian BoUniral Society a l >Uof pUnta collecUd by Whitrhi^l in Mmo|H)lamia ID 111 18. Nearly all ^ •P^imfna com from tbt nrighbourhood of Baart, a di#-trict curiously enough IfM well known Iwtamcally than othff |itr1a of Mesopotamia. Although iht collection WHJ madr nioitly on ihf Unka of irrigation creeks •nd in adjotmng planUtiwia of data paltna the comparative absence of woody §p$&% fal thr liat n notic«iM«. Tbf bit shown, M is P^h, ^^raJ, t prvpotfaBK* of XeiopbyUc aud aaJt loving

14. Paris ^Cow M (tK *n, Wlk> *m„U matfnal fmn Kew. Witbiffb. AI«niH«f sion the ?.*fDdUniU !! U ,h*lHm*1- ^publiahrfimw^lrtpmi-* -eastern Indian a genus of small trees and shrubs, natives of India, previously marked the Archipelago and China. The confusion which and several species the nomenclature in this group is reduced to order new species new to Science result from the examination. The species are :—Wendlandia Sikkimensis, Wendlandia formosana,

landia •adlaadia sptcioaa, Wcndlandi* grandis, Wendlandia Camblci, Wend-
Wendlia pbilippinenaia, Wendlandia Amocana, Wendlandia ternifoha,
^ m h a andamanica, Wendlandia arborensis, Wendlandia Burkilhi,
ya^dlaadi* Angustinii, Wendlandia Erythroxylon, Weudlandja sibu-
***** b«*aidea numeroua varieties of specie* formerly established.

tributio ^ Mi. Biswas has dealt in a *vtry* interesting paper with tbe dis-
on the n of tbe wdd conifers in *the* Indian Empire. A similar work
suggested 8^nus Querius with, if poatible, an extension of tbe range, ia
Mr. Biswas *u>* my worker wko has material and bUrature at his dupoaal.
Empire ^as also published a paper on tbe bving conifers of the Indian
a very in the Journal of the Asiatic Society of Bengal. Although
lt^i ^rge number of theae are plant* introduced to cultnation in
ho f 6 brin «in8 together of this bat will prove useful to many people
widely lnull »f with Conifers in other countries where they are more
plants * preientfti than here, Uke a special mtcrest in this group of

16. % Qt .^Jpine has experienced the difficulties in identification of
Up t Q?*11*' * difficulty felt bv not a few forest officers, and has dram
not* on their identification in tbe field of Cox's Haxar.

17. Of t|^ R " *[• P*rkeT examine* the stnctlv Indian species of Vitis and
tion of tb oOn,Uiri* P^nl *»Ui nug<>*». The geographical distnbu-
value 0(^ " P »• ut«d, carefully made analytical figures add to the
another ^ he diagnostic notes while herbaria isimsma are c»t*d. In
There has l*r Hr. Parker deaU with the difltsH |Miis C> ml»o|K>gen.
printed ... . been a goo j j fm | oj c^fmuon regarding the grasses com-
10 < S * 7 kltr tlu* *<ttttt wtflcD th« present eiaminaUon should help

18. A revision of the genus Leycesteria has been undertaken by
Airy Shaw. The
by Wallich i 18 •x*n*"*u«i of Uyc«s3tena a genus fint esubliahfd
5>lon Wft^24f *?***** to havt been prompUd by tie finding by
private *r^ie« Ju A-ift<n o, * cunoui •Jitiosi.- L. crocothyrtoa, a sti*
a small shrub with to Leycesteria formosa, the on|pnal of the genus.
Leycesteria is, lor thli owing how heteroge-
species. The plant may ••••« ii •* found in previously known
species with varieties forai * ***Mt addiuoa to gardens. Some
are discussed.

19. The Provenance of Early Makyaa plant rolWuona, a volu-
minous work by JoAm*j ^ K4^y*naawa«i, a ssjrrty oftctt. has appsaftd
in the Society of Bengal. This has been
in preparation for a considerable time. It tftUiUd grrattr examina-
tion and fuller reference work than IM *| *Amm** A^Mt^^aW StfSl Stt MB
compiled it should add considerablT to the geographical data incor-
porated in existing floras of the region ii ttfl ii oMff ip doubtful re-

cords of the location of Malayan plants. Mr. Narayanaswami has also had under preparation an extensive bibliography of work in Indian botany. His examination of Travancore collections recently made has resulted in the detection of some Ceylon plants to the mainland, while two unexpected new species in Aeschynanthus and Cinnamomum have been isolated. He has also attempted to clear up the relationships within India of C. particularly the much confused Cinnamomum C. nodosum and C. japonicum. The nomenclature of the same is in a similar state owing to change in the bounds of systematics. A study of the current position of Dendrobium W. and Dendrochilum W. and on the position of Dendrobium Lindl. and Dendrobium pectile Lindl. have been prepared for publication.

20. Mr. B. Cr., of the Herbarium, has published the following papers during the year:—(1) A Outline of Indian Algae, Scope of Algological Study in India, (2) Acrochaetium Alg. from Burma Flora. The Herbarium Notes on Lomentaria. The Water of the Chilka Lake. (3) Second Part of the Flora of Calcutta and notes on the organisms of the tank bed.

21. Of interest at once from the botanical and economic points of view are the identity ... of the timbers ... examining these woods ... existed regarding ... quite distinct trade names. ... probable that the varied opinion ... regarding the so-called species in India ... confined to wood.

22. ... of the North West Frontier ... the economic sphere ... should issue. Considering the limited time at Mr. Badhwar's disposal for this investigation, a very useful body of evidence has been adduced to show how a successful Santonin industry can be developed in selected areas of the North West ... and is making good progress. That investigations like these ... early results is evidenced by the ... retrenchment Mr. Badhwar had himself confidence to go over to this work in a private capacity.

6

8urv 23. The •enices of the Department were »>licitcd by the Malaria 1^^ °t India in the production of a descriptive list of all kinds of ^ U n *ater and swamp plant*. The lack of a handy text confined W%ter vegetation has long been felt by malariologisU and others engaged. *t is fe lU W01* on l^e ^ tnout ion *D^ prevalence of mosquito larvae. Oo t known tnM vegetation in ponds and jhevls has an active influence *&J CSe '*rvtc« and * forthcoming text with some 128 illustrations it u Utl descriptions containing the minimum of technical terms will, plant o|)i^> 8timui*te this important ntudy- the interrelation of the work .*Ud ammal W« of Indian swamps, ponds and waterways. Thia The figur UUn(ier preparation by the writer and Curator of the Herbarium. ** *re P^P^ed and descriptive matter well under way.

24. W or ^, oa l^c *ower Ofders of planU has in the interval not been neglected. however. There U * *oo^ record of work on the Fungi, still mostly ^ Ala **f}*^ to the parasite members of the group, while work on iu the j ^ He *"tlC9 4ad MO«MS goea on. Mr. Biswas has dealt again f^tini Urnt, o, l^e At,mt*c *>c»ety with the organisms found in the ^Vfcub *1^*11^ Oi C4jcutu In lD(••lne Journal an account Wil>er t^^i Ukudhu n *nd Singh of a CoUetotnchum which cause* the "-P ^ ••focC itius plants.

25 O

Allen,' 1 ^H ip!ci€i of Nlt«U» *nd four of Chara are recorded by 0. 0. of Wal«r in "K from lh* Oei«llbourho0,, n, A^ra. The general absence tnd lb* auth Dflghboiirhood nuhtates against this jrroup of planU J ^ t er. KoF § ok*orvilt»ons are, as he states, mostly of a negative accompliK!||mbeleii tW0 new wo"* mxAi mhich ihow what ctn in a subject I l0 eVf0 thf lfMt pmBUng situations nhen interest field botan ! J>reifDt ln d when energy to find what eiisU pushes the

betw* fMd<iDce the Al •• Educed by Boergenson of relationship k other tod d of thf Northfrn P*rt of the Arabian 8ea and Algae OM tl §Jil^ Dl **** o(the wofW,, ^ relationship which waa At***** lnd n lhf Al«** of Australia and the Northern shore *** and Japan 1* *" DOW exl<Uti d. for species as widely distant as Houth now involved.

27. Prof ... M

phyte ... le on the gamato-

to many ... us, contrary

ment is largely ... develop-

... freedom for growth.

28. Of work of an ecological nature reference na? be m#df u> Oarland's examination of <UurtS|o1 among tfcf |msM W ike Dmto trap dry mixed deciduous formation and its •SB) SB) sub-classification.

S [1] A peculiarity of arrangement **•••• ^7 A C. i«ki is thf pi. vascular strands of Heptapleurum venulosum, Indian

me lu **<* of the Araliaceae, has been followed up by the author who now . ftfrsu that the abnormalities traced have originated iu rwjwnse to ^•iologic4| needs.

5 30. The first volume of an important series on Forest Trees of the British Empire by Chalk and Burtt Davy has been issued. The work combines fully descriptive matter with morphological features of diagnostic value of about ... of African origin. If the scope proves to include Indian species as it is to be hoped it may it should be a most valuable addition to literature for the Forest Botanist.

31. The rate of progress on Sir David Prain and Mr. Burkill's monograph of ... resumed through the influence of ... Bentham Moion Fund, who, on condition that ... give a portion of the funds necessary for resumption, were prepared to supplement this to the extent that 32 botanical plates could be produced ... the year ... 1^4 should see the work finished so far as illustration is concerned. The Annals of the Garden are fortunate in having secured a work of the magnitude and standard of this Monograph.

II. Industrial Section, During the year under report about 207 specimens ... in the Gallery. Most of them are ... of fibre ... oil seeds ... coir, coir matting, etc.

2. N ... due to ... undertaken by the Curator for want of funds ... of expenditure, but it is strongly felt that if the specimens are to be kept in proper order by replacement of those which are decayed due to ... Curator will have to go out touring to collect the specimens to replace and to add to the ... already.

3. The ... thoroughly renewed and brought up to date ... of the different Managers ... at all the important Tea Gardens in India and Ceylon. ... Commissioner for India of the Indian ... Committee, Calcutta, presented the Gallery with a set of 17 photographs depicting views of different aspects of plantation work and the growth and manufacture of tea in India. The photographs mounted and ... form a very useful and educative adjunct to the tea exhibits in the Public Gallery.

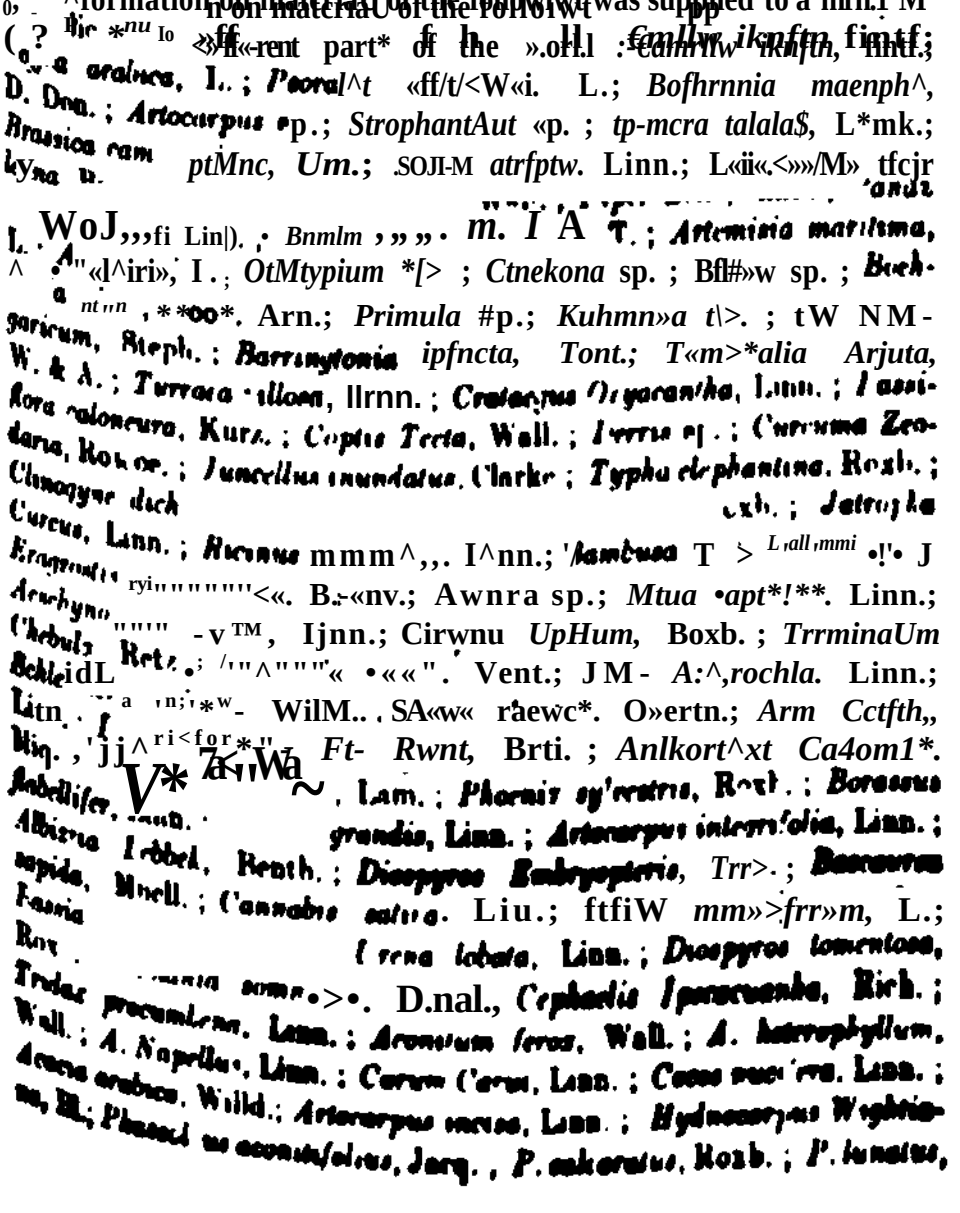
4. Messrs. D. G. Dutt & Co of Calcutta presented a ... of coir products manufactured in the South comprising beautiful specimens of door mats, ropes, mattings and fine fibres used in cushion work which form a very attractive and useful ... in the fibre bay of the Gallery.

• Kxhibit slowing Cinchona and it« produoU have been renewed.

«• About 2(KNt l»beU (or exhibit* were replaced by printed or typed «« and, u WUHI, m num ber of herbarium specimen* exhibited in the jT»y were replaced by coloured drawings of plant* which show the *• **d. leaves in their natural bearing!.

7- Information regarding the source* of supply of economic planta *yku* producu wan Kiven to a number of correspondent* both from *nd .broad, and a conwderable number of plant* and plant pro- *erc identjtwd on Uhalf of Government Department* and the »l public. The National Ayurtedic College and Hospital (Ba«!)ra Mtra K tha PtriMd) o(rak•u•tu applied for certain .pecimens of « plant material with a \iew to extend their Muwum and the Inrti- »•' helped with about 196 such specimens dunnp the year.

8 ·^formation on matcriaU of the follnwiwt was supplied to a mrn.1 M



tin .
lift ' '' ^'¹¹7⁰' **.1 ?ir- *ta&wtoif* Linn.; P. *raJiatu**, P. *rulynii**,
• ᵃad ,4/»TM*I *gratYofenn,* L.

f^ III. Chchoni and Quinine.— fl/rf:- There *as no hnrk imported duri *broad on ^omnmt,nt *<*ount during the year. Bark harvest* NtR tlle yotr on the Burm* Plantations amounted to 78,382 Um. 0^the stock of the last year 114,170 lbs. of bark VM Rent to the Bengal of ^TntUoni Quinine Factory at MuitrjKM) thus leaving the total ijuantity 0y.?V*W bw* namely 78,382 lbs., at the Plantations as a carry * ^ 1933-34.

were •,*tmi:poo storks of bsrk rarrieil over from the previous year ... wa bark ... ^ of Gcni,911.7 lbs. u opening balanee for the year. To the Moek fr* *R 177,195-** lbs. (this is made up of lH.17fi lbs. dwpatrhed from the Bur«» PUnUtions during the year and 83,019 lln. dr^patrhed POQ the Mantationi* during 1V3I-3;[1] but reaching the Fa·torv nt Mung- ·>ar IIII n8 103 .3<<)» brin K»ng in a total ->i 77H.H»«-7 Ik. During «he 62,355 •<i,8KH-3 11M. of bark M»« bmrl JM.M33-3 lbf. and Rnrnia bark lbs. of R were *°rked l»a\inu 345,639-'• ll». of Ja^a bark uml :}||.U7fli-rt carry B|trm» Urij ᴅ>> a ^^ c|wug balance of 0M.71H-V lbs. an a ov^ to 1933-34.

3. ^jJJtL[101]*[1] •tork of India Government bark at the clow- of tl.e year and 656,718 W IU. comprised of 78,382 Ib»s. at the Mergui Plantations *hs. at the Mung|>oo Kartory.

4. bark ^'irinc the year 121,388-3 lbs. 'Java bark M.K1M lbs. *pl»i* Hiirma ... 4,953 lbs.) were worked and 3,Mi lb« of Quinine Sulphate and 2,004 lbs. of Cinchona Febrifuge uere eitrstted. Burma bark j;ave ° Ib«. of Qujnj^ Riilphsite And Java bark gave 2,582-fl IU.

5. ment ... !°^ y W[k]«»«r. · At the close of the M the U)Ul Co*enr of India» ttock of Ouintne Sulphate purchased as Mith and extracted from Ja\t a&d Burma bark amounted to iWMW-lKttl IU. of which 62,634 lh«. lay at thr India* Museum, il&.513 lbs. at Mungpoo and 4,011·828 lbs. at Naduvattam.

6. *Work of Cinchona Febrifuge.*- TV total utofV of Oinrhnna Frbrifuge at the close of the year ... eJ to AlW »«. d whirh w»w«f 12,300 lb, ... ^Hi ... ? ^ *t Munrrqq ... 10.4M. lbs. at NanVatUm and \Y1

... of Quinine. During the T«*r ninlrr report lit* «•!* of QUUUM from the different stocks amounted «• ll.38 lb of. against in the previous ... were . The shares of the provinces in the distribution Punjab, 77,678¼ oz.; United Provinces 1,887-6 oz.; Rajputana 861-8 oz.; North-West Frontier Province 208-0½ oz.; Baluchistan 82 lbs.; Central India 304½ oz.; Delhi 238 10½ oz.; Sind 4 lbs. The

reduced talea of Ooinioe ftilphate are to be accounted for by the facti that Mad"^ di<* not indent and by a shorter demand from the Punjab thi! yetr< D*m**d ^rom the Medical 8tore Depot, Lahore, WM murh lea1 ^n what it was during tbe previous year. One pound Quinine issued from the Mung|>oo Stool if to far unaccounted for ; thii was forwarded «« samples to the High Commissioner, London.

8. Raie of Ci*-k<ma Fdrifvge.- Until it ii uiied op the Government of BeDgal mect tH indenU for Cincnon* Febrifuge from their own s*.ft^ so that the amount due to India on account of Febrifuge receipts ^ * not McerUinable till after the close of the year when the ftiirl-.tal>tici11 rMlilt« of th« working at the Factory become kno*n. b. i£g tbc) ' w Ul»der rejiort the quantity of Cinchona Febrifuge BOM tJ,e'-- ^ °n the Government of India account wai 8,96825 lbs. from lUKk oi Government of India Febrifuge at Mungpoo and the Preside* Jtil, Alipore.

*ipb "eTfntlf h I** ** of 'Juinint-. During 1932-33 the actual reyetr ^I0llnt^1 «« R«. 2,16,988-8 against Rn. 3,17,MO in the previous 12 \L the total receipU Ks. 1,00,3911 were by cash and RJ. 1,16,494-1 cr^it sale and R*. Wl 11 by Bank Draft.

w<cv:."""''''»•*.- In punu«oce of the policy of Government • Kvinc ,CUt*d .v U>* trmn»frw.c* of Public Hf*ltb •* • iubjnct to the *c<*uou *oJ '" con,or«u|ty *>*» the reoonimend«tioM of the Public *° itifh* (<"nmitt<* to liquidate itockt and contract production- ^"'fict*** '" th* "*• o' tb* lvl»nUtl0IU iD Burm* hM beeD DMMJ," tr*^ m!!" '" thf effort " «om« 0D *• <luick' r *• c00*'^"1*00 fo»

°'Utk trp*» »rp, however, .till aome way from giving the harvett V, i(.*•* c»uM Ri..e ,f ,||0Wfd fc,, ^ 1 , maturity, and it muat. thereto „' "• •» U> be made proper u*f of, be aome ymn before redoc-""•te ! ? r r*" ^ flfw't*<1 ln th' ctreumauncei it if perhaps un-%>k;b ,,.***th* he«t are* of the rearm ao far utibaed »hould h« that ?** o(T!" the vo"»«»t Onchona. but one could not foreae* the "I'nnvT"11"4011*1 ^»»opninit when a Cinohooa programme waa I > Cui**"1 whl1' P"*-nt producuon »'* W d o' what u J*airabW "^ »il| " c*ru>n '»»•« • «'«ne will MM when the atocVi pro-HPpbn o(PTpOn* ^e n«c«Mit.v of having again to depend on foreign v» *•»*, oi the dru« . Tb* «l*'i»t of Totaquina moreover prondea I uW|p u> Y J11'1*11*tb' B » " « «•'•««««»»* • '' ' ro«npo'tlon tbat f0'>lh th. Uoc* <*ker Mppbaa at the united i t « b of bark are put

you "«*» •*•/*•• •" **H worked o!T a. raHIv - P«rt«ltl». *• *• ««oding »ri| but there u »J •>• 1 ^ " CM W *"»

change '* the eiperimental result* so far evident. The reserve as a whole 11 only moderately fitted to Cinchona. Wbik it is being worked out an '^her industry that may well prove to he worth while in the finan- tial ^ is in course of development. After many 7ears of eiperi- ment 011 *1! the Cinchona Plantations the best means of harvesting Ipeca- ^tnha u a nurseried plant have become clear. There has been much on here thtt thew lbouW no longfr ^ nece§sitv ^or w,itnce American sources of this important drug plant.

IV Financial.—The total budget allotment for the year was Rs. 38,000 (including Rs. 1,000 for English Charget High Commissioner's Budget) was for the Botanical 8ur\e? lor CiJfc Dg tbf Indu «tn»l 'Section, Indian Museum, and Us. 1,25,000 allotment. A surrender of Rs. 1,765 was made from the total budget from lf098 H from the Botanical Survey proper and Rs. 667 appropriation. Charges on Store*, so that after surrender and re- (this ejfcj the •u*»*nU for the year wrre reduced to Rs. 1,61/233 was for 2? Proviiuon of «•• 2 ^or losi by exchange) of which Rs. 39/280 Rs. ^ S W ^ propW| ** w for Kngiih CWgfi tnd was Rs* I L or Cinchona». Tb« total actual eTprndituro for the year Stores W Q*mfly **• •^•8 (including English Charges on for ftotan, €JCittdlll« *• 2 on account of *lm%* or Cam l.j Exchange) Hr the 2L ind *•• l.»Wl for Cinchona. The net saving Cinchona RtT 8uncy of lndlt ind 1,765 was reported to the Government of India.

the year as Director.

iT^tare**1 Curttor« 'ndustnal SerUon. Indian liitffum, through- or L 10 ^M lw eT>tm*foramoDlhlnd *htlfonle*vf,from 9tb NWm ut,e, ml,fr IM2. ^" the Director himself took over charge

2.

year excepting V15 swami was the Systematic Assistant during the ber 1932, when for four months from 13th Jul? to 12th Kow-m- Assistant, acted Mr T J i D. Snm^aaan, the now wtitnchtd 8ysUmatic for him.

3. Mr. U. C. Pal Museum, till the % ** AiilfUnt °««tor, Industrial Ssctioo, Indiaa ment the post ^ ^ov^mber 19.12. when u a measnrt of fftrtack- with his retirement H#d Wltb f*ffft fTom thf 1§t of Drfi*ir *lWI,* service **ltii^b* He bt<1,^ndend aort than » yean of msftorfaw

4.

out the year. Banerjee was thf Head CWrk o(tkt Department through-

5- On the Cinchona Plantations, Mr. P. T. Russell, was Superintendent, Cinchona Plantations, Burma, and Mr. Mg. Sine, Oveneer, throughont the year.

*• All the members of the staff have worked conscientiously and well 10 the difficult circumstances of increased work due to development •nd to retrenchment of posts.

C.C CiiM«r.
Director, Bctamiatl Surrey of India.

[illegible]

Report of the Botanical Survey of India for 1933-34.

tK^ I. Systematic - Very little in the wav of touring wan possible the ... the Year. The activities of the Survey WOT. a* ha* been q^,!** generally since retrenchment «iu rffecUnl, confined to brail-for ... at the Museum. No officer of the Survey wan deputed outdoor work, and apart from purely local collection* all the new material ... to the herbarium came from other departments and individual officers fortunately placed for field work. It is fortunate in times like these that the Survey is located in association with the Royal Bot. Garden, for here are grown a large number of plant* that arc ... the immediate neighbourhood of Calcutta. Many of the ... specimens of the Garden ... an rt«»ck from which distribution can be made ... inadequately, to make good the deficiency in material for exchange ... thr ... of new work brings in its train.

But if the Survey ... its progress ... maintained by the product of the Indian Schools and Colleges. Many of the workers from them are free lances and the ... of work which result shows how rapidly and ... the purely Indian School is taking its rightful place among the ... of ... of the world. There are now but few divisions of the plant kingdom that have not ... their devotees, and the scope of India's contribution to botanical ... Although work ... with those divisions ... of ... which are of ... importance, predominates, the literature ... logical botany ... mention two branches ... that the Indian effort is not confined to those lines which most ... recognition. Much of the work is obviously done for its own sake and for the interest the ...

A feature of these reports ... herti a hrirf Wfiw «l liw wort donr and published ... botanical study in India, no matter from what source, but it is impossible in the space allowed here to do other than mention a few of the outstanding lines of progress during the year. No claim to anything like completeness is made.

At headquarters identification ... the ... Some 3,611 sheets were named. Many of these are, of course, plants that give little trouble to the herbarium worker; but the list contains its normal percentage of difficult species where dissection and comparison with description and figure and authenticated herbarium

I* * all have to 1* reported to More determination ean lie made. A ** "htomnmti H|Mvimem< may and often do give more trouble to the W*nutiBt than many dozen* that get rwogmHcd at a glance,

a Work iu the herbarium comprised an examination of plant* from Mittle explored area along the Haripada frontier trailM of the Aka AHHam. In tl,,w u>llrdionM wveral new <r likely to lie new n]in-ira ^•. ^en isolated. Amangat others, Glycotmis Boreana Narayanan and a new member «f the ChirurbiUoMB not yet named.

Mat*rial of the gi-niui (JlyeoBmin from the Shillong flnd Dehra Dun herbapi* ha« Urn n-vuml and nnanuHl along with tU»t of the l<«alcollee-tion. The mw HMTief wliirh liave now Urn recognweil as a result of this revision arf TvkniH{ lo

Yanaswami hw formal the HU hjiTt of a]*JHT to »e read Mm the Indian Scien* IonjEn-HH.

Plant rollwtU)I « »^i«' in ronnertion with the work mw going on on the Control h»v<> >«-n rr|wrt«l cm to thr Kt-nriwh Kntonioloprt to ^^P^nal ('ounr|| of AKriru)tura| Kt-nt-arrii. while HI*™1 attention ^UbTu KIVin U) llui A*mmH» Flora now under wvwon for puhhea-W aJI of tllv « N SWviw. Snuiller loUof pknta from Sikkim, of the IVhra Dun nn.1 i-Uwhw *rr aU» rrcal^l w fcirmiiig part

Japan, Hyderabad ww di»tril»ut«l rhiefly to America, China, consisted of dupli MiTlk i>im awi cjrutu. Much of thw mat^nal extracted » MaUyan j.lant* <f mhwh *veral m-Ui were relatively thr hwhanum win. year. ago. The lUbym »« «• therefore ^'rtwntetl in the Sibpur herlumum and th*m dupl^t^, work twhange dunng l*notk when field ((f <> U> Ul. hi dml t Mw a j to the nwmUr of nearly of % j j j p ^ pUnu wrre firm t* the FhtfMeologtml IV|»artment T ^ * < ^r.l M«lrmr in (WirtU lo hm the !«. for a of lhf nf mHmnAi I>UnU |t |t ^^ ^ ^H ,,,, there. Material ^*uiV <lf JVr^ ami HbododajidlWWM on Joan for work l.y the Several ^ MtIuU »>»l Filafcajiak iiMKinh'·

Continent of 200 valuable England, from America and from Singapore. ApurchMT accessions exsiccate (from Kr Vf||b8lll, * « tatfcat to tW

Mr. Biswas, Curator of the Herbarium, visited the Bhutan borders from the plains to Senche-La in connection with his proposed revision of Sir David Prain's work on 'Bengal Plants.' The area is not well known botanically and his tour is a first step towards the compilation of fresh material for revision of the Flora. He brought back a collection of some 1,800 well preserved specimens including several bundles of living orchids now growing in the Garden nursery. Mr. Biswas also utilised

the opportunity he **had** while attending the Indian Science Coi^reM at Bombay to vMit the mangrove AM of the Satatta iaUmU. Hen* the chief component «£ the mangrove vegetation wan found to bo Oriop* Ca ^ ollean^ wh th h ^^ **unporumv** a» a predominant »MUJ>M to otlu»r sp. **JJ* °n thr mangrove wiaiit* of Bengal and** Burma.

Work <m t!l<l " Mur*«l H*wlrAi»" is being continued by Mr. KW-IMT. of th<- Imliaii h'ori•nt Service. Ho lu* come to the difficult un<i numerous group of th<i rAti*mt{ ii H imtural t|iervfori,tluU liw IIOUH published in the** Kew Hu|K›t|Il UI|(U•r tilt• tlt|4> • **New or littli* known plmiU from South India** slloultl llnctt v n§laU> to ^^'"p1,0^' Wltli ljntlclii notes, of **such ftpwMi M AxiMPQU Wightii, ArwaMiia Batfinui, .\ri<.uum translucens, Arisaema tylophorum, Artlimxon ili*|>rmnii«f \rthra\ou villosus, Dimeria bialata, Ukuemuin liaiigaihananuiii, l»*lywuuin travancorense and Manlllurw (orticuUU.**

Pridee °* |ilm- amoii|pit the Honw of the year falU to Prim-.I|MU Ky*m'* "Flora o' tll<* NIIKIFM and I'ulnry liillU>}M " a ri'Vimni aud olalwratwi work under the title *' Kl«»ra of the South Imlian Hill Suiwiia. ^»Uoa-tb ^,, ^ on f. Kota^i, KmUiLiuiaK YWJUWI and th»* wwiitry nmitd by lbe Thl» »» muck mm iliaii a iHToiil fililum of the original work of C^1*"uthor. Thi- an'a m I*XU*II«IIM1 b»y tin* iiuilunion of the tWaa rewrit^ 0n, IUkl Vtrrami. Many of tin- *U*nwr* il«<ii;n|iti«iiis liavo Uvn with iu Whllr *nuM* ui* l ^m have »>wn nhortrued to allow *»l* tht* vuliuar ties of many nuri^roui ailibtimia U*iug kept to a coiivrnn-nt «»'• Tlu« Im-jili-the genera of ^ »P«'i«« citrd have lwru eiti-wW. and new k«-y« for illustrations** ^ *PB*tly to tbf Vllllc oI thw riltlul1 • Th«rrareGil m l^C ComPIM1K>« VOIUIUP.

The late of Cook K<%V- F*ti,rr Blatter with **MoCiWi *tmtimml*** their p-vrann Parts XA, XXI aad **XXII m** thr Journal of the Bombay Natural HwUiry Society. They llAYe r k a t with the H«t^e« Mvl A m lepia* daceae. One species Ceropfit |ttMl^y«Mil it MW. BUtlcr and Millard in the same Jouriul (^nluiup **tkeir iD«tnti«l MM** of" Beautiful Indian Trees." The pUtm of JWaca **iaiin,** Uochtaperraum i^Mypiuiii and Gardinia lucida now puMuM **AMU hdp,** •«»*« **witfc tkoie** previously issued, to develop an interest in the and may lead more than «••!«•* m « l tbt niay pave thr way to t life time's study.

The " ora

^ ^ ^ h *, A1*WU**A ' **kM imivvd** bttk aU^nUon *mntm* |NH7 ^^ttittTtfc and Altrbl*m **piiUMtd » tW** Tranaart*** **of** UN lin-

new re- mannmaller in the Botanische Jahrbuecher wherein helps to redress are made and new species recorded for the region, on plants fat*li.0**11 one while Father Blatter has also been at work area. This author's descriptions of plants

S Waziritan in the Journal of the Bombay Natural HWory Society "*>*le the followinR new .pein-:- Krodiuu, nauum,fcrodmm *deno-*«*•. Erodium heter«*H«»». TrigoneUa l-u, TngonelU .pjlo-h »«V A«r.K»luK munlagin-nm. Arfragalu. ^f"*™"'. T^ lera ucant hin.Hur,*. Kuphorl... hHiomoj-ioule., Kuphorl.w pam-.rad.at*, Medicago pwudoimmafaMuiu and %->\v*W monantha.

. ^veral „ r^.nl, for thr " Flora of A«am " re-ult from ™rk d> tl.- >-„„ by Mr. ('. K. C F«cb.-r while atu-nt.cn to thr Flow *f Hunna-' ha. virUrd J'aUuuium 8uku-i, a ww «|««rii. Mr i. r. P›[[^W W r*i WW .^...^notyp Fk i n Uodw hlus distans, * S«*» from Bunna. Taiwanm rrypU-nrtwita • « interesting > ^ » of a Fonno»n Conifer » the Mjitkyin. drtnct of Upper S* Th» (Wfer wa, for long known only ^ J ^ T where I£ eon«l(.rcl ouJeMuc. It WM Uter d«co»ered u. th. ^ en Irra- -w1)- vuenhr,! of N. W. Yunnan well in the intenor, and the present disco*T murh low,r down .llurtrato. th,- l^uhar di^ontmuou. distri-bution tbat cruin ^ i « of planU dWpUy. Thr lollop new species have ^con,,. u, ,,,,!, ,ri(m r,p,.r Burma. (Uukhm. »*««.› Jurinea Cooperi, J-nnr. t traU r.f.A.. M«i(»R> n'"1"1"IU1<1 AW*-,,"""™- Mr. A. l'« nmtmurd h» wnting of the " Flora of A-am, ««hu« partly the at C **fr- «««ri»il by him, part'y »' •""•l«r-twl1 W1,k thp ita" ""P«. and «,, ,o the pre-:- Fa.hyl.rn.1 pkicv^ ^ {"I" nica

assam ... mplocos Peabi. Christa mish-miensis and Strobilanthe, hMt The* appear described with illus-trat

...In |*en n»de .bore U) Mr. Nar.yana.w-n.• work on Glycosmis ,« w« finnhnl the rev^n of the Indo Malayan species of • >•«. lblrwl Iron, other her»*na wa. irn*d at the same time. Mr. NM.rwMww.u h* cnt-ally r«»»rd the (oUowmg species :- Glycosmis pentaphylla, Glycosmis arborea, Ol)toam« cymosa, Glycosmis angulifiora, Glycosmis monticola, Glycosmis p. osus, Glycos-mis puberula, Glycosmis Wnutai, Glycosmis chlorosperma, (:hrwwnn macrocarpa, Glycosmis Borreana, Glycosmis ..., Glycosmis paraphy-llanus, Glycosmis macrophylla, Glycosmis Parkeri, Glycosmis Parkin-sonii, Glycosmis sapindoides, Glycosmis pseudosapindoides, Glycosmis perakensis, Glycosmis lanceolata, Glycosmis crassifolia, Glycosmis angustifolia and u"y*-- hfc-Ur. of whKb the- m t*J «• new species validated ^ '•«»' <»«rn,K.«- ami pUtr. rtil I* br publ-he,!

The nomenclature in recent years undergone considerable and drastic change in conformity with the latest rules of plant nomenclature, the object being precision, priority and uniformity The several Indian floras recently under

preparation have, as far as possible, adopted the change*, but Hooker'* "Flora of British India " remains the standard and unless it i* revised simultaneously it will be difficult for systematise in India U» adopt n thL "ystem of nomenclature for the whole |H>numula. To meet a comprehensive ^arayaiiaswaiui ha* liern compiling what is intended to U» available literature t of revised name* culling the information from the changes l**»d<*« revising certain names in the light of mvnt of card indi »' Indian geasrm. Hw list is now in the form appearing **** Wht> ^'in the revined name appear* alon^nide the name synoptical table of British India". He haM aUo pn'pared a Flora show the families of Indian flowering plant.H of Ht*ker's in ij K the change they haw undergone in n-rint years both i<Uturr and in taxonomu- jMwition

of XWHT*[1] ^ Ul# pllMlt ^*rilpIltir H Mr Urr* |>A^r Vnl X VIII tion of K«yal H<»Unir <ianleii. Kiliiilmneli. «•» flu distribution the bu J*'*>'»» Conifer* and their exteiiNion UiwardN tin* Kast into layan M. UIIIUUI wva. and a painr on the dintnhution of the linn*. from |» «<*x containing referring to a new HM<·ie« Ilex olitata Upper Burma.

In ias, fvtnitto and OBUMM have contributed thnr share of work which especially . ^* •" ^•cr enlarpTtfT wfipe. to the study of Indian Uriany, of the (L ^ramdp « little ton. I,..I on hy oflUial suneys. The study and ecology -Ttogani*, anatosjMeaJ, « M"l<»i:i<al and physiological studies, study by k "^ "' ^*1*11 ,irmfH J|rs H1MMH4">' k<i»d»»K themwlvw t4> extensive "tudent who may not aUays have wide collections or studied, and several 'iterate u h|j| thn]HmA] Thr cn-ptonams apecially arv officers may be cited works of an «i ologna1 nature cfpcktty by forest plant life. a* adding to our io>owWfe of the social in Indian

Mac

^ of tL u eALl Wltb tbr f ^ * V •* *• ^ ^ i I>pocUr . The

Pinus longifolia in K|U V* •«« ** Hoshiaquir Formt forms the »J«rt »f an erolo^iral paper by K. I[1]. Moiun.

Several papers have been contributed hy Mr. Biswas, Qmtor of KM Herbarium, during the year 1933-34. His pt^per on • M OMpmti^ study of Indian species of Avicennia " ml-oita Mr. Bsiwas' AeW obn$_T$. variations in different parts of India, eu wrully a M he Clakaria *»dri- the Arr

In J Ui* *nt** —**»** ·Tkm paper has Im pubbsUi with Royal Botanic Garden, Edinburgh."

Raniganj and Jharia Coalfields " vegetation of the neighbouring areas of the Mining and Geological Institute " published in ike " Transaction of the general features of the different •< I***." Mr. BiMm 4mk w*k tkt types of vegetation of the

of R.•rifluij and Jharia. The paper " Living Conifer*" formsa counter-part of Mr. Bimraa[1] paper on the " Wild Distribution of Indian Conifers.[1]* In th/l* paper about Htf aperies of wild and introduced conifers at present j£qer c«itivatH»n m different parta of India and Burma have Wn *OKle<j. He has also published "Observations on Algal collections fro* to* Khasia and Jaintia Hilb of Amaru."

^ A long wirt thfl wnt<r Mr BwwaJI u HJW> pngagwl in the preparation Wb'f™ TllltlVP trul i!lu8triltd,<J •"*·•*th* commoner Indian water plant*. *itli thl,, lM l>rimaril.v intends! for the use of the worker* rollalwating too ^ Mlllaria ftirvey «f IIKIIA, the nwe with which many of the com-M^ Wtt^r |,Unu ran lie identified should rentier it a work useful for |rr^n<1(i by a wide rirtle of Indian hounta having an interest in the ,n oU 1>> Jt may |*> „xi><vtiH| to funush the baniii for ecological §tu«lie« ,% th **««*ti« ami marsh vegHation. nrh in this <ountr>' by reaaon of PulfT rttHy ahuu<lAnt "wnfall. The plates for this work which ia being tb,t! liy tlie aMl ol thi§ MmUrii1 Sum,_v,tave *jl bwn ^ . ^ ^ wul

^ pti n » ne«m,K roni|M«k Sir David IVaiii ami Mr. Burkill'* moiio-Hill | of Uk* K*,nu» l>»«O0om ia pacing through th« Preaa, the platoi 1* *«»i»iliffl during ISKM-35

Kal. *• *ndnrtrlaj gectiOL During the ·vear umler report about 85 Gallery. ... were registered of which 63 were exhibited in the Public ... Most of the ... mal materials, others were fibres, medicin*1 l>lHnU, ol1 '-^l*. «>"• yielding plauU ami guriw. Of the new exhibits tho flJ«t noteworthy' are the *Wfmmm* of Taaaar 8ilk Cocoons1" H*«^ »il|(yanw and piewa of rlothn moirtly coloured prearntwl by the Ind Mi!rui1 ln*itutr BanpaiU Mavurhhanj. rxhibit4nl in the New Central r* "ftheP.br, bay. No. teUr ISI>UM "'e undertaken b>· tir ·r ».r reaaooi already A ^ la*1 .v « Annual Report.

Sort lllpr|ihf,,"w "hibit of alible fruiu. abfwrmai fruit*, rare fruiu, ^Hh bxnt lni||IWinia m«Niu inal ptaota and (^inehona and IU produeta, of cj'ot<^iphii explairung tbt wtbod* emplovwl in the rultiTatkm placed >rit »n«| (ht^ii of madbfture of Quinine ami other «a!u, waa Lady ^ TM>lr to the fmhlb hi Ike Nature ftudy Kihibrtion held at it, k^* • '**\rn iinI V,W,taiai| |««1 TV eihibit *wu* mo* oomplete of interested visitors tn<! t* trotahb takn vat Wry r*warddd»»• tbf larft number

Exhibits of < Whona aiwl *it* pfim** were placid « iririw with explanatory notes for tlMi *W M»* Pharn»areuti«l UBttfcffMt Md at the All-India Institute of Hvgmr and I'ubfc H«ihk ii Jaawr, 1934.

As usual a nllnlirf of H^'*"««- H » *flh*ilil1 • ^ Uittlfjr and in the Tim! replaced by coloured drawings of plan .

Year ^ngtment and overhauling of specimen* continued during the ones. ^ about 2,fiM0 W*l» for exhibit* weir replied by prints! or typed

I I.H'nution ^^ M)unttt of iup,,iy 0(Kr,moniie pbnu mA •M.r"1'"-'" *« Kiv.-n t» numerous rofw.|«m.«rtit». »««" <""» ln<lm ifaj>f"a<1 •• » .•o.uMd.Tnl.k nnmlirr of |iknl« «<>•! I'Uirt f^"»»'"* «'••• iT* "•• Ijelmlf „f Government lV,»rt.nellt* mwl the H'lnral |.ul.l.r 'MM.i information 1 «« •>»H<»U «f thr fcJfcwfnh w«* mp-i.li.il l" various w !.." ' " <liff"r-»t I'-w^ «» «•»• »ur|a Aliri"t i11"1'1""11"- '•lmi • '-iai, *twhu. WilH., Acari. Irur^hni. W.IM . \«-«lv|J« MMIIW. «b»""Tj'r||ynofiieiM. H»|M.r», Linn.. AenrhynonH-w ""I"I4- l''1" • ^«*Vl" HL itw F<mlu. He.mil. Alhmn BUMiiwram. l>e»v.. AI|MM K\, ! W»" • Amomum .ronutirun.. Koxl.. A....mum MihuUtnm. ^«einVI>drOgr*I'hi" l>»nkuUt«, Nee., An<»letdr<Hi ||«iinilrtuin. A IK . HJJ» "*ritm», !JmArtoco»>u« hin.»u. Un.k. Artr^.lu.

galus
cephal-
Boiss L . " ulul, Artr*K«l'w •••m«»i. H-w . \-«r agalus pycnocladus, Olivier, " ** A»t«g,lu» rtr«i.«f<«»«.. Bumr Astragalus verus, Orelliana, > KelMonw. I-.nn . HaUniti* R.i«l»un thu. Planch . Bixa Cannabis sativa, Lina, (Vuthamuii tinrtoriw. Unn. <'•*"• K"llul"- Linn., Celastrus pa ni(-«l«t<u.. WilM . <Vr».m iMolUm. <S«Ttn.. Cmrhoim Ledgeriana, P*v-. Cfe Mo"nil • *WIIOI» offi. inmliK. I.mn . «'m.'1,.m» Mi.vin.hri.. ^"'•"it * namo BUim "•yl«""i'um . Breyn . (Itiullw <'«l«-ynlhi». *-hm«l. r T'* o»r h|Unnin'. <Vhott . Coi-tw TeeU. Wall.. CVirtui My«. tan . Ht, ,(vH|q<u. WilH. (\Ti.n,irum Mtttwn. linn.. (Nifylw «'»birim ax** I"" "atlvu*- lj n" • Currum. I H ^ . Unn.. CVlllr »i»h '<> anotin Wall., Derris a1"1 8> ^'M""" almWiuiii. >*w . l>el|.himum denudatum Lotus, Linn., *P> l)j»iulw "!• . l>w*"n-« Hunnhiw. Hk. f Diospyros Elettar* (alta Eclipta Alb. Roxb . Jambola , . Mmlon . Kpbedw pedun.ul»r». «<MM . Ku«em» Pero I- flw^m;: Kophorhi. Tmvatti. tan . KeruU am., Garuga pinnata, Hoiss . Fraxinus floribunda, Wall . Fumaria parviflora, nepalense, Sweet., Rojb.. OfnttUM K«mw . Royle . Geranium abyssinica, Coss., Glycine Soja, Mb ud Zucc., Grewia sp . Guizotia Rheedei, Wall., Holarrhena antidysenterica, Wall., Holostemma Linn., Hyoscyamus niger, Linn., Hydnocarpus venenata, Gaertn . Hydrocotyle asiatica Benth., Lasiosiphon speciosus, Isoptera sp . Lallemantia Royleana, sp., Melastoma malabathricum, Decne . Litsea polyantha, Fuss., Lespedeza lenberkia platyclados, Meissn. Linn. Melia Azadirachta. Linn., Muehe- Lotus, Linn., Oryza coarctata ymphea Oryza sativa, Linn., Perilla ocimoides, Linn., Phyllanthus KIMMH*,

Linn., Pinus "««»«<*». Roib., Piper nignim, linn-, P*«a« •-* ». Fuch and Mey-. PodphyUum Enwli. W.D., PoogwnU gUb». Vent., Prosopis spic*w. linn., Prunu. AmrpUlu^ MIL, Pmhoton. Ipecacuanha, Stoke.., IW«pu. -nuiinu.. linn. I.. Q*"* «". Linn., Rubus «wtieowt, linn.. SJv*lo« oleoidw, Dene.. S.u«uw« Lappa, Clarke., ^ um *Kmtom*. I). Don- *» »P. 8id. rhombifolia, Linn., Smilax macrophyU.. Roxb., »muk« UWM. R^' Htro phanthus sp., Strychnni Nux-vomic4, linn., 8u«k mwitinu Dumort.. Tamarix articulata. V.U.. TWrii dK.«., B«b.. T«-n« gallica. Linn., Term^ Crt*pp», linn.. Trm^iuli* (VbuU, R**.. Terminalia tomentosa, JWdd, TiD0,^ ,;^,01,.. Meini., Trwhck-Pfnnnn. fragrans, Hk. f., VentiUgo c«NeuUU. TulMn^.. Vip« Clung, Endl., Vitex un Ro

WJ ^ytwthw roM, Lindl, /jiipber oftciwle, Ro*c.

from i ^ * * td Qumine. Bark. Thw **> no b*rk unpotttri ... on Gov«nnifnt «c«aiit .lunng the *ytv*. Buktarwlj during the year on th« Bunn. PUnUtion* w»unt«l to 54,878 Ibt. Urt year's stock together w*h . portmn o< thr b«k h.rv«rt«l dunng the year under report, WM »nt »• ^ B*"^ Uovrrnmrtrt Quinine F«tor/ at Mungpoo. This amounted to 111,301½ lbs. leaving 21,928½ lbs. o bark at the Plantations •• » e«ry over to 19M-35.

Mungpoo stocks of bark carried over from the previous year were Java bark 345,639·4 lbs. and Burma bark 311,079·5 of 656,718·9 lbs. as opening balance for the year. To the stock was added 111,301·5 lbs. despatched from the plantations, bringing in total of 768,020·4 lbs. During the year 167,631·5 «-• of bvk (J.v. bark 56,175 lbs. and Burma bark 111,456·5 lbs.) were workwl ^^ * total closing balance of 600,388·9 lbs. as a carry-over to 1934-35.

The total stock <* I~l» Oornnmmt b«k »t the *tVm* of the year was 622,317·4 lbs. comprised of 21,928·5 lbs. at tht Mergui Plantations and 600,388·9 lbs. at the Mungpoo Factory.

During the year 167,631·5 lbs. of bark were worked and 5,739·6 lbs. of Quinine sulphate and 3,394 lbs. of Cin ted

Stock of Quinine. At the close of lke year tk « ^ Government of India stock of Quinine sulphate purchased as such and extracted from Java and Burma bark including both p«n*«l and trade standard Quinine sulphate, amounted to 151,919·071 lbs. of which 54,036·09 lbs. lay at the Indian Museum, 97,271·153 lbs. at Mungpoo and 611·828 lbs. at Naduvattam. There was also 97,368·65 lbs. of cnrif Quinine at Mungpoo Factory.

Stock of Cinchona febrifuge. TW ioul **mk dOmkmm* febrifuge at the close of the year amounted u> a Mi?* iu. oi wkicb IOJW* lbs. were held at Mungpoo, Jail, and 7,636 lbs. at the Royal Botanic Gardens, Sibpur.

Sale of ... ing.—During the year the sale of Quinine 11,568 lbs. ... will to 13,955 lbs. 11 oz. against ... previous year. The share of the provinces ... 1,917 lbs. 10} oz., Punjab ... 8 oz. North West Frontier Province ... 247 lbs., Bushire 5 lbs., Madras 1 lb., Central ... Kashmir 4ii lbs., Delhi 172 lot.

A slightly ... by the West ... Quinine sulphate » to be accounted fi demand ... and few other provinces had a slightly bigger ...

... of ... —During the year under report the quantity ... sold on the Government of India account was ... Woit.

Revenue by the ... —During 1934 the actual receipts amounted to Rs. 2,88,862-10-6 against Rs. 2,16,908-84) in the previous year. Of the total ... Rs. 1,01,M9-14) were by sale and Rs. 1,80,323-9- by ...

Plantations. No extension of the plantations having been permitted work was ... to maintenance of the trees already out and to the filling up of vacancies in areas already under a good complement of Cinchona ...

... area standing well, much better than any of ... the history of Cinchona here and it should ... yield ... of bark. The usual difficulty of bringing plants through the dry period from November to March was experienced, but suitable shade planting has done much to prevent the ... that follow complete exposure of Cinchona to the sun, and as the Cinchona is harvested shade plants ... in the form of ... phalus, especially the first and last, should leave the estate still worth something and ... worthy of attention. The development of an important industry is going on rapidly along ... Cinchona. Many ... on the cultural methods suitable for the plant have ... and ... industry could now be developed to any extent necessary. There is a steady and growing demand for Emetine in India. This could be met completely by home production and certain of the larger European drug houses are also interested in the development.

IV. Financial. The total Budget allotment for the year was Rs. 1,64,... of which ... was for Botanical Survey proper and Rs. 1,25,... was for Cinchona ... from Botanical Su... Rs. 3,840 were reduced ... and Cinchona allotments the grants respectively to Rs. 37,540 and Rs. 1,22,... Total actual expenditure for the Survey and Rs. ... was ...

transferred to the High Commissioner's Budget. The R* i"!! kr Botanical Survey was R*. 509 and under Cinchona

me writer new cnarge rnrougnom- was Curator, Industrial Section, Indian Museum, throughout excepting 1 month 22 days on leave from 1st November when the Director himself took over charge as the Systematic Assistant throughout for 1 month 6 days on leave from 8th January to 13th

throughout the year.

Mr. P. T. Hussell wan Superiu^ndent. Sinc, Ovmeer, throi^hout

«uff have worked well during the year.

C. C. CALDKH,

Director, Bolanual .Surrey *of India.*

(51b)

Report of the Botanical Survey of India for 1934-35.

[illegible] Botanical Survey work proper [illegible] more of out-door or [illegible] investigation and [illegible] of work [illegible] stated, field work [illegible] the study of plants in [illegible] India and Burma, with the object firstly of appr[illegible] vegetable wealth of India and secondly of increasing [illegible]ledge of those plants, in all possible aspects and finally making such a knowledge available for the benefit of the people of the [co]untry [w]hich maintains the [illegible]. It includes among others [co]llection, classification, naming and preservation of plant specimens and plant products in [illegible] in a herbarium and [illegible] muse[illegible] serve [illegible] only [illegible] for future reference but also as [illegible] assemblage of the entire vegetable resources of the land in [illegible] [read]ily accessib[le] [illegible] and (2) collecting and acclima-ti[sin]g living plants in [illegible] for the purpose of their multiplicat[ion] and distribution when found useful to man. [illegible] since the organisation of the Survey in 1890, its activities have been directed towards floristic work mainly, as the extent of unexplored regions was great, but now and then problems of economic importance have also been successfully tackled as a reference to previous reports would disclose. But for some years past, the Survey had been passing through critical times both [in] finances and man power, [illegible] the [illegible] inactivity in its ow[n] [illegible] of work. [illegible] review [illegible] no exception [illegible] work and [illegible] the Museum [illegible] of which [illegible] large extent com-pose[d] [illegible] for the absence of [illegible] of the Industrial Section made a very [illegible] in Dacca and Mymen-singh and collected a few specimens, which were added to the Economic Herbarium attached to the Museum.

A feature that keeps the Survey alive is the constant flow of specimens into the herbarium sent by officers more fortunately placed than those of the Survey, who, in return for the present of specimens made by them, are supplied with lists of identifica-tions and economic information. Apart from departmental work,

S

«ul. ** voluiue of botanical work, corering a wide range of ifi ***». both in pure And applied botany, which ha« been done ^lfc* ladiftn rniversitiw, the agricultural departments and elie- t j * 'ho** a considerable advance in the proper appreciation of fctt value wt*n«cal »*wdie« in India. It ha* been a npenal *r* o' this report to record aid rtfiew thne product* at well.

II. 8 ... its have been identi... extra depart- ments, corre... *he critical ewnnination »f several sheets of th' **•• itillefti0n* of the HeiUnum. The major I ... «' »h«*«. i,lHitifi«atiun« repreaenU the wllertion* «f Dr. S. J ... T ... th< little known BaJipara Frontier Tra<'t along the C ... b»rderi «f Aiaam. Many interettiug new record* hare ...Ubli^Hl for tbii reifion and «Anething more than u pawing Wli ... it giTef tLrlit direct to the utock c^ ... the floriMir Surre? of Indian plant, ban long been ... P*N and nwdf no Btt€Btio; any joogar. «f the many inters- ...'"'H. .Wri/i /rt^firrfl, Thbg. mr. *parrifolm* itandi ... IHNllUJlr ... from Indi ... IMIM ... yr'^fiicu ii a protean »pe<-iet occurring is Japan ... Chin< ttffilorift to the South-Weat of Japan, from Kia ... hi,an. Itn nearest Indian all.r ia *S. plectra**. thoide roll ... l*d by Griffith from Punakah in Bhutan in the begin- ning of the ... *j*po*H«.* var. *parrifolia* wan fint ... A ... iod Utw on ^ Fitbr in SVichaM about ... r Vflr IH85 ... h'uai» in (Vntral Chi«a wa# the eitmna ... lltnit of the »p»riM. IU occirrence in Balipara Frontier ... iU diitrihutinii nNMUileraMy Snuth-We»t w.rdt ... the ... rhift^ mountaiim and the Kaftern HimaUya. over ... C ... Ih ... tm<u rolor *o ^ r » wH *UPPort" th* theory held in the early fif<"* of <he la»t Of ffci ... H<mkrr «n^ Th»mpin.a that there waa a Mrong element ... ior» »« the Xorth-Ka#t*r» border* of India· Thu u ... of fh# '"wple* of dittant diacontinnoo* diatnbutio. ... »orld, wkuh .i. diarua^d ia th# U* wport. ... of the Formoaan foeifer. Taiw.m. The ^»atl ... c>rr«'nag ,fi M>itkTina di-tn.t of Tpp#r Burma ... of ... irT^mt«r orrarn*cf* of the atme pUnt, in ... Fated ... following are ... among them, namely, ... iamajf. bat tW ... (1) imperfect knowledge of the flora of the intervening country, (2) geological disturbances causing subsidence in one place and upheavals in another and ... ethnological. Other records from this area are *Juglans* *mf L.* afrvnaf raik«r

extensively according ... *uercus incana* Roxb., *Quercus polystachya* ... Wall., *Salix longiflora* Anderss., ... *urceolata* (1, urn) ... *fairminum* Lindl. ... the ... widely m ilu» Nonli- ... from Itimhui to the border of Western Nepal. ... collected from (hinu Kill* and the Shun Mute* ... Burt ... the Aku InIU. « Unlily almost ... the two original centres of distribution, bridges ... long in the ... the entire length of the Himalayas ... Osk, *Quercus polystachya* ... Shan Hills ... eastwards across ... of the ... Ttroy in lower Burma, taut* oiif to the inference of ... Himalayas ... ladA-Huriiiw* Flora running from the ... Burma ... Shan Hill* up to lower ... of valoihle pUntn. ... by casual workers, ... the fact that our knowledge of several parts of India is ... rfect.

The herbarium ... «n«HtioDi were finished during the year by consignment ... *T9nirpi* ID eifhan^ fn>n) WMhington, Canton and ... general ... ^ n # 6.000 *h«*U have been put into the collections.

2,... sheets of the material Ulonjfinjr to *Derris*, Burma ... *Aricemnts* and *(iouypium* wer» »n loan to ... and Mr Hutchinson ... l'<rfrht. Mold<«ke of HaniU research work on their hands.

Messrs. Parkinson, K«njiUl and fb* of the Fomt nVpartnwnt had several groups of planU placed at tkeir di«|w»^i1 in ih* herbarium in ... with their floriMic work. Dr. Hthni of Lucknow has revised the sheets of ...

163 sheets of *Ervolvulus* were ... the Madras sheets of the Hiltpur nerV«riuiu whirh were *n%* loan to Kew in connection ... prepanlinD of tbr Klnra of Ibd... by Gamble and ... Piirài ... «err k, received ... ffon Kew.

General information on all kinds of subjects, botanical and economic, was supplied to a wide range of correspondents. Notes on the genera *Psilotum*, *Isoetes*, *Imperata*, *Andropogon* and on the species, *Cymbopogon Martini*, *Andropogon versicolor*, *A. Schoenanthus*, *Cassia renigera*, *Cassia auriculata*, *Brunfelsia latifolia* and *Asclepias*, forming the materials relating to economic problems, were furnished.

Ha Th i' Cutltor of th* Herbarium, Royal Botanic Gardent, accom- bat J*[1] fcy one of the herbarium umtenU botauited on the Pam- Otj" •»<! the Tundi U.IU of the llaianbagh dutrict of Bihar and herT.*d blrou*ht in f f*ir «'|ftr0B of pUnUU Anothrr of tht Bengal awwtanL. Hanpodo Xaskar. vmited |»ortioni of Northern tod ««ur»a m p^ collection o! plants al«o.

I nj V ^'•yyo M wna mi io of tthe Suurvey department hu completed t hmoe n nnr y fviMn of the M«Mi<latum; «f <he Indian grmaiet, of all * ""I»"rtttnt pruup of wwwic plants. »hwh not only conwU miy, 1h' *"i««ble c*r«b of India, wimely, »k«*». ""- o*u- I *D1 f l i d i W tt/' e!W""'«l oil.jieldiug plant., .ugar «ane, raw matenali id x* he "» «»* manufacture of |.ap*r and bawlwoa, whoa* utility of th Kt»»«niy of India .. too well knoi>. In the preparation »«rk * P*pWl IUUl.h •'"ip *•» deriTed from th* Ute Dr. SUpft 6l«tte? ?• *"*•* o(Tropi«tl Afn«, the l»U Hev. Father K^ •""•««••• »f th* (iramiMM ID Cooke* Flora of Bombay, Ph.ti nni.. ""'"y oi H.hnr and Oritta, Mmiiri Knumemtion of

f h lied in tl

Hit u nninb" of Uenrra and tpeciea haw be*n dr.Mi«»ll>

J *011 r«nod«.|M to »< to fit in witb the modfrn conwp- "«l ikl the wnw« «nd ap«.ihe limit., l≈p«ng •!••.« •» mim! •*tW wrlw publiakW Mine «H the *»li<l OM»%» »* r*x»iTM i» n, J**1"' Thwe ,-hanrr* were ilmdr «ntirip»Ud by Hooker tl»l J'ŏrt of Uritiah India, which *u publuhed in l!«4. la »'HdT*^"tal "wk only ifig |tsera *ui* *« •!»*"• WfW rm),r- lr" 1% o*'irti»«>• ladia, b«t vmltr tfc« Mt•nM|«««i. Uwrt de-ribed uera and 948 species which includes several new species after grasses in ind*' oo«to«ttf Marly 75 i|»«w« according U> Iionktr, o! » -nlr about o^w,.trt hh 6fitt*corffiwl «I»P.*- b""*u" •"* -r- les placed tb#w,» hat* MI kt»- dirtnbot*d to mallet genera like Sch ropogon, Amphilophus, Capillipedium, Sorghum, Vetiveria, Chrysopogon, Dichanthium, Heteropogon, Cymbopogon aad Eulaliopsis. Simi- Polli- i *•• Fr* 7 r—fm<m, rmitam, *m~rTM> • "••»—*—. Pm ** **'Z minus, /*c*»«*« •»* «^«WI-. He hM *tim* «^- i *«* ^ J * * •« »M Mwirblm of IaJ«a Flwr-M Want.. Jkl» ^ " 4 "M« I* tM iMt NpWt W MTWf »»»• .lartrd

^N •» k» U I M •* oW IM iww* •! lk« fciMM-tl

Survey 1 hdi.. wheu ,b. Utter i. !«.. H i. • «rk.tb.t »h««U prov. ** v*lual11, ««»- •-, ul1 *ho " • ? h t " somethi f to do with plants of India. These 1*0 papers along with those on *Glycosmis*, *Dendrobium* an *nodosa* and *japonica* were read by him before the Calcutta S~u» of the Indian Science Congress held in J« w r v ,tt:t¯, ,,, h(tt aU o lW,ribu.«l to Ihr same congress ar H^ ' ^ ' ing p-per «u lh« D.tur. and the importance of a ...rium.

Mr. Hi..,,, ,h, Vmtot ,,, ,hf H,r barium Botanic Gardens, Bengal, published four papers fifth in the "Transactions of the Mining and the Geological Institute of India". The first of them is o» " Snn,e for*i^ weeds and their distribution ld occurrences over extensive areas of such noxious exotics like *Eupatorium odoratum*, *Croton sparsiflorus*, *Lantana camara*, *Eichhornia speciosa* (*crassipes*), *Ageratum conyzoides*, *Mikania scandens*, *Argemone Mexicana*, *Suaeda maritima* and *Opuntia Dillenii*. Thes f the numerous "Mici "»•« »>.T. cm. to .uy in I»«Ji.. not onlv to the detriment of man. They have been sp iH M W»H. fr^lom .dMtr? ", on their onward march extensive areas of valuable arable land and unless they are nipped in the bud they will prove certainly, in no very distant date, a serious source of loss to the agriculturist in the first instance and to the Government in the long run. The Oxalis and the Spergula pests in the potato fields of Ootacamund and the surrounding country o> the Nilgiris, the menace of *Eupatorium adenophorum* to the Ooty hunt, the water-hyacinth (*Eichhornia crassipes*) curse hanging on large areas in Eastern Bengal and Assam, Burma and Ho««k India, the intolerable nuisance of the Khaki weed, *Alternanthera echinata*, to the pedestrians and the sportsman in Madras, Salem, Coimbatore, Mysore and elsewhere in South India are some of the weed problems that have been engaging most vitally the attention of the public and the Government alike at the present moment. Other papers by the same author are "Ob... are "... logical studies in India", ing «t C? «• »lu nMrmmUr p^tj^ W Fir- Krishna growing ... Royal Botanic Gardens, Sibpur", "Observations on some plant abnormalities in Bengal" and "The vegetation of Tundi and the neighbouring areas of the Hazaribagh district".

III. Systematic—B onal.—Interest in South Indian Flora is continued and Mr. 0. E C. FwrW «f the Kew Herbarium has published '• *Mt III «f kit " 5«« * Iit«U known plants from

Spilth I i-

f^ iUtl* "• the follow.nK new .tpccie* for the Madras piwiact. J/fp re s»»rrila tmnrrrllirriM,*, Ariicrmu conrolutum, (nhuhnf pfcify ^nl"'9"n l'w».«lrw'. Imp'tiri" AUcim\ I. cortotmpm. I. ht/t'e . f, tfni(fritol<1,] nmImnanwrt, Sonrnhi nrma1iuUn*i$, ^\\H? '"V"-"''"'" var. Hol,< mtclvn Hut the Hunt Pul)I-rtail< roiltril) «tion to the KVitematir hotanv of Madia* n the of nt Ihf- IM,IIU|tin,Hte" part fXo. X) of Ilunihie'* Flora ot(ir l>v (- K- r Ki-lier. denlinjr with the diWrtilf fumily of 511!1111^* W»th tin- puit. the «ynteiiiiitn- |Hirti«»n of the Flora > . n !*" "* tillnl||Pl1 """• *i«k ^ *"** |wrt Il>lirt XI) whlrh iH 11^1 fl> Ilr HIIVHII) in thfe pre^v the Florn nt Madra* will he i,,,,! U<l The L,M part will .ontnin the infnnlurtiiiii. addendu Uk i^'l11^1111" "m i Ar "i&"rx. TIHM^»nrkR«a*-flirted I% tiamble Committ '"MIHI the utillifiiity of the Sei retiipvnf Stute for India in tion of the »h|p. wlm Hail loii|r hee« «onne<teil with the prepara- collaboration Mateii«U for Il Kloia of the MtiWmin IVnin*uln " in take the *ith Sir IttHirire Kiuar. «H" hnnM* th*»n to under- work. i-ilation of thi« «oru. on the termination of the MnUvan

U.^^ ^^ I1MW and Il *nif* of riirre<.|»oiideiMe pa*«ed l»etmeeii Ui|tl| fi A.T .<***-. the then Hireitor of the Hotuimal Survey of ^\tj""] Ih r . A. Ilrtrlier. then, the (rnveriiinent H<»taniM. the ^' H*U| ^a* aU, fnr ^mi#1 t,.,,,. Ml,.' of the l»«n*o« offirern of ti,,!loJ)fHn«»l Nurvy, „„ fo de.ir.bihty of ^artinjf the .ompiU- V. M,h Flora for Madia* mfh mi|»erfe«t ii.uter.aN und when there % ^P K Xrf111 »||rU «* Madm* In Ite rxploieil and ndlerte*! and Gamble IL Ihfl p "f the .urln.r -u,fe<l ro fbe ta-k Nota,th.landin|r. Survey ho with |fcp(wofk WTI>lp lo the head of and impressed the need for the collection Agency -j|' "' to fcnu »f -fNN.menv whenever |«*.,«Me. fn»m the U If ^«»»)«ni and V»ta»rap«um am tracts, including and Ih#I M '»'^I-r. fore,N of tb«^ dittnrti. the coastal ranges ^411, Ih, M^-ndrm^in IliIU cm the b-t f^-t. parts of ceded ,f r ULUn ^ r-iti- «Ur — »".. Wr«a ana the higher ranges. Mysore. Hyderabad. the Ilif*™* mountain, of Madura district and portions of TmTancwre. e^HNiilU rent ml Travancore lying between Peermade and HH#nrMtan. whirk were considered by •iiti nvipUed then

Consignments of Madras sheets of the Sibpur Herbarium were forwarded to him from time to time. Some 2,300 sheets belonging to families of Portulacaceae to Connaraceae were unfortunately lost in the sea during the war and the Madras sheets of Sibpur up to Rubiaceae were not consulted by Gamble as they reached him after

** had finifthed with thoae famrtiefl with the mteriaU available ** Kew. Collection* of piantn, made in the Rampa Agency and 111 the Central Travancore, while the work wa* in pmgre«n. were *•«** available to him, and these hare twen helpful in establishing *** record* for 'lawe area*. Gamble completed the first seven l*r t" between HU4 aud *Wto,* but hi* uiifortimate ileath in 1!W5 deprived him uf the opportunity to aee to the end of the work, however, it ha* bran ably wmtinued by Mr. ('. K. ('. Fucher. *tfl <f the Fumt Department iu Madrai, who ha« now published "** penultimate part. Fimher has i ot departed from Humble* P*"» of treatmeut «f the work and aii:ce th« la«t piirt in •*!ill |H-nd-l^ft publication, it M too premature to re\iew the work »** » nhnle T^e l»ul\l,iratiuii i» u valuable «H»ntiibution to a pmvmre which initiate>d the study of Indian plant* •« eariy*a» the seventeenth century and Hent out eminent votarien of the S«ience like Knxburfrh and Griffith to distant parU of India for rreatinK other i entree of botanic'al reaearch. Citation of localities like Koiikun. Uni-an. Carnath' and the Corromaadal coast under distribution are m-thri vague terinn which ret|uire dear definition in the mtriNlurtinn. Thee* were the broad freoffimphico-hotanical iTivinion* which Hwker and Thompwn u»eil in their work* an early an the fiftie* of the last century. The note* on thin part *oi* the Flora, which Mi. Fw-hrr has publi^h«l in the Kew Bulletin nbould a^ist in clemm* up c^•in cloubtful points in the nomenclature of the Madra* grasses.

A<Witional parts uuinlieM 2! to 25 of the - R*ri«ioii nt ('nike'* Flo^a "f RfimhiT" by Hlatter and Mi-C^nn. deal.ny i»ith the Cyperu J-^e of Botnbay'baTe appeared in the p**e* of the Journal ft# *?* Bombay Natuml Hi.tory Horifty. FaHher ,n,talme«U of ^ ^Pular illustrated account of " S<ime dutiful Indian tree, of India " by Blatter and MiU.rd. contoining the d^r.pt.on, of *Jacaranda" mmowfolia. Solanum m^ranthuw.* and *B<*»h,nu, variegata & pvrpurea* were alto published in the «.••- journal,

The intere* in the - Flora of Waiirirt.n " i- evidenced by the publication of Part III of that Flora dealing with *Cucalpnaceae* to *Lentibulariaceae* br Blatter and Fernandet in the same journal. In this con~ti«.. it fa -y mo- r^retable duty to record the sad death «* »W .enioT author. Her K. Blatter. M-. «. 26th May 1934. India ... a. ... im. who, by his enthusiasm and keen interest in the study of Indian plants, has contributed ma ... re of Indian Plants from 1917 up to th« date of hi« death The ... Records of the Botanical Survey of India f *in* much indebted to him *U** " ... works on ffce " Flora of Aden ff .nd on " Flora Arabira M

Ferns of Waziriatan have been published by J. F. R. D'Almeida *ho in collaboration with Blatter has shown some interest to the *'lom of this part of the North-Wat Frontier of India.

Mr. Mukat Ilehari Kaizada of the Dehra Dun Herbarium had ? F*per in the • Indian Forester f, Vol. LX, on " The new or little known plants from Kumaon ", based upon the collections of Mr. A. K. (Kuna«ton from Kumaon. In this article he records the existence in Kumaon of nine species of plant*, namely, *Clematis '""loci/ah,,* Wall.. *Sinnmenhim nrutum* Rehder, *k* Wilson, *Cttr*i h,fMtn.r* 1).<\, *Xnttfiatuw herjvfjruH,* Ham., *Flrmintfia* ^o/wrr/iM Bih., *Mumrna frontlona* L.. *Erhmanihm attenuatut '*'- I'hioqacanthut hxmherUi Sp. Sot., Uranthus odoratus* "•11., *Vucum nitnrtftnni Sp. SOT.*, which had escaped so lonjr the noti<> of ftllrh eminent workers in Kumaon as Sir Kdward Strachey •n<l ^inferb<,ttnni flJMM»). Duthie (1880), Major E. Madden ij^) and Osn.a^ton (1927). who bare ail* carefully gone OTer hllni*on and it^ flora rather minutely and published their results ln tn*ir respective floras. Of the«e nine species, *Sinomtnium ari/fM'»* Kehder. A Wilson, of the Menispennaceae, is an interest-ln* ^nrrfrim of a Chinese plant, which had not so long been !!!**">. outride f'hina and Japan. *Phfoqamnthui Lnmbertii* and I "ri"* *otmnttnn,* are two new speries described for the area. Thii report of ^vprnj fwh r^,,.,!, fnr an area. lon? considered orer-worked•• i* an intere<tine illu«trotion to prore that no area is an exhausted field for hntnnical diacoYeriev

Ecology, „ .ubjert of fnr-rearhine importance and application in Z th- •trr nnmv of India and in the studr of Indian plants, waa a no ^av a n^Wtrf one. It go" *"* in ^^ with that of "T^<- survey and each is so inettricanW miied np with the other J V ° -P«mte one from the other wonld ramble the separation -.*r •»« from the sance. Mr. K. I, Affir^r-. paper on the J*J F^ra in IVodar Forests and ita imporUnce » i> mlopflil paper d^!»np will, .he soil Flora in Deodar For^t. and IU rektion-ship *« ** growth of fw crор. The author in ^n.ck br Hit won ^1 occurrence of the same type of «l or .orfbr, row of plan.. "Werer Den<lar Forrst. eiirt from W«. thro^h Seraj and lower »ueb . to Hatar. and conclude, thil • -.1 ^ 7^ most of the abo,, ^i^, would rerf i>lf * •«!* *. t o * *» th* introduction of I^^r. Fm,w.cr and the ah.tud.nal ran,e of the indicator ... es to WH * ^ V forests than mere stray occurrence of o@# or two niMTia only. The nature or the habit of the soil flora shou account before launching upon regeneratio of tree crops.

Works of suck ecological nature are the desiderata in the right Erection at the present moment and deserves greater application aid encouragement than hitherto.

Mr. K. 0. Shehheare. (\>nvrvator of Forests, Bengal. records the distribution of Conifers that orrur naturally in Sikkim, namely *Abi€1 flenna, Tajnt* hnrrntn, Ttuga Hrutwnuimi, I'mut ticel*ti% i^rw Gnffithu. Ptcea $irinulo*a* and *Jumpcrm ptcudotabma,* and discuss** the causes underlying them. The cultivated conifers are "••o listed in the pa|>er *Cuprrs*u$ Caihmmana,* n conifer of :"-"ious statin i» alno diiwuwed in a note by Sir Arthur Hill, who *• •'•served hit final opinion pending the result* of the cultivation IB *'* of the inspected species.

To the Botany of Assam, • most useful service ha* been tendered "> 'he publication of the Firnt I'urt of Volume I of the " Flora of A«ut,, '• |,T the |aU) Rai u,i,adur I*. >*• KanjiUl and Me*«r*. *V.* C. »«njilal and A. Das, dealing with IUnuncukceue to Kl«*<*«rpa«.ae. T1»i» »otk is beinp |iubli»hf.l under the authority of the (Jovern- **nt «f Aitsam and it m hopeil that the other volume* alMi will *oon follow. A«cording to the note on page tii liy Mr. Dun, thit *lo'» of A-wam strictly exclude* the herbaceous plants of AHMUII *n<l 'reut., III,,MIV aboiit the plants of forest importance, mtrii-lv. **•••. shrubs and large climber*. But the title of the work app. an J ^ rather inappropriate and should have Wn " Forest Flom of ***''' "• The authors have not defined the limits of the flora arid no n'«P .' appended for the help of the rea.ler. At the hefrinhing of "•• 'mnxlmtion. a short note i» given aln.ut the cdle:t..r, in r*" » »nd aln.ut th,. beginnir.,.'* of this How. As th.- joint author ?• B"« «ai.l 4ii%thinK *U.«t the labours and the a.'h..vement, ,,f "" «,,.;,,,,u, Sllrvry of *Mitn* ,•onll«-t,oii with the *Han* of A **»ln. a few words on thcne points are essential.

. ^oUnioaj work in A-am starts with Buchanan Hamilton, »ho * Iftftr'. colle,ted plant specimen* from Oo.lpam ,*h.le engag,d * th' at.ti.fir.1 S.,rrev of Bengal. *«hmM ? *}}£Z"„ "" I*" ^,a,,,, who IB 1M2| ,•,,Ier^ in Sylhet. Fn IMS W.llich, accompan.ed by (Inffith and McTlelland. ajrain v.^.ted Therapunji, Myt> the khasr. Hills, ^uhatti ana Sadiva .n quest; of th. tea pUnt. Onffith ...ved behind and hi* kotMiral work in Khas.., Rho?h and the Mishmi mountains are ^M " (}nlllbV post..umous papers. J. W Master.. ««der the ^rden *rnplor', was deputed by Wallich in 1837 to work flora he P-MisM in 1M7. Tn UW» H-)ker anJ . portions '•' the SrlhH and the Kb.". H-H*. «•»««•. '«"«••• and

Peil| <«»ine next who hetween ifCH) and I.SoT, supervised and u.r*Uted "'* Indiun collectoi* of the Botanical Gulden in (heir districts, '•^ide** hiiiii^liinµ the collections of their own. *Coptu Trrta* of *'** Mislinn Hills was tint toiwarded by Jenkins to Wallich and it WIIN lutei on roller ted by (iaiuiiie and Jiui kill independently from Ih** Mishiuiv .|# |J# loiter, under Sir (Jeorge King, worked ou the "aI»M., ||||U i,(|S7-I. who wa* followed *ul>*H|uently by S. Kurz ^*«ti) and II. tiulLitlx IISTS). and <i. Mann, the first Counrrvator 01 I'oifM^ nt Aooum (I.Sfii) who have all explored the JJnihinaputra I)^U»> and th«* KIUIMU and the .lamtiu Hill* ie*i>ertivek. i\ B. ''i»ikH\ inde.i\»,uiH lietwet'ii IHt»:(.mil ISM weie partIy on the PUii* n| AHSIIII and puillx on the HilU. Theieafter we JIUKN on f" the MMitinunii* iNitailiral artl\Itie« ot the Botanical Suivey ut 'fll'«J« jmdei the succe^ivr direitoi^liips of Sir Oeoiye Kui^r. Sn I)in'd I'!;.,,, iim| |.f.-€•„!. .\. T. Uairr, who have earh iHTsonally JIIId I.\ Kuro|H-aii and Indian amende* carried out an unhroken dm in '•' ^taniml explorations tiom 1H90 to I?H4. During this peruHl Nfr Uwnjfe Walt and Mi. I. II. Burkill ot the IVp.ntment of the I{flIM'itei· on Kcmioniic |irtH|iM-tM to the Uovernnieiit ot India had **U, vtrv niHtftialK t-nm-lieil the rollmtion-* of the Surve\ from I>lu«^ IiU the Maiiipm. State and the Ahor Hilk lymp ^"th and mirlh i.t the Likhniipur di-»tri«-t of A-w.nn. Hotainc:il exploration^ 111 '^MIH .ind Buinia weie the maiii work of the Survey tin nearlx IM|1 dt..;,nV tmm the IH-^II.IIII^. Tin- late Ha. I11I1111111 I'. N. KII"j'I«I came up 011 the «cene in I»H. wlm ltr.d^ed up leveral Jh ·uuu. 111 t|,. cnllertion. nt the earl> veteran^ frmn 1«H4 nnwardv the Botani.nl M.nex ||ini..ii|;lil> eNpUfd the entile province ot Assam t(I· . . . .„. ^1 In ihe i»«hei and aiiuniulated a womUrful collection of A-an. plants ..I Sibpur. But for thm excellent col-lection ami tl. • hrlp ien.lri.xl I.y thr IHK.-fW »f thr Survey, namrly Kamu..., |)eM«iman ..nd Nurawiiunwaini in identifying the Assam ndlecno... t,, the author, of ••••- *«« Inim WI 2 ouwara, it would IIilf ,|;|W· ,,,,.„ |IIM,IMr for the -uthcu. to have issued the work a. ||.,.. On thr whole fl.**|I «PP«»« a long-felt desideratum t..i (he Hota ..I the province of Assam.

Floras h.,,e ., fa, con. . . . .ut ... • ... « pi-in**.«f issue for Madras, Bomb n (incompl we|. Knnion. Oorakhpui. B.h... and Or-. llr.Mf.1 (old,• Assam - NI Burn. p,n old .ml in.prrfr.-l). TWe are .I,|| yrral parts of India, either unexplored or imperfectly explored for which no flora so far exists. These parts are (1) Mysore (partly included in Gamble's Madras Flora). (2) Hyderabad. (3) Central Provinces and Berar. (4) Central India. (5) Rajputana. (6) The

p
•»J«l>«!i a whole. (T) Kuihinii, i.S) S*\>u\. (!») Sikkim .iml llliutan and (10) Burma.

E Mandragora Shebbeare,, <'. !•;. <\ h-her ..ml Carex monti- 1**' ata. Kukeiif lial art* tun new tp*«·ieo foi Tiliet tlnil li;i\.- been described in tlie Kew Hulletui.

TI
Ca..t *ne.. colleHiom of t In*t mtrepiil explorer ami n ill* tor, the l[1] • Kiiiploiu Waul. tii»m A^ini HIM! Cpper IIIHIIIII, have been 4 wnirre of f|I(I I)In<t nn|MHtaiit roiitriltutioii to our knowledge of j,''''''''' '»y Mi. IF. K. An>^lmw. in the Ken Bulletin. W.th ie t.:'' '"lei luateriaU M| tlii^ ^eim- |ilare«l at In* ili«|>«>oal. he \uu\ Item able >»«t only t(i rleiir Up IIIHIIV illMIlitful |M»illt- MHirerIIII^ reltnill j! l#*s «»f the ^remi- Hlreailv puhli^lied 1»y ('. B. ('liirke lit the lo. The •• '»t liiiiisli liiiiliu. hut ;I|M) In tlpHTilte neveial new -»JMM·i»*s. »«w •|»Hrift. that haw* i(»nie In light. are:—

·I- /tuhi/fn,,! (I |»|NM Bui ma}. .1. >tk/*inun*i* (Sikkiui) new var* '.'//'"" Ain-^liu«, tui. jwmln-rrtlirtlhitn Air\-«lmw, var. umrromfHiLi Aiiv-<*hnw. Mil. luumnuiiti Aii\-*l»aw. \\m\ var i*irnflnni (Kurx.) Aii\-»h.iw ill I. winjrm Wall.—all "°IU Kliu^iii—,|. urnihilni (Kin>r «« 1'iain.) Airy-*huw, 4- ptrmln-driflithn Air\-t»liii« (Up|»ei · Biilinai. ·I. Ityalu. r'in1, * Ain-^lum \K. Bhutan). .!. nth tmbntufn Air\-*htfw (lp|»er Burma). .1. Knnjilnli A. DIM (A^iim). .1. «/J;MU Ain-.,|IJ|H |A*%uin). .1. hrtuhiilH*hi Air>-»liaw (Tppei Butina), atl«l .1. i»-H*t1ltM Ain--*li»w (Tppei Burma).

A* tiillt-r ile^ription of A pi pin I § HUM MM. Tlaike. a rare species ·*1 •'••llwinl ImiKlrnl inr< MK" h·Urirtith. ha- been possible now fr<»«" KIII^IMMI \\-..MI', h.llei material*.

•*»• .ii-i-fiiini ,,f ;, UtuiiH.il tour ni««l^ I»y Mi. <\ K Parkinson t *fl1' Mnlaui |N*Nk in IniiM Burniii hai l**n pre^enteil liy him tu th * l*irw of tbr IIHIIUII |nie«tei. Mukyit |»«ik IK one of the three high^t |N^k. in the rliNin of HilU kn«*n «- •h*[1] IVna-nerim Yomas which form n •t.iitiniiHtioii nf the Shan IM«ft-Mii and «f Martaban. rininir to N height of Jif.111 *.<**» ^ · A «I<HI/1, " f the vegetation nf the TeiiM^r.m Hill «»|^ wIHI "n •*numpnitlon »f the species collected therein is appended to the paper.

IM ^-^nil V'l'linitH interr.l to l».l..« «re the paper*. (1) H key to th- species ;if 7)^,.^. wt. nr^ileatpw »T Airy-ham. f2) Firmiana and Erythropsis by IF. N ni-II^J. W Afl ttrr0Ufl! "f «^ genus Veronopsis by G. Tay ior U.MI (4) A prili«l w « « « "'' <'«*i» Taxonomic groups of the Malvales by H.
Phytologist In (1) above Dentia Hookeriana .. ..

Airy-shaw and *D. ,t«urothn** Airy-shaw are two new Indian species closely related to *D. <or,/mlwsa.*

iii The two genera of Sterculiaceae, Mars, and *Erythrop* th. I:incll.—lon with *Scaphnun, Ptrrygota,* anil *Pttrocymlnum*, St«UKh separated by Robert Hrown were united together under •nTk l>y Iielllnam an(J Hooker in the ' Genera Plantarum ' by Masters in the • Flora of British India \ MOB! of these j^ era have bet-n separated by later botanists. *Finmana* and ^*ythropm* are considered very distinct from each other, of which w doe* not occur in India, but the following belong to *Erythrop*s viz. :~

Erythrop$it colorata (Roxb.) Burk. *(Sterculia colorata* o*lO, *E. fnlffens* (Ma«t.) Ridl. *(S. fnh,cns* Mast.), and "> *iwllchs* Ridl. now *(Steicuha pal I ens* Wall, et Voijrht. nen.).

The diMovery by Sprajrue and Fischer of Dr. W. Wetson's Combination of Indian Grasses ' published in 1882 in Atkinson[1]! Gazeteer of the North Western Provinces of India", accoin. panied by corresjwnding uumlier under *Andropogon* in Steudel'i Synopsis plunUrum (Humacearuni [f] has led to a joint note by them in the validation of new ro... io?m by i,,,ljre<.t citation of synonyms concerned ". These "natHifi, werp |ong overlooked and were omitted from the Kew *) long. Ignorant of Wntwn'i earlier combinations authors «»eir o^n ronibinatinfm which are now reduced as nvnomms "* light cf thom* earlier names. Watson's combinations like *>t" »>po,fOfl Vttrtun* Wnt*. (ilie rusha r« the geranium grass), *"t'»:t"n ftt ruatui* (Sleud.) Wats., and *Ajwcopit hnmiiayr* have BIIW llllpfri^<,f(^F'w/w.'/"n *Mnrtim* Stapf., "7""/»#i *fit nnnuf* Sfaiif . and *Aporopu Knyhanu** XH..« respectively.

Hutching'! -The families of flowering plants". Part II. Uj* ri>r *l>out tllfi •'Iwifiriiiion of Monocotyledons of the world has *nd" /.Mll *n#Ml- T"*[1] phOogeny of the monocot\l«lons propn^d D,^ " >n Ibis bo>k art on s par with his work on the wjij n" an<J «• »• out of place to dm-uss the merits or other-

lnn to the taionomy of Monocotyledons.

Of tiOnj| J^ w«de range of subject* covered by the scientific produc- fVp. th# In^«an TniversitiM and Collegwi and the Agricultural

Pteridophyta **S in Indit iB ** r ~ lm oi Indiin BoUnM ¥nngi ,**

. (VtolofT. Pkysiology, Morphology and Anatomy, ih#

^productive Organs and Agricultural Botany have all been dealt *»th. Anything more than a pawuug reference to wine of them ** out of question, but it is gratifying to realise the rapid advam'ea U*t are being made in the utility of such branches of Botany that ar« impossible for the Olhn'al Survey to take up. A rirt.nn * * W i a ' by A. Mitra, ' The Root-mtem of embryo-sac and the Mien-grain "in Cassia toru ' »»» It. M Datta. 'Origin of leafy •Porophytes* in Ferns ' by U. I*. Maiumdar, ' A preliminary note a> the itudy of Afolla pinnnta ' by S. It. Sud, * A contribution to the anatomy, morphology und cytology of the flower o! *Ihgtra Mus*n by A. ('. Joihi.'[1] A contribution to the lite-history of *Vallineria i,nrah** ' and ' The vancular anatomy ol the Holers ol four Xyrtaginareae ' are »ome of the botaniral i*aper« that wore publi$_{B}$U»j in the Journal of Indiun Botuniail Society.

" Thf rla^ifiration of the rim of Bihar and Orifisa " by KMIII Ram and Sarvayya Chetty, M The chromosome nuiiibem in *\hv* geim* Sacch*arum " by T. 8. X. Singh, and " A Haploid plant in Hu'e " by K. Hamiah are *mw** of the results obtained in I In- braiuh of agricuIluml botany and plant ^nHirv ' I'hysioK'inil investigations on nater-hyarinth (Kuhhornia i-fwip) mih notes on some otl*r aquatic weedn ' by l'ar.ja is a rontriMilion fo the «ilij^t «.! ***** and the.r eraduahoi,. In this paper the author d > < ~ on **!*ri,„entai banin, the lite-hiilofy of ihi* |ieriiin«ttH neml mi<| suggests rertam remedies for *iU* erad.at.on. uhtrl. are no more than the prevention of seed-foimanm. at the proper tun, and removal of ,|,, »$_{WI}$| *Uy* mr-liiniml m«in«. «'»•'«'»••> "»«*ures* have proved a lailure for the pur|«M»*.

Mention may be made her. «b.t th* m.lfr-1. for the systematic portion of |hj, w ! h!ivf h^ $_{K}$ir,n 1« me by Mr. V. Narayanaswami, the Syste! tic Assistant of the Botanical urvey o working in the HrrUrmm at the Royal Botanic Gardens, S...pur

IV. Industrial Section.—During the year under ·font ago <p«·linens mere exhibited in the Public Gallery Indian Museum after re?i«tration, Drugs and the pharmaceutical preparations mad* from them, that were kindly presented by Messrs. Bengal rhemiral and i'harma'Hitical Works, Limited., deserve special mention and have been very attractively exhibited in a Central C'ase showing serially the various processes through which the *•* material* pa«« through before they are finished product*. These include, among others, the following:—

Holarrhena antidysenterica, Hydrastis, Strychnos Nux-vomica, Hyoscyamus, Scilla, Strophanthus, Psychotria Ipecacuanha, Aconitum, A.rop. Belladona, Ephedra vulgaris,

The Curator [illegible] tour in [illegible] [illegible] other [illegible] [illegible] [illegible] Economic Museum. [illegible]

A. usual a number of herbarium specimens exhibited in the Gallery and in the Timber exhibit in the Staircase were replaced by coloured drawings of the plants, giving a much better effect to the exhibits.

Numerous correspondents [illegible] furnished with information on the sources [illegible] plants. [illegible] as usual Identifications of botanical specimens were also carr[illegible] for several, the most [illegible] being the Excise Department, the Customs House and [illegible] operative Societies.

There had been a considerable increase in the number of enquiries by commercial firms and the public in [illegible] the sources of the sup[illegible] materials and [illegible] relating to [illegible] special economic [illegible] of the feature [illegible] Gallery [illegible] their local colleges and [illegible] studies of the economic products [illegible]

Mounted specimens of wild plants [illegible] Burma, Provinces, United Provinces, Nepal [illegible] were su[illegible] lied to the Kew Herbarium at their request.

[illegible] of the following was supplied to various applicants in different parts of the world:—

Crotalaria juncea Linn., [illegible] Linn., *Sesbania aculeata* Pers., *Punica Granatum* L., *Artemisia maritima* [illegible] *Raphanus sativa* L., *Cocos nucifera* L., *Mimusops hexandra* Roxb., *Broussonetia papyrifera* Vent., *Symbo*[illegible] *on Martini* [illegible] Stapf., *Vinca rosea* [illegible] *elliptica* [illegible] *culata* Vahl., [illegible] *lappa* Clarke, Benth., *Carum cop*[illegible] *Taxus baccata* Linn., *Andropogon* [illegible] sp., *Aconitum* *umbraculifera* Linn., *Metroxylon* sp. [illegible] *sativus* *heterophyllum* Wall., *Clematis Gouriana* [illegible] L., [illegible] Linn., [illegible] Desv., *Eriodendron* [illegible] D. C., [illegible] *sativa* Linn., *Papaver somniferum* Linn., [illegible] *Aleurites Fordii* and *A. montana*.

V. Financial (Botanical Survey proper).—The m^nal Budfrtt allotment for the \eai w;n IN 41,2MMI tm I In- llnliinii-ttl $»irvey propei in<·luding the Induttriul Serlion. Imliuu MUMMIM i!l<' n Mini of IN. 1:17 wa* reanproprmted. ItrmiriiiK l,lfi H"1'?** fyr«ire in IN. 41,713. A !*urieii<lf»i »»f IN. P»47 wa«* muili' tnnu the •Hoti,ii»i,t. The ai-tiwl el pviiil 11 in i- ««i IN. 4UW1. The ^i\mjr U|»«ler thh heufi mMH Ks. |f^} IHMMJT iliHtnliiitwl niMlei M-veial ilenn.

VI. Staff.—Mr. ('. C. TaMer held i liaifrt- tin.mahout the >ear '** *lhuH-Un* and Mr. S X. Hal »a* the Ciirainr. liidinlrul Se^inii, Jpt 'au Museum, during iIn* ve.u iindfi re|M»it.

Mi. V. Nunivanu^ttim «an thf KyuteniHlir Assistant throughout the year excepting for 27 iia>> on lwvf tnmi !Mli A|»nl io "itli May, 1934.

Mr. S. «. Hanerjee na» the Head Clerk till the tfM September '*** *ud during hi» atone* on leave, Mr. T. C. Mukiierjee. Senior l:Pper Division Clerk, arted an the Head Clerk till the .-ml nf the y«tr under report.

during the year Mr. M. N. Mukherjee, Tpper liivinion Clerk, rftired on superannuation after rendering over 2S yearn* meritorious service in the department.

All the mender* of the «taff and clerical ^fiilili-linif-ni have worked quite wtitfartorily.

S. N. HAL.

Curator,

Industrial Section, Indian Museum.

CINCHONA AND QUININE.

Burma Plantation*.--Mention* neie reunited to main- UjiMf> ot the exMin^ /\i»* in jfood »oud»tion. Tht plantations ha (* « <«nnj>arativelv drt yeai. taintall U'injr IS mrlie* -diort nt ilic « *VI«HM.\e4ir'!» total. Hut through juilirmu* •*tiimiLii••••• »»f •» ^••'••n °P the eftet-u of drought weie iiiiiiinti«'d ami niuliona did not suff*r t« unv extent. Tim ie«uh of mi intere*tinjj[exjieinut-til i« T°n«| 1y the Sii|N-rnilt-iitleiif — nuiiiely. that tree* onjrinalK with *Io * MMIW mhii-h had IMH»II tliiiin^l to oi < MPIII* at the begin- IIIn|t iif the vrar turned M verv rapid LNouth «OIII|«II»MI to trees left -inned.

The Imrv^t nf lurk (ilituiii«l ilurmjr th»« yvn *«•« t»4,4*J!» U»v T^H 'I^ariiunhu \mU roiitniUf to HOIIIMII and lmiit«li«*d ISIS IIIH.. ry rouu now otojed at the htdian Muslim/ Of the *\un\v liw* planted toi the |in>te<tiou of V<»u»g iimhona. nililier IH douijf Hell and seeIII, to lmvf already attracted the notice o* the Government of Burnm.

JIUUgpOO FACtOry. No UrL ^a!* leiened ill thf fa«-Un\ duT p ^ tli« \e uudei ie»uit hut til ilie "\ sting stor k » ^^ ...,615 IU. mere eitruikd uelilmg •!',"-» 1^- ol W'»i"i»ie Miluhnte and 1.W1I HH. (imludiiig nuifiwl in |Hi"-i"*j »• «lulhoiia tiluitugr. T**" N now a ,ota| of 12,:j|,!« ILv !el»nlugi- at the lai-l.u> .ill m Uu^'»iind rouditjun and kept a^ a te^nt -KUIIIM tue d.i> >»hei, t k* **/ of MadrMH tek.luge Hill give out. All Uummf Mil|.li..i^ exIr »M was ...,..»d, ton.. ... there ...e «nll Uig* 't«'^ »l ilie purified product made in |Ni«l)MM. I" I1" I||.IIIW MI extraction Burma bark and the |ni : ha^l J»v. lmik i^ Uended in such propor- tion as would |t*ail I......>l>i>lli\ IM e\l*lidlMir«\

Besides tin, Uk |M. II*. net .rude IJiiniin- Mil.l**1- *»* ten ty- tained to yield :5,000 lbs. Trmb- W«n»',., ..I B. P. Standard and 204 lbs. ordinary Quinine S.il,,|Mir. 11..- experience of the last two years have led to valual>U rMI!|(s the T...,.ne , produced being equal in colour to most liiaml, .HI the M.rkH ..-I better than most in chemical |Mlrm, Thr |ow ,,llU * J which ^ to be such a desirable 'ti-iwiu. .. the In.de ... . 1 - » - ^^ 'f suit- able plant ,'ou|#| ^ p||I Mp |||f ^ j,,ir|H»-e.

Indian Museum: Ctlcutu. A. the Museum. besides the usual distribution ,,, JW.D,,.!.....r.....«..-. arrangements have also been made for tit* prwlnrlioi. of '|"IB"" ",! febrifuge tablets fo! .....H....«. nirr<t<tr rubilc ilealth. A A total of 1,000 lbs was supplied during the year under review.

* U"le-*Mrlh\ liaintactioii »a* the supply oi *,{**) lbs. Quinine Sulphate powder and 2,000 lhv tablet* to the Government of Oylon during the epidemir outbreak of malaria.

Total sales were as follows:—

	lt*.
Sulphate	29,942
Quinine Sulphate TuMeU	2,342
Cinchona febrifuge	1,936
Reinforced C. F. TaMeU	M»0

The total revenue realimni from sales being R«- •.08,781-5-0.

tO0k«.—In the «-our«- of the \enr the lotnl Mock nf Quinine of Ulphate e <llmil11 »»-'»» '^•7.«M7 lln. to 2:Vt.m\ lbn. The Mockn of Cinchona febrifuge changed from 1122.:|17 llm. to ."iM.I-'ll Hw. Cinchona febrifuge from 21.147 lb to 19.187 lbs. Detail* are given in the following stock account*

Stock Aooounts.

Quinine Sulphate.

			Cr
	» •		lbs.
To stock on 1st April 1934	JII7.IU7	By sales and other issues	77.:r»l
To manufacture (,iH) returns	4.V3OH	By stock on 1st April 1935—	
		At Muslim	&2:2\U
		At Mungpoo	I^.^I'J
		At Naim attain	»l|*J
	313,217		:U.1.217

Cinchona febrifuge.

To stock on 1st April 1934	tfl.147	By sales and other issues	2.71«
To manufacture	1,2[illegible]	By stock on 1st April 1935—	
		At MuDgp<Ni	V2,'.\
		In Calcutta	7,.l
	22,4[illegible]		22,4[illegible]

Bark.

To stock on 1st April 1934	HW.3I7	By issues for extraction	101,815
To quantity harvested during the year	[illegible]	By stock on 1st April 1935—	
		At Knagr	V^.fiii
		At M^rtMi	*U>
	[illegible],748		[illegible],748

S. r SKN.
Botanical Surrey nf inAm.

[illegible]

[illegible]—484.

Report of the Botanical Survey of India for 1935-36.

I. Systematic.—The officers of the Survey have had little opportunity for outdoor exploration since the advent of retrenchment, but, as has previously been the case, a large number of workers outside the Survey belonging to Universities, the Forest, Agricultural, and other Departments of Government availed themselves of the expert services of the officers at headquarters.

There has been a considerable increase in the number of specimens identified for various correspondents and workers, some new species having been named. That intrepid and veteran explorer, Capt. Kingdon Ward, His Excellency Sir John Anderson, Mr. N. L. Bor of the Forest Department, Assam, and Mrs. Townend are a few among those whose collections have come in for identification. Capt. Kingdon Ward and Mr. N. L. Bor collected in the Nafra Hills, while His Excellency made a collection during his visit to Bhutan. A large number of specimens, however, are from Mrs. Townend who has been a very enthusiastic collector in the Sikkim Himalayas. All the above collections, judging from the collections, should yield very interesting facts of distribution, some new species, and not a few first records.

Besides the above, the Imperial Research Entomologist, Karachi, Mr. C. E. Parkinson, of the Forest Institute, Dehra Dun, Mr. Kayastha, Forest Department, Assam, Mr. R. S. Tandon of the Allahabad University and several others had their specimens identified by the Department. A considerable number of sheets were received in exchange and presentation from the Lingnan University, Canton, the Botanical Garden, Acad. Medir, Taschkent and the Singapore Gardens.

Some 421 sheets were on loan this year, comprising: the genera *Psilotum*, *Pteufnprmum*, *A*****: Uiorarpus* · *Genwstoma*, *Monotropa* ... to Mr. C. E. Parkinson, Norman of the ... Mn^nm of S.tura! H,.torr. T. T.-M ... the Sun Yat Sen ... Dr. ... P. Ark-Hk.r of the Calcutta I W . * , and other A^t i:A -^rneo., which were on loan, were received from various workers. including J. B. *«+"**. Dr. H. N. Moldenke of the New York Botanic Garden, The Fore4

Botanist, Federated Malay States, and others, with necessary notes iU(ro)n>orated on the sheet's.

Plants going out on exchange or presentation include 200 local species to Fnnnow. 30 apecimens of *Phrntx* to America, and a collection >D or **0W|ir *'u<^ *n 8Pec*ftl preserving fluid to Sweden. :"e National Herbarium, Manila and other institutions thr<>ughout the world also benefited.

General information on nil kinds of subjects, botanical and ^onomio. was supplied to a wide range of correspondents. Among oth****, information wan given regarding *Mcdicago mttva,* Sabai *fa*. *(Hctchcina* and *Schiira* species, Citrus, *Piper chabba,* 7Qr<**kto!frnoi K,ir:ti* and *Hytluocarpui Wighttana, Paychotna lP€c<in.)inlbi* alH| *Yflw* plants. Correct aud up-to-date information *B*nling th«. l,erbaiium was furnished tb Dr. Verdoorn for ^corporation iU th.- next annual isiue of ' Chronica Botanira ". ^Mr. Biswas, Curator of the Herbarium, boUniwd about ^rJMing up lo Phulute *via* Sandakphu and brought to the I^Wium almut *:m* taluable specimens aud a good many Alpine " seeds.

'Among foreign victors who worked in the herbarium, mention sho*ld »r n,a<le of 1'rof. Tnnaka who made a prolonged study of material and liternture regarding Citruv The Curator of the Herbarium ha, pnblnhed a few |>aper*, namely. " Jute and i! lied Fibre," "Our Garden Sangria* M, " Calcutta Filter J°*» and Organic Growth ". and i4 Notes on the Systematic J°*»«n of K.n«OT« growing iu India with special reference to

The Fwr under review in of «p*ml importance as several important rwnlution*. •tigge.tionr and tentative proposals specially affecting nomenclature nnd taxonomy hare emanated from the Sixth International Botanical CongreM held at AmMerdam. The proposed compfUtion of . new phrtograpby repre^nt.ng the rollection\! » the larger herbaria of the world and the scheme to photo. graj* t*pe specim,n, of all plant, «honM go far in removing certai* handicap, under wh.rh all worker*, penally monographiMs, have ^n la^r,ng. An Internali<»nal Dictionary of Botanical Terminolr Mhonrt rftncted to Phanerngamsl. translated and expUlli<!in ^gl,,h. Fmirh. and Germai,. would no doubi. prove of -'we lfl the ,tanHi.rdi-itinn of nV«nnt,on, M. work is contemplated. It w, .U. h,M *to* h h.fhly He.ir.blj. that th. Linnean iTm. ^ , M . at ihr l.nnean Society and or the BntisK Museum ibould be pbotorsph^d, tbui making ropie. available far

d:.. . Wibution to workers in other herbaria. A number of modifica-tio** proposed in the intermitlouul rules of noxueucluture have *•• accepted by the Congress.

^ P*rt 10 of the Flora of the Madras IVsidenry complete* tho Ora proper. The Dual pait mil contain addenda, indues*, etc. Fis<her has contributed iuither notes on Tart X, *huu uiu ^^ulated to clear many doubtful pmnti. The South Indian «Pa**es, 132 genera, are included in this part, Stapi's guiiem-•^8 beinp mainly adopted. Seveial genera of the Flora of Wish India, like *Panirum, I'aspilitm, Polhnia, Anthutma, "dropogan*, etc., have been split up into smaller genera after Stapf.

Several new species and new combinations resulted from **• Barnen' rollntion^ in Snutn India, worked out by Mr. Fischer. Amount the^e is *Impatient antumudtca C.* E. 0« 181^r, sp. D()V .. Travanrore. Anaimudi Hidjre, 8,000 ft., •Barnes, allied to *I. trarancoricn* liedd. *Arum avntum L.* and *9*n<,ndr tonmna* I)ali., formerly united under the latter name, had to be separated npain a* the result of new material Ur»i*hH by Prof Hames. Two specie- are romfniiiml, *J*n*mh '.ratn* Thw and *l<d jn\dn<1ra toitrnnu* D.llz.--Imih from Travanrore. Tie vegetative parts of the two species are very »imilar, but all the parts are larger *in I. ovata*. A new Sonerila, *S. n<mak,,<1cnn$* C. K. C. Fisher, from Ikrne*' Travancore collect ion. is also recorded.

Collections mn<U by Tnpt. Kindlon Ward and Mrs. N. E. Parry in As*am has<> r^ultnl in the following ne^ «p^iM, com-binationsand first rfNi.nh..-IVmonif *Tnhumifnhi* IIook. f. et T., var. *}"nuhor C \ . V* Fisher. Oaro Hilk Mrs X. K. 1'nrry; *Veronica cana W'M*.. JVlei Valloy, f.,000 ft., F. Kindlon Wnid; *Veronica capttat,,* Rralh . Delei ValW. H.«« «•• F Kindlon Ward: *Pinguicula alpina* !#.; Jlelel Yalley, 10,000 to 11,0041 ft., F. Kingdon Ward: *Anrhuvanthu*, AWW«« i C. h. (. I—IMT, ,p nov., Delei Valley, F. Kingdon Ward: *Arachynanthus lincarifolia* C. E. C. Fischer, sp. nov., Delei Valley, F. Kingdon Ward; *Elsholtzia Thompsoni* Hook., Garo Hills, 100 ft., Mrs. N. E. Parry; *Celtis sinensis* Pers. Delei Valley, 2,000 ft., F. Kingdon Ward; *Lloydia Forrestii* Diels., Delei Valley, 12,000—13,000 ft., F. Kingdon Ward.

Mr. C. E. C. Fischer has continued his rnn<rilll|<ion to the Flora of Burma ha H "fi tin ...Hr.iinM «f T »•·· Parkinson, Kingdon Ward, C W 1) K.-riiwJr. »» J 0<hfrf, of which the

following are new species: *Goniothalamus burmanicut* C. E. C. Fischer, *p. nov. *{Anonavttr),* Noith *Tonuyoo* District,, C. E. Parkinson; *Scvlvpia Kermodct* C. E. C. Fischer, sp. nov. *(Flacourtiacea), bu6in* District, C. W. D. Kennode; *AJhatada* Orr°*phil,t* C. E. Fiwher, Comb. nov. var. *magua* C. E. C. Fischer, x*r- nov. *(Acantliacat),* Maymyo Plateau, Gokteik, C. E. Pℜi nson.

The first pert of Volume I of the Flora of Asiam has appeared. Thi» ia the result of the work of several authors, all Forest Service men- Although it suffers from some of the di«ad vantages that **? he expected of work that has been done in the field ami away hom herbaria and libraries, it is welcomed a* providing the first ^'i-* accounjt of part of the Flora of the province. The volume * htrftdnowl by an ecological sketrh, by a geological account, and y a note on the climatojogical factors influencing the vegetation. I{ ^ Uind to ^rvp afl n uwful woik of reference and as a handy J^pminn to all interested in the Flora of this part of India. *Vna!ly w j|| it oid t|,p Forest Officer and botanist.

The r*Ti«inn of the Flora of the B«mUy Pwiilenry (started y **** late Father Illation in Uing continued in the pap" of the i^rnal fl| th, *liofilha* NatMro| Hi,ton- So< iety by Dr. (\ McCann. r- *r*l»w,,r* M U,n|! rnntinueil. In the same journal some b^ ^ l Indian *w* with coloured illustrations by the late E. Blatter and S Millard, popular descriptions of *TecomeUa undulata. Kydin* ™/vr,,,*. *Amhfnhn tv>hd». Ihtttma mdica,* and *Kleinhn-in hnipttn* huvo oppt'iir<'<1.

, .V"lum, VIH. !C... (5. of *iht* Bf«ord« of th^ Botanical Surrey %** «• ».n.|.Mi.m Iho Flora Arabi.a by the la., tath,r Hlutter. ^uis«••!««„ ,,„,.,;„ ih, familier Gn*ta<«c to Orarome* and a general index

In the Journal of thr Indian Botoniral Society (XIV. No. «• P?• »7.»fc-,, s• C. D.tit record, -me .p«i« "f Cbara and Nitella, chieflv from the IWn, ro»nd about l,»ona. and Kathiawar, ..f mbirh one i, a new .perie.. I" « %',P1." " ^ in the Jour,,.l ot the lnd.nn Brtwicl S.«-.rly (XH. No. 4. pp. 339-348) Mr Muka. llrhar. K.i»J« «••• ,lMrrlM * numb<r of recently iittmiluced or olb^rwi** imperfectly known plants from the r V\»r Oanirriir Plain Tbi* !»»* wa v foim a sort of supplement to Duthie's Flora of the Upper Gangetic Plain It has been observed here . . i.^nou* to fmpi«al America are becoming (hat *mm** nhni« imlir110". . ' n nf #•ne established Upper Gangetic Plain to in conformity with observations made in the neig of

J*fcutta several yean ago. lie has alto contributed a paper, The (JeuuB lMlotuni iu India ", Indian Forester, LX1, >io. 10, PI 654• pie»eiiting an account of the genus and the distribution o&e of the two apecieb Luo*u under it. /'. *triquatrum* alone occurs in India.

Mr.]). \\. Mukerjee has c-ontrihuted notes on a collection of plants from Mahendragiri in the Kaatern Uhats, Agency area. Sixt> *|>eries were collected at r>(HI ft. above nea level. A preponderance of Smith Indian Hill Flora oxer other hill fWu* wan observed. The altitude is iaid to have its effect on ihe colour of the floral leaves, epidermal growth, etc. Dr. X. I*. MOI made large tollertioti* in the Utanically little knuan llaliparu Frontier Tfa<it and hut, given an account of the Con if era griming in this ar*a Uigttkei uith brief notes on climate and geology. Mr. C. K. Park»iiN>n ha* gi\en an a< count of nome Indian and liuruirtie Dllk»iias (Indian Forester. LXI. Xo. 7. PP. 447-4-Vi). K. U. Haker l^'onU a Hiuall IHMIIV leguminoim plant with vellow flowers from ;** s»lween Uorge. Tibet, collected by Cant. Kingdon Ward. It *• allied to *Sophora*, *Carugam* and *Asfrmjulus*, but diileis in ci»rtain characteristics.

I* i' made into a new genus under the name *Salwenua \\'<tr<l,t* Baker.

iirtlyMtmm cUnnum from 8. E. TiM »i«l« raceme* of |iU|tf •"i citlournl flower* and pod» with H-4 flat Kl»l>rou» artimlations •• a new «pr< it'H. *Hnlt/finim cilrinum* up. now. S. K. Tibet. 13.VM) ft.. F. I.udlow and Sherriff. T«o new *|H>< \e» of Styraceae belonging to a ntW p-nu". *Uinnlfiidron. are* ul«> reported from T'»*l in the J.,urnal of the Arnold Arlioretum. XVI. |». -141 (I.tV>)- *f/umlr,,,h,,n I, h, I,, urn* Alfred Kel.der. (ienu- nov. KJK nov.. extreme S. K Til>et, foil. C. E. I'ulkmwn. *llmuh ml ran buristatum* Alfre.1 K.hder. up. n»v.. I'pper Burma to Went of Yunan. foil. C. E. Parkin«on. 0. F. Kinpd"" Wur<! han jfiven a very interesting arrounl of hi* 12th expedition in A-iu in que«t of plants and their «^d«. Tie explored S. E. Tilwt. namely, the Salween-Irrawady Divide, Shuplan (i""P«- Prl •"'?• W'i Valley. and part of the Mi.hmi«. ne hw .l*> contributed to the Journal •f the I(inne«n Society. I»nH»n. a sketch of the >reo?r«phy and botany of T.M. heinir material, for a flora of that country. In the conr• of the paper he oWrm <»•» rerent boU.»,cal exploration h- ,hown that the affinity of the F.o«tern Hm.iilay.n Flora '»• «lm,*t entirely with Wettem Tb.na aero*, the T.bet.n river *** -ountrt Ii .].«* not lit «ilh ••>• •oulhe"1 ranges except •• • a.Dor J-r«. -Uhouirb the mouatam range. appear

° be. continuous in this direction. Both alpine flora and teinparaU forest extend cant nn«d west in continuous belts. Definite xonal v«jretation according to altitude exists here beginning with tern P*r«te rain forest and ending with alpine flowers and dwarf *lru in the higher rones. It is evident that the Flora of Tibet becomes progressive, richer, and more varied as one travels south-eastwards into the river gorge country, where many types of plant associations are met with. The river gorge country is one of the """Uniral treasure house* of the world.

Another paper giving a pointer to a modern trend in classification is giten in the pages <1 the Journal of Botany (No. 873, Vol. 73, page 241) by Kingdon Ward, regarding Rhododendron •**•• Coiisiden.,1 from an evolutionary standpoint it can be 'Oferre.', t|iat Mi ore amongst the most stable parts of flowering Wants. They do not easily change in response to a changed **ironment." The author supposes that a study of the seeds may *>»< valuable data in determining the line of descent and so in R i s i n g relationships. Applying the above prinnple to the J-inVntion of Khod<xlendron. he proposes an amendment to Ba>ley Ualfour's system of classification of Rhododendrons, where *d characters receive greater attention than hitherto.

Mr. Uharadmaja has reported the occurrence of! W« tom^*nJrhna* I, from near Benares where it is said to be extensively -pread over a radius of 10 miles. No more than passing mention can he made in this r^rt regarding the •ver-,ncrea.,ng """Her of pnp,r, on a wide range of bot.n.d *ubj«« tfcrt have •-•"Med flon, Indian ^ni^ersitie., Colleges, ..nd !"«'••*"• A» bran-he, «f ,M)fany now have their student. >n th» country and the 'las,, of work is high.

Mr. P. Maheswari has contributed a paper on the progress of work in India on the embryology of angiosperms wherein he stresses the value to taxonomic classification of a study of the embryology, the wood anatomy, and vascular supply to the floral organs.

Of ^ia, im^rtance is .W" J ^ ^ I ^ L u in the Jo, """• of Ih, *lkmtm*? * atural I, ,llw7d ap bv the medicinal cinal and ^ I—. . . .H- •"I"!""; 'B m"dicLi and porous ferns Poiw>noiu c r i ^ of India and the mea

classification

-- - revision

Kew

^*" on further collections *two* Afn«

aft f F Africa etc. Stapf's revision of the cultivated Sorghums of Tropical Africa.» The present outline which pives new specie*, varieties, •» >8 a preliminary to a complete re\ i.«ion of the Soighuiiui.

yea. Indu>trial 8ectlon, Indian Museum.—During the adiT Un<ler reIH>rt the Public Oullery hu* Wen enriched by the p lon of «*M HpecimeiiM, which coiinist mostly of medicinal plant Prod Urti <«llected fiom Kast lleuiral and South India.

an,j J I urator undertook n lonir tour in the Ma<lras Presidency v«li aVall(oni during the year, which resulted in collection of •ftil tl^ M^ei lllfi||H o* medicinal plant* ami their product*, fibren spi ''leil> PriM^cti, |>iodiictrt of cottage induHtry, fM>d materialH, *iiit *Ul <l|,lt,r miHrellaneoiM artiden. He altto tonic thiN oppor-Ui^i • r<dltM iinjr herbarium npei-inieiii for the K< nnoinic Wjjjj.^ 11111 "ttaihi-J to the Industrial Sectioh, Indian Miiifiini, Sl^ also 1»i*en enriched by the addition of almut '*() HhectM.

As Usua'. a number of herbarium apecimemi, exhibited in the 0all ery * mu : ' Wpre ^placed by coloured drawing of the plant*, giving '^ter pffp«.t (<l ti1€. exhibit*.

During tnp year a number of «tud<*nt« »»f wnne of the Clleges ftf p t'al ru !nt!a nnc, the I »oM - Graduate itudent* of the rnivrmity «»f %i"ited the Gallery with a view to study the exhibit*.

No with j ^ 0 1 is corre^piindents in India and abroad vere furiiiMliiMl and {U-orinat,ô|» on the ftuurcert of mipply of the hmiiomic Plimu num ^1 v««"iou* cawA the plunU were itleiitifieil for them. Th«» Nr of f,lll luiri«l by commercial firm* and the jreiieml publir m India regardin tbe %.tiirce* of supply of ru* mateiLiln and fim^li«-«l products considerably m« reuM*d and Ibey weie all Miti«far1mi|y dealt w»tb. Fuither supply »f lwlaiiMtil *pecimenr« of will m#. from v»Hous part* of India 'win continueil for the Kcw Herbarium at ^" r request Aiitheiitic specimen* of *r<*t** o»f *Amnitum heterophyllum* were *upplied to Prof. W. K«e Shi-nifh of Southampton for revarch studies.

The work of ^pnrral "whaulin* of iho OalIpry Wa" rontinil «I-result InK in improrements in Tariou* diwtionii.

Information material* of the following was supplied to various ^rrenpr>IM|ents U,(h in India and abroad: —

***£?*" arnhi*TM WHM-; *Aronitum hftrmphylhw* Wall ; C"1"n sp : *Alstonia scholaris* Br.: *Amomum nrtnahcum* J.: *Areca Catechu* L. ; *Arenga saccharifera* Labill.; *Atropa Belladonna* L.; *Bambusa* sp ; *Berberis aristata* DC ; *Boehmeria nivea* Hook * Am.; *Brassica campestris* L.; *Brassica* sp.;

Broussonetia papynfera Vent.; *BuUa frondoia* Roxb.; *Cane* Papaya* L.; *Carum Carui* L.; *Cassia* sp.; *Cinchona* sp.} *Citrull* ^ *Colocynthis* Schrad.; *Citrus A u rant mm* L.; *Curcuma aromatica* Saliab.; *Datura fastuosa* L.; *Dendrocalomus strictus* Nees.; />«Tru *clhptira* Benth.; *Embclia Ribes* Durm.; *Gardenia* £j da Koxb.; *llobirrhena antidytcntenca* Wall.; *Hibiscus* *<*arifj* . *Hydrocotyle asiatica* L.; *Indiyofera indica* Lamk.; **H(pfera wdiva* L.; A'icofi/j/ia *Tobacum* L.; *Ocimum Basilic urn* •J Ory*a *coarcfata* Roxb.; Oryza *latifoha* Desv.; 0ry*a lafira «r. f//rn/i pmin; *Oxytenanthera* sp.; *Papaver somniferum* L.; ^«///i *ocimoiflet* L.; *Picrorhiza Kurrooa* Benth.; Piper Z?effc L.; ^'100 *PsylUum* L.; *Podophyllum Emodi* Wall.; *Psychotria I'rantanha* Stoke*; *Sacrharurn cihare* Anders.; *Stiunurea Jxippa* ***S Scojmm* up.; *Sesamum indtmm* I)C.; *Svertia Chirata* m.; *Trrmtnaiin Chehuia* RetE.; *Thereiia nereijolia* Jusa.; <>'por cordi/nlia Miern.; *Tntintm vuljar** Vill.; *Vrgtnea* *Scilla* Steinh.; Fflforuimi WW/if/ni DC.

HI. Cinchona and Quinine.—*Burma Plantations.*—In the plantation rainfall v\as normal and there was no damage to Cinchona. No extension was allowed, but the existing blocks were maintained in good condition. Analysis at the Mungpoo Factory showed that ufqp has enriched the Hurma bark in quinine content and >* compares now very favourably with Munsong bark. During the year under review the harvest of bark was 81,772 lbs., the corresponding figure for 1934-35 being 64.429 lbs. Bark sent to the Mungpoo Factory for extraction was 75,569 lbs. and the stock of bark at the plantation at the end of the year was 92.511 lbs.

The -hade trees *re iloing well. The accumulated Ipecacuanha roots •* aent to rnlriitU and stored at the Indian Museum, Revenue realised fro n the *m\e* of these root* during the year under review was H» 1.7M).

Mungpoo Factory.—Tie recry*talli*ation of crude quinine to Trade Quinine of H P. Standard went on as before and the total produce was 17.230 iba. Its growing popularity w •Tidenced from its continued smle.

During the year bark receiTed at the Factory from the Bnrmt Plantation fnr extraction was *V*JM* «». The total bark treated was 73,07• l»». (Jara ?3 341 *IU.* and Runna 49.737 lbs), yielding 2,820 lbs Quinine Sulphate and 1.379 lbs. Cinchona Febrifuge.

Since the supply of (Who* Febrifugf from the Presidency Jail, Al'f*re. to the OoTrmment of India area was stopped under orders from the Government of ..., inJ* *bom* the India

•*• «re being complied with from the Oownment of Iudi« itork °' Cinchona Febrifuge at Mungpoo.

liiian Uuttum.—Th« mort notable evmt of the year wae the Government of India'i d«ci»ion to make a free distribution of ^.000 lbs. quinine to the various provinces and minor administra- "«•»• except Dengal, in purtuanoe of their policy of Insulating ^ »urplug stocks. This distribution was made from the nlw-k at *« Indian Museum. Owing to the IOM of the water of "MaJliMtioa the Java Quinine became short weight but over- •"•ngth and this quinine was used in making the distribution. A» invoice weight of 49,451 lbs. quinine wa* »<ufd to the n n m Prince, with the result that the total stork of quinine r«i-hed * «mo:nt of l.i7,870 lbt. at the .nd of the year• leaving an exm, ?! OBly 7,870 lbs. over the rewrve. This suall quantity would la«»i«ably prove inadequate to mwt India's normal annual d»«ribution».

„ Three kind, of t.blrt.. 'ru., •>«.!- *W«A'™«*< ««»»"' f*i»f..r,ed Cin,h.,n* Tablet., and Cin.-b.ma M.nfuge Tablet-, are Wi»»f pr^ared for .upply to A.*m and rP|w Ind... Th«» *WW'. are made dhfrt from the Indian U M . The supp « ^m ,n,rea^ from 1,0001b*. in IMM6 to I.7M 1I-. ' » ' J ^ '»«» the l>unjab began to indent for Cinchona Wbrifuge T.Hrt. lo»«d« the clor* of the y«r.

B«ide. the free distribution of 49.4S1 lbs. of q«..»J <^ total "» -l« of all kiDd. of drug during th« y"r were .« MW .-

	48
	,222
Qutntn* Htilphito T«M«»t«	I,164
Qomii* R*.nf.>rrel Pinrhon* TibWi*	165
...ets	4,533
	53,354-4.

">• total revenue realiwd during !»*' ... the

, . > following Mock arrount. will re".l ^ P««« «>' "went kinds of drugs.-

ifninint Snip'1'-* f>r.

	Lbs.		Lbs.
To Stock on 1st April 1935	235,268	By Sales and other issues	100,806
„ Manufacture and returns	22,900	„ Stock on 1st April 1936—	
		At Indian Museum	9,715
		At Mungpoo	147,543
		At Naduvattam	612

m

Dj. Quinine *Sulphate Tableti.* Cr.

	Lbs.		Lbt.
To Stock on 1st April 1935		By Balm and other iuues .	1,225
„ Manufacture . .	1,194	„ Stork on 1st April 1938—	
		At Indian Muwum .	868
	2,093		2,093

Qutnin Reinforced Cinchona Tableti.*

To Stock on Ui April 1935	319	By Sale	1,764
„ Manufacture . .	1,484	„ Stork on lit April 193&-	
		At Indian Museum .	39
	1,803		1303

Cinchona *Febrifuge Tableti.*

To Stock on l«t April 1935	XU	By Salei	155
„ Manufacture . .	383	„ Stork on lit April 1936-	
		At Indian Muftcum .	228
	383		383

CinckoM Febrifuge.

To Stock on 1st April 1935	19.687	By Rale«i and other i^auefl .	6,250
„ Manufacture and returns .	1,900	„ Stork on lit April 1936-	
		At Indian Mwuin .	1,768
		At Mungpoo . .	13.480
	11.487		«.«W

Bark.

To Stock on 1st April 1935	885.131	By UMM* for extraction .	73,078
„ Quantity harv^ted during the year .	Sl,7»	„ 8Urk on lit April 1»»-	
		At Munirpoo . ·	501.364
		At Mergni • •	92.611
	666,983		666,9\1

IV. Financiml.-Th* total h>Vt allotment f;r the year was Rs. 1,53, and ** WW. of wbub R, 41·800 wtf for ft.tanirtl Surrey proper ** 1.U.20B t i, for C.nchonm. The wbult grant wa. spent,

leaving a small saving of about IK 2.0(10 mainly due to mo.lih.n-tion by uudit of the flat rote of extraction of tjuiniiit' irom Imrk.

•• **8taff.—The** writer held charge throughout the yew us Director, except from 31st May, li«J, to 'Jtttb November, l'JHft. **»'* on leave out of India. During hw absence the pout «f th« Director, Botanical Survey of India, was kept in abeyance. Mr .S. C. Sen, Quinologist to the Government of Bengal, who *ns •••0 the Officiating Superintendent, Cinchona Cultivation in (Stal. discharged the Cinchona duties of (he Director. Mr. S. X Bal performed the duties of the Director at Indian Museum and *»» placed in immediate charge of the Quinine Stock at Muneura **w the general *upeniiion of Mr. Sen. Mr. K. P. BIHUUN. C*r«»nr „f tli*. HerUiium. Hoyal Botanic flaideiw. Sil.pur, who *•' then ofliriaijmr an the Superintendent. Royal Botanic Harden', J'^arg'ed the Director', duties at Sibp.ir. Mr. S. N. Bol was C°Wor of the Industrial Section, Indian Museum.

, Mr. V. XaraNana<wami. Svnlemalir AMi-tant. acted a« Curator 2 ^e Herbarium. K«yal Botanic (lardem. S.bpur. uialer the J"Vrnment of Bengal from .Ibt May to 'JOth NoTen.Wr. 193.». and Mt. T D. Sriniva»an. a retrenched officer of thi« Department. J*ked in Mr. Naravauaswami-s place from l-'Kh August to '»Mh ..ovember, 193.».

Mr. T. C. Mukharjee acted m Head Clerk up to 13th May, 1935. *hen Mr. A. Boner,ee was appointed to officate in the ,H.,t. 3.'• «• B. Banerji. the Head Clerk, retired from Oorernment .er-vlc« from l»t February. 1KW».

R 0. 0,, Cinchona Plantation Mr. 0. H. Jothergill acted a. J»P*i>tendent througbou. the year during Mr. P- T. It.i«ell . '^ preparaton- to -etiremont. Mr. Mg. Sine «.. Overseer ^ *Srto«t the Ve.r except for a period of three month, when C n.ruih J^J officio|ej jn ni(l pl8re.

All the a.n.b.r. of th. sfff worked wdl during tb. year.

C. C. CALDEB,

/)ir«rfor,

Botanical Surrey of India.

MGIPC—L—III.7-8—6.1.37—430.

Report of the Botanical Survey of India foi 1936-37.

I. Systematic.—Although no outdoor work could he pr.w vided for the systematic assistant on account of retrenchment, useful work was carried out in the herbarium which continued *lon|r the usual lines. Opportunities for identification of colleo- •>ons ^nd for'the study of special groups of systematic importance were freely availed of. Identification of some 3.5INI specimen* were carried out, the heavier collections arriving from the Sikkim and the Bhutan Himalayas. Material help and information on plant^ of economic importance added to the variety of mork done in the herbarium. Questions on Artcniisias, the source of Santonin, on the nutmeg of commerce, on Papaver, on Srhizolo- bium, on Poinciana and on plants harmful to the tea pkut lauiu under notice.

HfW was an unusually large number of specimens on lonn. All the Labiates and several cases of Ferns went to Kdinhurgh and Ifcw respectively for the use of S. K. Mukerjee and K. Biswas. Small'«• consignments were with the authorities at Dehra Dun, Singapore, British Museum (Natural History), Ixmdon, Shillong. Besides theee, fresh materials of M specimens were supplied in and out of India. 767 sheets of Primula and 18 sheets of Crepi* returned from Kdinburgh aod the University of California where they were on loan, besides 283 sheets of Brassica returned by the Econon*ic Botanist, Cawnpoi*. These were put back into the herbari'«•. 108 sheet* of Asiatic Palms from Singapore and 41 sheets of varions flowering plants from Buiteniorg were notable additions under exchang* account. An interesting acqoi.ition to the herbarium it » *Ami* of the aqoatic *Aldroranda renculosa L.*, presented by I>r J. C. Sen OupU of the Presidency College, Calcutta. IU .nirreat ia twofold. FirMly. it h*.not;*b*u col- *^ •«•€« *Dr* Roibfirrh first Jiscowed it in the Salt Lakes |JV WmtU in the beginning of the l*b Centnry, and secondly, U a*. » M" TV Vikrmmptir, a locality removed from *• «m by arrvial knndred miles.

c J« XI of O—ble's Flora of the P « ^ of ***** *7 -" *• C. Fiatker pubiiikrd at the beginDinf of tha year completes

the work o* oDe o, ^e P*0**110*4, floras. It contains besides addenda, corri^n<la» indict and a'map of Madras, a revision of the genus Pavetta, ad*P^ fron» Dr. C. E. B. Bremekemp's monograph of J! o, tn« genus in Fedde's repertoriiini. A general description Kr .!. flora of the Presidency of Madras is also added, wherein as j ns., *l>at further botanical exploration is bound to yield more species new t0 ko*an,ca, M-ience as indeed is indicated by the results of l»rof • £ • |5arne'fl collections made during the past three in ,. *s WeH •* discoveries by others. This is particularly marked species tfepuA Impatiens to which Sir Joseph attributed about 50 true of *Q"ea« the preneiit work includes 81. What may bt vjures **>hth India in this respect is equally true of other provinces >nd more, intensive floristic work is sure to bring to light beer ^records and newer aperies from placep supposed to have been thoroughly examined, leave alone other areas still untouched by systematists and explorers.

Arisaema attmu/itum and *Anurma pelt at urn* are two new aroids from T«*vancore deecribed by C. E. C. Fischer in series VII of *** or little known plants from South India. Examination of recent collection* from South India have also extended the hitherto restricted difttrihution of the following species of the presidency of Madras namely. *Hib%$cut cane$cem* Heyne, *Q*i*qualu malabanr* jj^q" *Anoroyraphtu elongata* T. And., *Ptptromia dindigulctuu* *i*k Mm wiirt Lindl., *RhynchottyliM latifolu** C. E. C. Fischer, *Ariopma peltata* Nimmo., *Unutma Banum* C. E. C. Fischer, *Ar*<ruM* UiyA/n Schott. *Ophwglossum liuiUuueum* tl^11* rfre«>tly diMt>vered in Travancore and noticed by Fischer in •oOI> wies of his in a new record for India.

^ Kh<MUlendrons of Oylonf South India and Manipur, hitherto raIIeJ *Rhododrniron orbortvm* and regarded as identical with the Himalayan specie* of that name have recently been analysed a*d found to be distinct from each other and alao from the Himalayan *R. arbor+um* by J. M. *Ccw%n* of Edinburgh. His examination h-» W to the result that (1) the South Indian, Ceylon ... species should now be called respectively *R. nilagiricum* Zenker, (2) *R. Z^ inicum* Booth and (3) *R. Wattu* Cowan., ... latin diagnosis. A

... udy of th* •M«»mr of Ik* monotypic genus of *Trichopus zeylanicus* Gaertn of Ovlon br *F.rk* Vfnwo W.t«n bu established beyond doubt the .Aniti~ of «k« •P^'" With the Dioscoreaceae. Watson .!«, ,t»B,ia«« tfc«t Ibe form ot *Trxrhofu,* ,,,. ... occurring ., iB, hill* of Travaa'fre «>J dwcnbed iB

e's Flora of Madras as *T. zey!(vucus* differ* markedly from Ceylon speries in the shape and Ten at ion of the leaves. Dr. M Eileen W. Erlansen has contributed to the Journal of the Botanical Society an account of the Plant colonïsation on reclaimed islands in the Cochin harbour, where sedges *timbhstylu ipathacea, ferruyinea* and *polytnchoidcs;* *ptnnatut* and a xerophytic grass appear to have been the Eighty-six species of phuits have come under her notice, the chief agencies uperaal being wind, birds and man. A brief comparison the courses of colonisation on Wellingdou isladd of the harbour and that on KrakaUu ha* been mode and twelve were found common to both.

Uchari Raijada has continued his enumeration and notes recently introduced or otherwise imperfectly known planta 66 new reconls for the area, covered by Duthie's Flora of PP«r Oangetic Plain.

Ward's expeditions into (1) 8. E. Tibet, across Himalayas, (2) in Delei Valley beyond the Eastern AwMiin and (3) in Upper Burma have resulted in the »ew addition* to the Indian Flora:—/Vimn/fl *Bamar.* W* W. Smith (S. Tibet), *Primula contona* W. W. Smith *P. [hrtyphyUa* W. W. Smith (rppcr Burma), W . W. Smith (8. Tibet). *Phottntn* HVirrfu C. E. C. Fischer (Delei Valley), *Ficus Xtphias* C. E. C. Fischer (Uelei Valley), *Hedychium W'ardii* C. E. C. Fischer (Delei Valley), *Antenna rhtzomatum* C. *«b*T* (IVlei Vallej) and its varieties *nudum* *Fischer* and drmrma *tpecwtvm* Mart. var. *jignuihana* W. W. Smith and /'. *Udlowii* species from Ludlow and Sheriff's from Bhutan. A remarkable new alpine *Lobelia nubi-* isolated from B. E. Cooper's Bhutan »nd demribed by John Antony. Capt. Kingdon Elections from S. E. Tibet have also yielded the follow->ododendronit: - *R. nrcxtiatum* Cowan and Ward, /?. Cowan and Ward, *R. pormdaium* Cowan, *R. Ram.* n. *R sihattnm* "owan, *R trirhoclodium* var. Cowan var. nov. Such » large number of new been discovered and described for the first time nrds as far at the frontien of India and beyond

across the riw gorge country are ill still mostly *terra incognita* botanically, except for the tra?el* of William *QriAik* tt the beginning of the last century, tod the recent tweb of B. E. Cooper, King, u Ward, I. H. Burkill, LwUow and Sherif, Joha Anderson lftd *. P. Bisw.

ET«» ttny (t,IlertioBi from other ptrte of the great Himalayas should namely, of the fix *Evphratw* deacribed by H. W. Pi- bkutenses ?. ^ » i u from Nepal, *E.* ***\»m (laduiir,; (W. Hima (W. Bhutaa aad Eaut Himalaya!), *. i^fel^tonj E. Kashmeriana *yat), A'. *Ktngdon Wardii* (Borma-Tihet Fwatier) aad (Ladak-kaihinir).

Th« confusion Rurruandinfr the nomenclature of the Himalayan Daphnes few at laet been cleared by the valuable contribution made by B. L. Hurt IB the Kew Bulletin. The eastern reddish flowered plant which extends from KatUra Nepal through Northern Bengal. Sikkmi and Bhatan to Xorth-Wert A«am it now named *Daphne Bholua* Ham. « 1>, Don and indadet Z>. W^. Wall. ex Steud, Brandis' Flora of Xorth-Weet aad C-tral Iadia and Gamble's Manual of Indian Timbers aad *D. Co-M*** Wall, of Flora of British India, Brandis' Indian Trees, and Smith and Cave's Records of the BoU.^ Sarrn of Wi^ "«• • • variety of this. M»elj. w. *ghcutu* (W. W. Smith and Cave) B. L. Burt. d plant is now designated *D. papyracea* w.U. ei Sl^od.. «d it extends from W. Nepal and Northern United Provinc*. to W. Punjab.

Schellenber us of the Connara- ceae based on £/Vathus *sterculiarfolius* Prain, the type species being now called *S. sterculiarfolia* (Prain) Parkinson nov. Comb. It occurs in I/nrer Burma, South Arakan, Bassein district, Diamond iiland tad Yiamatlon TilUf«'

Part H of Volume I of the Flora of Aisa» by Kanjilal, Das and Purkayastha was published during the year carrying the work to the end of Moriagaceae. This work was already reviewed in

at

Two Mtr flowering plant. *Dtotfyn* klka* for A " * " and *Crotalaria kodaUn*i$* for the Palni HilU, diecovered and named eonu yea» «go by late Debbarman haw been publUhed in the Journal of *• India. Bounical Society by K. P. Biawu witli latin diag> he .

. Premna *inttgrifolia* Linn., a member of the Indian rtrand **» W ba,n renamed by Harold Ray FleU-her a. *Premna corym-*S (Bonn, f) Bottl. et Willd. owed upon *ComuUaicoryml,o,a* *•*-, an earlier homonym tha. P. integrifolia I, The vanety .«d.r *P. inu^foha* of the Flora of BritiJi Iud.a »ow transferrei to the earl.er name a. *P. corymbo** (Burm. f) BotU. et Willd. Tar. *mguitun* (c. Bel.) Fletrher.

Oth-r change, of the name, of In* " lowering planU. th* result of intense .tndie, are tho* of *Prenanthu Brunonnna, violefolia* and *Hooker,* of the Flora of Briti* India wlueh Uve now. been traKfenW to *Lactucc* by Stebbrn. a. *L*tucdBr* L. *Hookm* (Ckrke) Stebbin. and *L viololw· Corfu* Hookeri a species bMed upo. the ,olleot.on. of Sir J. »• H«kw « Sikkim has for long b^cogni-d a. un«ti.f.rU>rjr ta»u- .t reaiy consisted 2two diZrTplant., neither of wh.ch fiUed .n w.th Certain C Norman ha., therefore. *oWed thi. confu..on by cmting a -w *pnv Cortulla* .o rere.ve the Hookenan .per.e. wh.ch he has renam*d a. *CortulU Hooktri* (Cl.) «»• . ^ - N on " *n has also other new .pecie. like *fortieth Hed.nh* (D.el.) Comb nor· Sellinum *cort Undt,* Norman nov. .p. and *Cortra d<r<»** (Don) Comb. nov.

Th• contribution, to a mtem.tir . « * « * rf J B J'a"^ ;. ^ally that of Alg-. pro« *• *«»* ? £ * ! JS Aown M to thi. bran, h of *Ini^* botany- ..*-»?***

!^e «w^ • ••«™»I UI «« iYi» knowletlire of South instalment of his contributions to the
Indian Marine and on the extensive collections of the sea
weeds deposited adras. Fifty species
have been enumerated of which fourteen are described new for
the first time.

Characiosiphon rivularis sp. et gen. nov. a monotypic member of the *Chlorophyceae* has been noticed by Prof. M. O. P. Iyer r. Mr. J. C. Banerjee has recorded his H-nary ^m J-T- Ely in relation u> .li.nt the Myxophyceae of Lower Bengal, L of lh. Chrooco««c- *hu* ecological factors. Twenly-»wo »p«'* been enumerated.

Botrydium tuberosum Iyenger var. *intermedium* is ft new form * *Botrydtum.* from Lurkndw by A. B. Bao. Mr. Gheroddin ha. ftvl!** th* preliminary »«^«y °i th« »W flor* of Hyd******* t'Wan) in the Journal of the Indian Botanical Society. The P*!*" entitled " Alg* in relation to Animals " by K. P. Biswa. T **• published in the Hedwigia, Vol. No. 76—1986—with one

B *r- 8. K. Pande ha. reviewed the studies on Indian Liverwort*. T' observe, that the distribution of the liverwort* ia the Hima-*?M derream* from the east to the we««, and increases from the V*"»« up to » height of 7,000 ft. thereafter decreasing. A new J«tWeroii from Travancore. *A. Ko*hii* has been deacrihed by , f. L- P. Khanna in the Journal of the Indian Botanical Society, 0 Wed with a jist of all the Indian species of Anthooero*.

. /•!»•« on Embryoloiry. Physiology, Morphology. PabwAotany JJ* Gnomic botany that hare bren published from the research f^tories of the'Indian Universities are too numerous and ,70n<l the .rope of this report. Suffice it to say that the mterest .r"1 ^ the study of those subdivisions of Indian Botany and JJJ T^i» achieved augur, well for the future of Indian Botany '** varioui tpplícatiom.

w t Vol«me XII. Xo. 2 (1) of the Record, of the Botanical Surrey J> ** dealiBR with the Flora of «h. Lushai H,U by C. E. C• fc1^ w**t to the Pr- during the y~r P«t II of S.r David * *Bd I- "• B«rk,ir. •' An Account of the »»««»."" in th. » P««n, through the Pre-. Part I h« h~n d.stnbuted.

the

t "od" "Port Ml specn-en. h." be«.added to the collec- & •« *ih>h!u.* Th«e\re mostly obtained from South Ind.a, i>> ProTiBC<- Md tnm Bombay Pre.ide.cy TJ-y m mostly •»*«. o.l ««d. «d »«l.c.wl plant, collected dunng tours by the Curator.

The Curator undertoc ear in t mbay Presidency and in th' United ProTi-r- «">«"* J" coll.. ^ ^ valuable specimens of <P,ce.. reget.ble drug., food matendj. oil * «nd sou* product, of «ttag* i^-«n«. 1HJM.k..»1- lected «on»., * i.- .-I nUnU durinff the tonr which enriched the J. . 4 . , . .L. [odoitntl Section, Indin Museum, HrrUnum altac-hed sheets.IB«— a«Uition of about 30

The notable amongst other specimens exhibited in the Gallery during the year are the coconut shells brass laid and engraved,

procured from Travancore, a full exhibit of lar showing the different *^ges of production with illustrative photographs obtained thro1*^ the courtesy of the Director, Lac Research Institute of Kam Kum and also a comprehensive exhibit of various kinds of silk Produced in Bengal, showing the different stages from the eggs *> the various finished products. The raw materials of these have Uen printed to the Gallery by the Deputy Director of Seric ulture, Bengal.

T ^ *ork of general overhauling was carried on and as usual a number of exhibited herbarium sheets were replaced by coloured drawings.

During n* the v w » ** Uiual, "t^ents of V»"OUI1 ^n°o18, Colleges I* .°* the CaJrutU University visited the Gallery with a view ***; th© exhibits and they "were rendered the necewary help.

Co T^P^'entii in India and abroad were* supplied with in- ^ion regarding the sources *of* supply of economic plant *llJ|Ct*' ^Prwent*tiv« *ot* numerous local commercial firms ^ for infoTM*tion on »«verml l>lmllt p"*1"01* and they tre satisfactorily attended to. Authentic specimens of roots of Aconitum *heterophyllum* w*w •*min iupplirf thi" *y***T* to pro* fessor Uwion of the University College, Southampton, for Research studies.

Ij^^^prehensive exhibit of Cinchona plants and their product* Zr*.wi*h other economic plant products, was put in exhibition Cjj *** by the Botanical Society of Bengal in the University **• °' 8cience (Bot. Dept), Calcutta.

Information on materiaU of the following wai supplied to the numerous ron-e«pondents both in India and abroad: —

Aconit"m heterophyllvm Wall.; *A. palmntum* I). Don.; *Agave sisalana* Perrine ; *Aleuntti* sp.; *Angelica gbue** Kdgew.; *Artimisia* sp.; *Atrvms* sp.; *Dambusa* sp.; *Camellia thetfera* Griff.; *Carica I*V * , *Umn.; Carum copttcum* Benth.; *Ca»u> angu.it. folia* Vahl.; *Citrus* sp.; *Coco, nuafera* Linn.; *Courovjnta guianensis* Hook.; *Cr^u* .p.; *Croton Ttglium Unn.; Cymbopogon* sp.; *Datura fastuosa* LiM.; *D. Stramonium* Linn.; *Decalepns Hamxltonii* W. & A.,*Derru* .p.; *Derru elUpUca* Benth.; *Dtchroa* /efrnfuga Lour.; *E»9**" malaccensu* LJDD.; *Euptorbta thymfalia* Burm.; *Evodwi Ra*l*rgh«na* Benth.; *Gamma tndura* Choi..; *Hyoscyamus muticus* f.inn *J**t»i* ?>«* Unnj lAhum .p.; Limonia crenulata* Roxb.; />o6,/u, .«^a *Linn.; Mallot*s,h,hp. pinensis* Muell.; *Mammea* Linn.; *Mentha peperata* Linn ; *Octmum Basihcvm* Lmn.; *0.*

Km*.; n_m *sanctum* Lima.; *Oryza coarctaU* Sozb.; 0. a * '*».; 0. *Kim liaa. Tar. p/#iw Praia; A**** sp.; *ocimtidis* Linn.; *Pcucedanum grande* Clarke; *P.* ... Praia ; *Ptychotria Ipecac sank** Stoke*.; *Rhododtndnm* ...g<m D. Don.; *R. arboreum* 6m.; A. *emmpanmlmtum* D. Don.; So/i* fca6yf*iiu» Linn.; *Sausrfe* Laffa* Clarke; *ScilU indica* KobN«jamMi tiu/irvm DC.; Sorp&um *vulgar** Pera.; *Urginia indica* Kunth.; viUJ ^unra^ru Wall.

III. ClBOhona and Quinine.—*Burma Plamtatum$.*—the pUuUtion comparative dryage earned beaTY damage to the young plants. Temperature was normal. There were no diseases 7J th« trees whic b however suffered badly from a plague of grafts.

'• Tie# of the uncertainty about the future of the plantation no 'Iteaaioas were allowed and operations remained oonfiued solely to Ue maintenance of the existing blorkt. The Government of India's deeisioas to transfer the plantation to the Government of Burma with effect from the 1st April, 1937, were conveyed towards JJJ ••• of November, 1^%. As the Government of Burma desired ^ ct>atiau« with the plantation but to close it down immediately siur the traaafer all mature bark was stripped off and despatched to the If unjrpoo Factory. Th« coolies were all repatriated before the end of the year.

Bark detpitthed to UM Munfpoo Factory amounted to 181,8»4 lbs. >ttst the carrrnpondinfc figure of 75,569 lbs. during the previous year. So bark was left im the plaaUtion when it was quitted for good.

All the accumulated Ipecacuanha rooU amtutiog to 3,482 lbs. were d«patched to the Indian Museum and stocked there for sale. Revenue realised from the sale of these roots during the year was Rs. 2.400.

*1***9poo Fmrtorj.—Th** rerrytUlli-tion of Crude Quinine to ... ^i*** °* B.P. Standard was stopped -rl^ in the year ... •^tiatioas for the conclusion of as *HP*™**** k*we« ^ ernment of *B-fl* M4 Mes-rs. Shaw Wallace A Co. Calcutta were ... A. • result of this agreement the chief market for the «k of this Trad. Quinine was lost to the Government of India with effert from the 1H December, 1936.

During ... Plantations wu 181J* lh# ToUl bark treated was 188,678 Iba. (Java 62,92*! ... B «. 125.752 lbs) •yieldin 7,464 IU. Quinine ^ ..., 4,M8 lbs. Cinchona Febrifuge.

»arring the supply of Crude Quinine detailed distribution from Factory to the various parties in the Government of India showed of late a tendency to increase. Quinine Sulphate aud ch0llt Febrifuge supplied from the Factor)- during the year 0,228 lbs. and 6,560 lbs. respectively against 8,244 lbs. and lbs. during the previous year.

**dian Museum.—*The* supply of tablets of various forms increased from 3,141 lbs. during 1935-36 to 3,331 lbs. during the year under review. The only noticeable feature is that the sale of Quinine Sulphate tablets dwindled from 1,222 lbs. to 339 lbs. that of Cinchona Febrifuge tablet* rats from i6o lba. to lbs. This change may be attributable to the comparative Price of Cinchona.

The Government of India having agreed to stop the sale of trade the Government of Bengal area with effect from December, 19M, sale to the trade has since considerably declined. This lots may however be marie good by general increase in the demand from the Government institution* and local bodies in *the* India area.

Total &*t salts during L935-3C and 1936-37 are given below: —

		1936*36 *Urn.*	1936-37 Us.
Quinine	Bulphtte of *U forms .	30,148	31,478
Quinine	Sulphate tablet i . .	1,222	339
Cinchona	Febrifuge UWMs . .		
Cinchona	Febnfugt powdw . .	4.5S3	6.610

The total revefiM raalisad during the year was Bs. 6,26,822^3.

Stocks—The year opened with a total stock of 157.A70 lbt. Quinine *nd closed with 130,941 lbs. The stock of bark changed from 1,364 lbt. to 4W.580 lbs. DeUils of the various products are given below:—

Quinine Sulphate.

	Lbs.		Ua.
To Stock on 1st April, 1936 . . .	157,870	Bj *Bairn* tad otW *ianm* .	36,064
„ Manufacture and returns . . .	9135	„ *SUfA* oo 1st April, 1937—	
		At lodm *Uumum* .	8,608
		At Mungpoo . .	121,726
		At Nadavattam . .	612

(^.

Quint** Sulphate Tablets.

			Cr.
To 8t<*k on 1st April, 1996	" *	By 8aW. . . .	.
Returns . . .	608	„ 8tock on lit April, 1W7-	
. . .	«	At Indian Monva .	581
	870		870

Quinine Reinforced Cinchona Tablet*.

Stock on lit April, 1936 . . .	39	By Sale	1,570
„ Manufacture . .	1,586	^ Stork on lit April, 1937-	
		At Indian Muienm .	55
	1,625		1,625

Cinchona Febrifuge Tablets.

Stork on 1st April, 1936 . . .	228	By Salea	1,423
Manufacture . .	1,547	„ stork on lit April, 1937-	
		At Indian Mnwum .	569
	1,775		1,775

Cinchona Febr\f%g:

To Stock on 1st April, 1936 . . .	15.237	uee .	8,773
„ Manufacture . .	4,666	„ 8tock on Ut April. 1937-	
		At Indian MOMOID .	191
		At Mongpoo . .	10,041
	19.**		19.A06

Bath.

To Stork on 1« April, 1936 . .	5B3.PT5	By hmm for eitractio* .	188.67S
Quantity harvested .	P0,353	ff Stork on Ut April, 1 «	
		At MugPoo . .	494,580
	683,258		683,258

IV. Financial.-Tbf tottl bud^t •llotmeot for the year was Re. 1,61,000 proper and Rs. !,179OO wgJ f^ Cinrhon*. The pant wM exceeded bJ t net turn of Bf. 2J00 doe nuinly to the wjnding

P of the Government of India's interests in the Cinchona Plantations *n Burma and meeting charges in connection with the repatriation of the coolies.

V. 8taff.—The writer held charge throughout the year as r"*ctor. Mr. S. N. Dal was the Curator, Industrial Section, Indian ^U9eumt except for a short period from the i4th April, 19? "t to the 14th June, 1936, when Mr. V. Narayanaswami, Systematic Assistant, worked in his place and Mr. T. D. Srinivasan worked aa Systematic Assistant. Mr. Xarayanaswami went on leave from the 15th June, 1936, and Mr. Srinivasan continued to officiate in his place up to the 8th September, 1936, and then he went over to the Government of Bengal to work as Curator of the efWium, Royal Botanic Gardens, during the absence on leave j! °f India of Mr. K. P. Biswas. On return from leave Mr. tfayanaswami assumed charge of the Curator of the Herbarium ,? the 2nd January, 1937, and Mr. Srinivasan reverted to the Govermnent of India to work as Systematic Assistant till end of the yr- . During the period Mr. Srinivasan officiated as Curator D ^ Herbarium, Mr. H. L. Chakravarty, an outsider, worked at yil*atit Assistant.**

***r- A. Banerjee was Head Clerk throughout the year.**

***n the Burma Plantations Mr. Fothergill was Superintendent throVhout the year. Mr. Maung Sine, Overseer, was granted leave for three montll« with effert from the lst March» 1937» P>^-parato the p^ to retirem«nt. The Sub-Assistant Surgeon reverted to the GoTe"Timent of Banna by the end of March and the other two ?*rki were granted each four months' leave with effect from the *7tk March, 1937, preparatory to retirement.**

AU the members of the staff worked well.

C. C. CALDER,

Director,

Botanical Survey of India.

MGIPC—L—III-7-4—38-1-38—400.

Report of the Botanical Survey of India for 1937-38.

|c^ I. 8r*kmatic. -Although field work could not be undertaken on j^ ^n-*°f retrenchment, study of important special groups continued it j.-*.crbr.rium. Questions of nomenclature also engaged particular nam Btion of the Systematic Assistant. Controversies on various H|>ecitiu e^ 5. »bould be settled not only by exploring literature but also by ^ J examination of ample dried, and if jKwible, fresh material '5te r*kowe\er the duty of every botanist to abido by the latent P 'national Rules of Botanical nomenclature. Much confusion in tin* ^i ^am<» can be avoided by following these rules. This year is dij *** ^>' the publication of about one hundred new specie* from c^d'Tnt ?art* ^ India. The largest number published goea tot ho tfo p°f Xc*, particularly to Mr. C. E. (\ Fischer. It is essential for 8P«c~alcUtta Herbarium to have duplicate specimens of these new HQJ1*' Cordial relation with K^w and other leading overseas Herbaria tjo * before, be allowed to continue in order to enrich our coller.- *U*j ^ ^ ^ them to date and also to fill up gajm by replacing ^^ onttM far as iwwible. Dr. K. P. Biswas, while in Loud on, tion ^a «*tisfactory .vttlement on this important question in eonsulta- ^luV^ Sir Arthur Hlll» director, Royal BoUnic Garden, Kew, K, bji^01 bright Smith, Regius Keeper, Royal Botanic Garden, Edin- MuS[aod Dr J ^M^^ttom, Kee|»er, Department of Botany, British been (^4tUral History), London. Home rare specimens have already to yj^! ivwl 'rom Kew and Edinburgh which are valuable accjuimtionH HerbariUD1- V*T J**t thanks are due U) the Director of K«?w and Regi1" Keeper of Edinburgh Gardens for their gt|ierou« gifts. An outstandu* event of wiWHlemblf intcrent to the Garden and the Herbarium **« the celebration of th* 8*-s-qui-Centinary of the R^yal Botanic Gar J<*11. Calcutta, when mt»*ages for continued |inw|writy of the institution Wl>rt* riwivwl fn»m far and wide. The visit U> th« Herbari on t]l]§ "cw^wwi "y IwMing British botanists and other scientist •^ on this occasion, by leading Wriimh m anwu and other come to 1 •*! particularly by fckr Arthur Hill Director of Kew, who hail far-reach t-'ftlcuttftto attend the Silver JubuW Session, is an event of between IK »niporUnce from the point of cordial relation* existing o. ~Z! W *** < Wiitta Herbarium.

****iJd WOrk In ^ Herbarium of the Royal Botanic Garden, Sibpur, S^keT^i011 U8U*1 'mes. :M.l)s|«cimen« were identified for a large r iOf^tM°• i corr"J*"»'J«iU in India. The Botanical Officer, 8hillong J"^ J:nb*nuDi, had the highlit iiumlwr of sheets idmtified for him, S ^ T ^ ' o n with the work on the flora of Assam. r>l9H «»heeU of T*V/ u* ^t^riaU wrr on IOM to specially iiMidy 4,2113 shrvU of ko^ith tutS|rW• W Hnufh of Edinburgh BoUnM-Oardnis in connec- fblL Q I'rfii...* paration of a monograph i. 1.. i.J.un. lsihnd<* by Mr. S. If. Aberrjee, M.Sc. 236 sheets of and Alternanthera to the I>tfw^raflhr BoUiu, (i*nlni BrH.ii; 24 sheets of Ficus glabella to Mrtcal/ <A the UnlM Univer»ity, China; 104 ihefu

of *y·*

jy, *****ropi** to FJmerD. Merrill of the Harvard University, America K*.-*) ; *%H* sbertAof *MvqinMi* and 10 sheets of .I*Umm* to the Körper, Department of Botany. British Museum (Natural History), London ; Selaginellas were worked out by Mr A. H. (J. Alston |artly in collaboration with Dr. K. P. Biswas and the Allium were scrutinised by Mr. J. C. I ttondy ;] 10 sheets of *Cw'ta* to Ijeiden, Holland ; 9 sheets of *Anthistiria* sheets to the Forest. Botanist. Dehra Dun: '29 miscellaneous Cotton, A. Das of Slullofiff and l.'tt sheets of *hlvm* to Mr. C. D. monograp Curator of the Kew Her}>arium, wlio was ciigag^l in a published 'hie work on the i<enii«. Mr. Cotton's work was subsequently Lilium, in a maxnificient form. '2.855 sheets com prising the genera and part of *Ikrru. HiftltHirtiifftji, T*irnkimffMin .*1erwMiqMn, MmjinrlUi* incorporated *LilmUur* were received back from loan. .'Ur93 sheets were Java were into the Herbarium. *24H sheets of Japan, China and and as received from Prof. Tanaka and others under exchange gifts.

3. Botanical inatcrials for j»uqiom»s of re-Heawh and stmly were supplied freelv to ^veral |»eoj)le lwth in Imln and abroa<l. They consisted *oi* ^rf*" K*l*^'1 materials, spirit preserved and aioiaU of local plan tf coH#xt<N| in *n<l uutaide the gardnu. Considerable amount of botanical and Monomír information on plant*, plant product* and agronomy was supplied to wide ciivle of correspondents.

4" .^P- A. |)as, the nhtor and joint author of the " Flora of Assam '' (now ln Pro KreHs)f Mr. C. K. Farkiiunm. the n-tiriiui Forest Botanist, Deh? Dun. and N. L Bor. the Forest Botanist, vizited the Herbarium at Nun pur. Thf V ww p y r n m|| fju·|jiti^ ^a assisUnce in their works. The two •"•wUntii of Bt. *(\A.* R. N. Chopra ami his sUfl of artists continu11111^ their work in the Herbanum as usual in connection with the investigati on of the Indian Medicinal planU. All possible facilities were given to thl„m Wld ««|»«i*l arrangements were made for their work.

5. Mr- V. Narayanaswami. the Systematic Assistant, BoUnical Surv ^ of !n<l1*. oon't,nue<l the critical revision of Indian (iraminear herb ^i thf »««V»pfc^ distribution of the species. He has also stud ** the systematic (mition *of* the two sperws of I »/w.

6. *Ur V C r* «U«T. I>im*or, Botanical Huivry of India, contributed % V r t l r ^ <>n .' the \Vt*tmn of India " *U>* the " Fiel.1 .Viences of Ind! V P U W * ^ ^ bv the Indian Science ('ongress Assucution, 8ilvct Jubile- Heasion, I<*m.*' \ short not^ on the •' Hibpur Herbanum " mas also ^ led him in the profiling, of the Science Congrea. Amor

7. * ^ Wlow inf wrrr publwhed by Dr. K. P. Biswas .—

^ ' 'M^ o o l r o n h r i m i " (B^og* ^neralis, Band XIII.

^ p J ^ M (Journal of Bounv- 1917-38). ' Haijdbook of Common C , ^ ' UBi^rasandCaHér was .bo pubbahed dunn^j U,e

' Nfw IWhi. -TW Flor» of tbe *l»** HJii ^ C.E r «

Fischer and "Some New North-West Himalayan Moases" by H. N. DUon and R. L. Badhwar were published an parts 1 and II of Volume XII, No. 2 of the Records of the BoUmcal Suivey of India, Part of the collection* mentioned in part. I of thin paper was worked out at the Sibpur Herbarium, 122 copies of Vol. XIV, Fart I of th* Annals of Royal Botanic Garden, Calcutta, with H5 plate*, were distributed and Vol. XIV, Part II of the Annals of the Royal Botanic Garden, Calcutta. " An Avcount of the Genua Dioscorea in the hast—the species which twiue to the right " by David Pram and I. H. Burkill wan in the Press. An illustrated treatise on Indian jMioiiial piAtltM (in Bengali) entitled " Bonoushadi Parichaya" by *• HIMWHH and K. (Jhose is passing through the Press of the Umvemity of Calcutta. Rewriting of the Bengal Plant* by Dr. K. P. BinwaM IK J^frMHing cm the principles agreed in consultation with Sir l>u\u> JTtin. •• Monograph on Fern and Fern Allies " wa» completed by r, K. p. Biswas in Kew an referred to in Kew Bulletin (Appendix , 1937).

K- The following new species for the locality are recorded in the Fl*• of the LuHhai Hills :-

*J'<t*lxH,t (h^f^ri/oliu* (Wall) C. E. C. Fischer, *Btymtw bi*h<ncf,*,<* C. E- t Fisther, *H. Wniyii* C. K. C. Fischer, *Sonmht nib™,* ('. K. (\ Fischer *M,tMM<ienil<i fwrwt* V.* E. C. Fischer. *M. i*tit«*«n*w* C. E. C. Fischer, *(hoMulia lushair**** C\ E. C. Fimher. r«rif#.i.i,i Parryue C. E. C. FiM-k-r. *Srnrrw h<*hnw»i** C. K. C. Fi*-h«r. *Rhml,*Utt.* drom *Parnfae* Ilut<rhinM>n. ;^i/"'M HVi^rn *i* K. ('. Fimher, *?!tyiiiH*ii ntemraiyi (* E. <\ Fischer, *D. Pompom* C K. *V. V*mW I).* IfV^/m (' K. C\ Fim-hiT. */Vfrwrwww P«irpm*m V.* K. *V.* Fischer, *Tn*,1*,l,*ln,rrai>*<i V.* E. C Fwchrr. *StrMnxthrs Parr^m* C. K. r. Fisher, *<hth*.*nfom glaiMlo*.* i* E. <\ FIWIMT. /^U M||| W'-m C. K r. Fincher ///V//n/'"' Siimmi'rhiiye", fWayyur /^M/I/^ f^w^rhayw, AVM />irr/ Hunimerhiiyi*. ^-/,V'^ /"^"^-'- Humnif-r-*V|1««inl *MaiittMw W<»<f<r<* C. K. C. Fiwher.

?: to other ,«•,«.« and two IKM^ dealing un BuUnv of India w,r,. published during thr wf hv H|MTWlIrtH and renean heirt in India and abroad. Ofth^.iwo l«o'ki*aiid i.iin'tiTii |»I-TH deal on the Uxonomy «f the Angio*i.erm.H of Indm, f"ur treat about the alg^ of India, two a* on ** Chmmf.^. IHO on the Mourn, on* on Bryophyte, fourteen on (Vtomorphokw and Em bryology, ail on I hysiology, four on Ecology. two on t)|f. ^ j ^ i BIM| ywisonous pro^rties of plants and the rest on mi*cellaneous subjects.

" «-.iW Beautiful Imlmn Trees '. a finely .llu-trat^l volume by oi mnd M»,"wJ. * «fk that w.<.w^n«g'»'*••««* «^{*«« the Jounul of the BmnUv Natural H-tory UocKty, and " Vol. II of the Flora of Ana.ni " bv KaiijiW aini A. D", *J«|C f«o Wumj. mance to Cornaceae are the two book mentK>n«l above. The nrrt „ an illustrated guide to the recognition of the wrB-knowo ornamental and useful trees of India. ^ neus of the second wor was already touched upon in the previous report It is similar in get up and treatment to the ones that have appeared arleady. In spite of the laudable

attempt to linn 8 tn* nomenclature of the species up-to-date and the omissions *" f#*w M lk»ib»e, there is still much to be desired on the first account ;* A ***** numl «* *f sj>ecies rmmled from Indii have been left TM *** 8 nou W ** incorporated as addenda to the work, "0v*J!L book fo k rant pTTM*u<* " by J. H. Holland, late of Kew, is a useful conne^ t 8tu<lent41 of K^onomir Botany and those whose work is li.* U i h Museums.

the flo J the contribu of the Systematic Botany of India, especially U (K u?* 1**nt*' Mr C *• C Fischer's " Plants new to Assam " Pt. *.xiii/ir 1922 75473)" 75)) ^ Contributions to the Flora of Burma" India ,,' 1937, 436,, 440>> ,, NVw ur iittle known P U n U from South Revi-^ ' s. viii and ix (K. B. 1938, 32-J7, 123—127), •' Further 240) !?i® f Rut ^«w ' by Prof. Tanaka (Jour. Ind. Bot. 8oc. 16, 227— B^mp|, the IXOIU *¥**** oi BurmiM and the Andamans " by C. E. B. ^dlt emp (Jour. Bat. 75» 108—111, 169—17f 260—266, 295—298) l»8 T** Coll^*'» " Flora Simlensis " by R. N. Parker (Ind. For. ", i ^)- "Indian Tenninalias" of the wction PenUptera and V |L? tl0I>Jl of lndUn FoIt*t PUnt* ,, v%_ iv b^ C,, K,, p1^*118011 (W. and J^ C *' »nd ll!), uruthe incut outstanding. 8ev«ral new species and records have- been descnb«HJ and noticed for the localities. They are, Clematis ...

aurantiacum Hand, Mazr., f^nifui k*}*da 8cindl., PottingrrUi acuminata Prain, OryspM trrraUt Diels, Qwrw* Engirt mna 8eem, Unc... K... Kth. var. Mtttminea Prain and Burk., fVirrx ... Hocst., (\irrj- /nrx Boot, (new records for Assam), Artabntry* multiflorus i\ E. C. Fischer. SUnnea PnrkiuMmii C. E. C. Fischer, v»r u ftlf*wn t\ E. C. Fischi-r, -VorAiiiw tchmliftuiu W. 8. 8m. W ? r K. C*. Fkirb6r* %»»"•« rbrnjAtiWhrn ((Vaib) C. E. C. ... tUwnwn N*ray»na*wami (ww sjnvirt from Aimam), ... Bn-mrkriiip. /. Latex% ptbirama, Htide**%*, ... P ak r ... mandala ... "" l***"'**", rimntttba and var. ^///frf«, vhiunluba, ompktia, j to k"*M. and Ayi»rMo^y//«f. (ik-w species of Ixora by Breme Kemp, B ^ ^ Burnuft) /M/»//M*»* Mi/nn//fr»ixM E. Bsrnrs, /. Pnndatn E. Vh,!"' a/jrr^«" Anrrwi»iii C E. C. Finrher, Sowrn^i Airwwi (\ E. (\ ^ p' ^'"rrAo, M.Hmifm/M (\ E. C. Fischer, ihdf/mannrpun G^mkh C. £ f,' J ^ FiM-h^r. /;. muro-f^ky K. Barn«, Opkutnkizn tncarnala ***** ... °(W«#«i C K. C Fiscbrr, Lkfrnnntira tannma var. *•• Fm,.^ j|jrw ^p^.^ for South India, Travanrore).

... rt^nt ^^rtnws of Kingdom-Ward, Sheriff and K. N. ... BliutAn, 8. E Tibrt and N. E. Burma, hive yield*! tht^ P^*^ di^nljr.1 by C. V. B. Marquand :—

j "'r ... M (Burma Tihtt frontier), G. otopkora var. ... var. G. ... Msrsusnd var. ^r»^« nov. v*r. ... Marquand (Bunn.-Tibet) K. B. ... (• K C. fmbrT, (Coniiiowt*^) M • new ... from near Tsango lake, 12,000 ft. Sikkiin(K. B. IW7:»4-100). Among J. M. Cowan's Rhododendron of Tibet and Bkuta- (Kota. from Royal Botanic Garden, Edinburgh. Vol. xix, No. xcm, 15.-167. 1936), only one, ... R. ... is new to tbr !•«*». Flora.

13. The following Indian PUnU have undergone nomenclatorial changes under specialist' hands :--

Spondias axillaris Roxb. *into ChoerotpoHdias arillaris* (Roxb.) Hurt and Hill. /*"W"» *micropkylla* Bedd. into *D. buxifolia* (Bl.) Hiern. *Maba buxifolia* (RattI) A. JuM, into ^J*"*/«"» (Willd.) Bakh'. var. buxifolia mmi var .'^A"™"*" Bakh., Ifo^i fttfym»«vft* Dalz., into Diospyros errwtr. *anpuAijdui* Bakh.

14, ** thp 75 species of the South Indian marine alga* (Rhodophyceae ^d FhjUH>P^n y^c^*«) from the shore of Pamban near Rame*-aram, 8C^led by F, Boer K cfen in th<5 Journ. Ind. Bo* ^oo. 16 ; 311--357, IH37, the following are new to the science :—

Gracilaria ^ *pygmaea, 1'kampui glcbidtfrn, Spyridta fiitiformi** ttn<| *Dasya Iyengarii.* The Zygnemaoeae *of* the United Province* and of Kashmir have received attention at the hands of Bhashyakarla Rao and Misra and iOme ,^ew 8P^PC"<* «»ve bee-n described by them (.7. I. B. S. 16, 269-2W. 1937» »n<l Proc. Ind. Acad. Sci. B. V.*, 3.)

Nitella (more*" *n<i ^»<«ttf *hsberruiata* are two new Hpeciea, the Indian Characeae described by B. C. Kundu in the J. I. B. S., 16, 2'M. 226 and 263-268, 1937.

*Anth*T™ "l*W*ffl and *AfUhoctrot burmanii* are new additions to the Hepatic flora of IndUf de-cribed by J L. P Kh*nn* in the J. B. N. H. 8., 39, 358.

15. Contributions to the Moss flora of India are the two papers, one 4*4 tj/1 D"*°n and R. L. Badhwar in the R. B. 8. I. xii 2 (11)]<j;i8 I* ?^*T h? H N .^ o o J B N H 8 . 39» 769795. 1937. Th« Tl^ %^7 With tb^ 17 Bew m^**8 from the North West Himalaya *« Bal W ^ ^ " Mn ^» collected in Assam by N. L. Bor, fa>nj here en lpftrm Fro ntier Tract and from the Naga Hills. 20M species are "A Pr? W Ud , ()f which 39 are new to science. H. O n, -...;..,.,

A Preliminary Suney of the Forest Types of India and Burma " reviewed in N o. l o* Vo1. lxiv ^ thpIndFor, I938t llia v«luable contribution *o our knowledge of the *ecology* of the Indian vegetation. The work 1* dutifully illustrated with suitable samples of earh typ^ of formation met with in India. Rrsults of the fytjlogiral studiea carried out •* *** vtnotu UniTenity laboratories in India on the following plants have been rmbliabed :— '

Eichhornia *ter%CMa* Kunth., *Aloe pern* L. *Pempku arulula* Font., *Santalum album* '., *Argemone mexicana*, *Mmi»petmnc^t* Tofi^Ji indica, Brassica carinata, Raphanus sativus f. Cytology of Basidia of the Polyporaceae 1 Ibje^wT ^ ***' 8> *• **•* " * valuable contribution (Jour. Ind. the{^^"•nd Ann. Bot. 1937) . Rev. J. F. Caius bw deait about the' ta*jii**' mtui potsoDous properties of Indian PlanU, belonging to X.*• 8 *L[1 "mmHtmmf*". ^e *Ca^phllncme* and the *Crowfoot** (J. B. heafct^^J- H. N. Parker has added several new records for the ***** >y Collett's •• Flora 8«nlen«s."

K. P. BI8WA8,

Royal Botanic Onrirns, Sibpitr.

II. 16. Ininrtrial Section, *lahm* MMIIUI :—During the year under •Jd *** "P^'inienA have been added to the collections of exhibits . put on show in the Gallery. These comprise medicinal plant j^rtioiia, fibres, oil **seeds** silk **and lac and have** been obtained from ar]*-ling *rH flfrcca Districts aa well *• from Blutgalpur **and** Ranchi.

»i 1 "^ WTlt*T undertook short tours in Bhagalpur District (Bihar) of >n Dehra I^n. which resulted in acquisition of valuable specimen* l>f»h >UIIUkroU" agricultural products of Bihar and fon-st products from thl ,>Un and M tn M "F*111*11* arrived at the headquarters after t¥* *>ar *'as over, they could not be registered during the year under fort. Hk* alflo took this opportunity to collect plants of economic "Parlance for thr Herbarium.**

»rt. ^ ^otao^ «hibit* that were put up in the Gallery during the year *ikl o** o, (,inrDOnm P^nts and their product*.** ***MaUoin* pkilltpincsu*** **^ *(1'{"**y$_{tr}$H,,, (dwda* fruits. Among the industrial oil seeds, valuable ^"•roens of *AUftnte* mimUwn* (Tung) from Feradeniya Gardens, : • »°n, *bniHMua* gp. and *Lu^rm iiMttatiA*%m*im* seeils from the Dacca ^ulturnl Farm h%e been very us?ful ezhibiu for the Gallery. xJTe<<*nt4ltlVf, n^1^ °^ commercial imjiortance such as *Htfn*c>t**** **, *inffii* var. *\U>**>m<i* (New MesU). *Biwhmrrui* mm (Rhea), *Apt*** TM' ('^i«al hemp) ami *Lt*»m HMttaluutmrnm* (Flai) with their exhib liotanical specimens have been procured to form good "* for the GalU-n* aud for addition to the Herkarin?n. *A* comprehensive rihibit of vanoun kinds of silk such as En, Taasar, Mulberry, Miiga including Cocooos. 8ilkworm* Caterpillars and Moths. and > their different stageA of growth as well as representative yarns silk finished *,lk piecen have been procured from Nathnagar Government Indu hutitute. Hhagalpar. Besides these, silk yarns dyed with dv jvnrmia vegeuble dye* as used by the factory akmg with the actual t*•««• have been procureil ami these formed a valuable and instrut- taJ1 <,Xhlblt- A ** <* photographs illustrating the stages of process m l*l*r manufacture have ^ n added to the paper case.**

1. Identification of plant portions from numerous correspondent both fp»m Imlia ami abroad, were carried out as usual and such materials for identification were received from Horticultural Society of Siam. Z^logical Suney of India. Veterinary Department of Assam, Opium Factory. Ghazipur ami other commercial firms and they were all satisfactorily dealt with.

****• AU>ut]ft* sami4e^ of plant puniw- representing vegetable r1*. *vAUrtM*«lbligvagMObWMr. II. H. Barkill from Burmese bazars, u ^n "".«« Krw. on r^quu«rt «•«« •» » »nder.toud tUt Dr. p ,.f H^l^n,,. Hmtunr.1 M«1K»1 Muwum' London IIM undertaken help of '« e, u mi BBP tlbmm wilth • VK-W t> id«tifr the iMDplM with th- »r I. H Hurkill of Kew, London**

informa- tion regarding JT tb- «,«««. prop-rt*. «nd •«. ete, of various indigenous economic plants and p investigator in Varnish of the I-- rtment of Industries, E------nent, was furnished w«h d.u,lT.ufom.tion regarding varnish-making resins and •"••turn ri^liliiw |.Unt- »n.l tUir product*.

22. ... commerc ... correspondent was supplied with detailed information regarding sources of supply and manufacture of Indian substitute ... Match wood ... and chestnut wood. ... Suction for ... of certain aquatic plants was given to the Engineer of ... while information regarding the poisonous properties of certain fodder grasses in Assam was supplied to the Veterinary Department of that province. Again the Director General of Commercial Intelligence and Statistics was supplied with preliminary information regarding the vegetable insecticides that are available or utilised in India and on request the Director and In Charge of Medicinal Plants and Food Poisons Inquiry of the School of Tropical Medicine, Calcutta, has been supplied with a short note regarding possibilities of cultivating the following 33 medicinal plants detailing the climatic and edaphic conditions of the localities in India where they could be experimentally tried:

Anacyclus ... DC.: ... Spreng.; ... Willd.; *Colchicum* ... Linn.; ... Willd.; *Eugenia aromatica* Hunse.; ... Bows.; ... Regetl.; *Gaultheria procumbens* Linn.; ... Linn.; *(Ihfcyrrhpi qlnhm* ... Linn.; ... Hayne.; ... Cav.; ... DC.; *Lobelia inflata* Linn.; ... Houtt.; ... H. B. and K.; ... Half.; ... Hapf.; *Piper* ... Linn.; ... Linn.; ... Linn.; *Psychotria* ... Stokes.; ... Linn.; *Strophanthus kombe* Oliver; ... Dryand.; ... Steinheil.

23. Other commercial people in India were supplied with specific information regarding certain more important medicinal, dye and fibre plants.

24. ... Prof..., and workers in other scientific institutions both in India and abroad have been supplied with information on economic plant products and in many cases authentic ... for their ... work have been procured for them. The result of the investigations ... out by these ...ntists are generally ... ed to the ... for incorporation in the records of the Botanical Survey of ... P. K. Bose of the Chemistry Department of the University ... was supply ...

Peucedanum grande, ... *Hamiltonii*, ... *Erodium* ... *Roxburghianum* ...

... Balkan of the same Institution was supplied with material ... research work and Dr.

!*"• UM> Dn»rtment of Sew Cuhure »nd Introduction <f Leningrad, J8.8. R, WM rapplM witfc m»teri.ls of I*Wi»* Jjff"»« »nd brus *prrmttfritiM.*

25. Nttm,rou» «ber oorrwoondviit. were nupplW with inforoutioit regardin**,,,,,,, o(iupply. propwti" »nd «*•»»' the following pluU or their prodluct*: -

Butea frondosa Roxb.; *Tecomella undulata* Seem.; *Poinciana elata* Linn.; *Aconitum* ... *llum* Wall.; *Mallotus philippinensis* Muell.; *Blumea eriantha* DC. / P i ^ ••*/»• Linn.: *Rhodomyrtus tomentosa* Wight.; *Plantago ,mria* ForJt.: ...(*rna rotunda* Linn.; *Uraria odorata* S .k; i «-o^. odmM Kh. F. ««1 T.. r. *Kirkee*; *Picrorhiza Kurrooa* Benth.: *AUm*. ~mi**c*; . W ^ *SipO** L«n.; *Atropa Belladonna* S .: *Xrt»tr>m alha, Y.* nolr Ditonr.: *Ar*innf*™«> **«*: *Bryonia laciniosa* Loo.: fr.-Kor.wi .^<P'"« Vent.; /?««'•« «« Linn.; *lattorus* ... *Chamomilla* sp.; *Digitalis purpurea* S-; P«U«J/« *A^utifim* T.: *Baptisia alba* R. Br.; *Derris elliptica* ... *Podophyllum emodi* Wall.; *Psychotria Ipecacuanha* Stokes.; *Strychnos Nux-vomica* Linn.; *Desmodium gyrans* DC.; *Cassia nucifera* Linn.; *Cassia angustifolia* Vahl.; *Saussurea Lappa* Clarke.; *Lycopodium clavatum* Linn.: *Acacia arabica* Willd.; *Hyoscyamus niger* Linn.; *Hydnocarpus Wightiana* Bl.; *Hydrilla verticillata* Rich.; *Atropa Belladonna* Lino.: *Artemisia maritima* Linn.; *Hemamelis* ;>—L.. *Dendrobium* sp.; *Vanda* sp.; *Stillingia sebifera* Michx.; *Cannabis indica* Lamk.; *Trapa bispinosa* Roxb.; *Areca Catechu* Linn.; *Gossypium* sp.; *Decalepis Hamiltonii* W. & A.; *Onosma echioides* Linn.; *Corchorus capsularis* Linn.; *C. olitorius* Linn; *Agave sisalana*; *Erythrina* sp.; *Gardenia obtusa* Wall.; *Begonia venusta*; *Melia Azadirachta* Linn.; *Dendrocalamus* sp.; *Bambusa* sp.; *Saussurea Lappa* Clarke.; *Saccharum officinarum* Linn.

26. Work of general overhauling of the Gallery was carried on and about 1,800 labels for exhibits were replaced. Several groups of exhibits in the Gallery have been re-arranged with descriptive labels to make them more interesting and easily intelligible to the public and amongst these "Paper", "Silk" and "Cinchona" may be particularly mentioned. A representative collection, comprising the more important economic plant materials of India was exhibited in a conversazione held in the Botanical Laboratory of the University College of Science, Calcutta, in honour of the Overseas Delegates of the Jubilee Sessions of the Indian Science Congress, held in January 1938.

27. About one dozen specimens of drug plants were trnt to Shillong Health Exhibition while a number of specimens were supplied to Baroda Museum from surplus stock on request.

28. As usual, teachers and students of schools and colleges took advantage of visiting »d studying the industrial exhibits with interest and they were rendered all possible help. Mr. Kalyan K. Purkayastha, M.Sc., an ex-student of the University College of Science, Calcutta, was given every facility to work on fibre plants under the Curator's guidance.

29. During the first week of January, 1938, Sir Arthur Hill, the Director of the Kew Gardens and Herbarium and a delegate to the Jubilee Session of the Indian Science Congress, visited the (Salary considered) Industrial Section and Herbarium attached to it and evinced considerable interest in the operations of the Department. Dr. T. C. N. Singh of Nagpur and Mr. K. Datta, Botanical Officer of the Agricultural Department of the Government of Bengal were given all facilities to work in the Herbarium and Library.

30. The ... attached to the Industrial Section underwent overhauling. About 300 specimens were repaired and about 800 specimens were ... mostly the collections of the Curator, during his tours.

31. The ... of "Food, Fodder and Spice Plant Exhibits" of the ... the Curator ... and another Catalogue of ... "Plant Exhibits" is ready for the Press.

32. The Library has been enriched by addition of 151 volumes by purchase, besides the usual number of journals and periodicals subscribed. A considerable amount of literature in the shape of Reports, Bulletins, Memoirs, etc., have been acquired by gifts and under exchange from various institutions besides certain number of complimentary publications from the authors.

33. The work of the binding and repairing of the books was being carried on as usual.

34. Financial. The total budget allotment for the year was Rs. ... of which Rs. 39,... was for Botanical Survey proper and Rs. 28,1... was for Cinchona. There was practically no saving nor any excess.

35. ... Mr. C. C. Calder, Director, Botanical Survey of India held charge of the Department till 18th October, 1937, when he went on leave preparatory to retirement. The writer in addition to his charge of the Curator, Industrial Section, Indian Museum, held the charge of the Office of the Botanical Survey of India proper for the rest of the ... Uie work of ... Systematic Assistant at Sibpur Mr. V. Narayanaswami, the Systematic Assistant under ... continued to officiate as Curator of the Sibpur Herbarium for the period ... up to the ... October, 1937, during which ... continued ... Narayanaswami, a ... of this Department ... Narayanaswami reverted to his substantive appointment as Systematic Assistant. Mr. A. T. Banerji was Head Clerk throughout the year excepting for a short period of 21 days from 11th to 31st March, 1938, on leave. All the members of the staff worked satisfactorily.

H. S. BAL,

Curator.

Industrial Section, Indian Museum.

III. Cinchona.—The outstanding event of the year in Cinchona from all India point of view has been the inception of an inquiry under the auspices of the Imperial Council of Agricultural Research on the possibility of bringing fresh areas under cultivation with a view to increasing the production of Cinchona alkaloids in India. Mr. A. Wilson, t... Officer-in-charge of the Enquiry, has travelled widely and examined ... in the north and in the south. His report should be out before long and its conclusions will be awaited with interest. It is sufficient to mention here that the results of such a ... enquiry would require to be followed up by detailed observation ... the areas which promise any material result.

The present inquiry has been particularly opportune not only in ... of the increased degree of public attention focussed on Cinchona ... but also in view of the prevailing depression in the staple ... plant ... in the country. Enquiries have been received during the war from all over India, from Provincial Government a. ... Indian ... community regarding the method of cultivation and the supply of seeds. Absence of knowledge regarding Cinchona appears to be general, for a great many inquiries originate in places where there was ... chance of success. If this interest persists ... there will be an increasing demand for the supply of technical information and authoritative advice.

... Factory: Extraction work on behalf of India went on ... India ... opened with a balance of 494..Ml lbs. of which ...

ended with a balance of .174.Ml lbs.. Java being I».2!» lbs. and Burma 245,275 lbs. The 4,423 lbs. Quinine and -J.iH.1 lbs. Cinchona Febrifuge.

39. Indian Market: Sale of Quinine Sulphate Tablets rose from 339 lbs. to J J M |U the bulk of the supply going to the Punjab. The sale of Cinchona Febrifuge Tablets ... decreased from 1,422 lbs. to 917 lbs. Manufacture of Quinine Reinforced Cinchona Tablets was ... Cinchona Febrifuge Powder decreased from ... and that of Quinine from 31.478 lbs. to ... the decrease in the last case being mainly due to stoppage ... the trade. The following comparative table would explain the position:

Sales of different drugs.

	1936-37	1937-38
	Lbs.	Lbs.
Quinine Sulphate		
Quinine Sulphate Tablets	339	2.4JJ
Quinine Reinforced Cinchona Tablets	1,670	
Cinchona Febrifuge Tablets	1,422	§17
Cinchona Febrifuge Powder	6,610	4,[illegible]

The total revenue realised during the year was Rs. 4,48,000

ñ 40. 8toekB :-They#mr opened with a total stork of 130,941 lbs. 2**[11]*** and ended with 112..VU lbs. Details :>f th»* various products ** Riven below:—

ifmmimtSulphate.

* T	LU.		O. Lbs.
° * " * on l.t April. [13]37 . . .	I>).tMI	Bv sales and other issues .	22,800
—manufacture . .		,. Mfii-k «MI I-I April.	
		At Imlmn Muaoum .	9,879
		„ Mungpoo . .	102,073
		„ Naduvattam . .	612
- •	|.V..:i*4		135,764

Quinine Sulphate Tablets

Dr. Cr.

	LI*.		LU.
To Stock <* U April. 1937 . . .	.VII	By Smlr . • • .	J.I33
„ Manufacture . .	J.IH2	.. Si4n k *m 1st April. IHJH--	
' •,		At lntli«n MiMeuoi .	||o
	2,543		2,543

Quin%m Hf-forr.d i imrkom T*ablets.*

Dr. Cr.

	LU.		l»i
To Stock on 1st April, 1937 . . .	••	By Sale	
„ Manufacture . .	4.'i7	.. Stock cm l«i A|inl, 1938 . . .	•••
„ Gain in weight . .	lf		
	520		520

Cinchona Febrifuge Tablets.

Dr. Cr.

	LU.		Lk^
To Stock = la Apnt 1937 . . .	••••	|l> hate . . • •	MT
. .	1.19V	„ Stock on !•» Apnl, 1938 —	
		Al Indus MMM« .	925
	IMS		lM*

Dr. *Cinchona Febrifuge.* Cr.

	Lbs.		Lbs.
To Stock on 1st April 1937 . . .	11,032	By sales and other issues .	3,711
" Manufacture . .	2,013	" Stock on 1st April.	
		At Indian M U N I .	2.IM
		" Mungpoo . . .	5,066
	13,045		13,045

Dr. *Bark.* Cr.

	Lbs.		Lbs.
To Stock on 1st April 1937 . . .	494,3??	By issue for extraction .	12?,049
" Additions . . .	...	" Stock on 1st April.	
		At Mungpoo . . .	174,891
	494,3??		494,3??

41. the administrative charge of the Cinchona Section was held by the Director, Mr. C. C. Calder, up to the 28th October, 1937, when he went on leave preparatory to retirement. Thereafter the writer held charge as Principal Quinine Officer.

42. Mr. U. H. Fothergill, Superintendent, Bonn* Plantations, reverted to his substantive Appointment under the Government of Bengal. The Overseers and Clerks attached to the Section retired during the year.

43. At the Indian Museum, Mr. S. S. Bal, Curator of the Industrial Section, was in immediate charge of local Quinine Stocks.

& C. SEN,

Principal Quinine Officer of the Government of India.