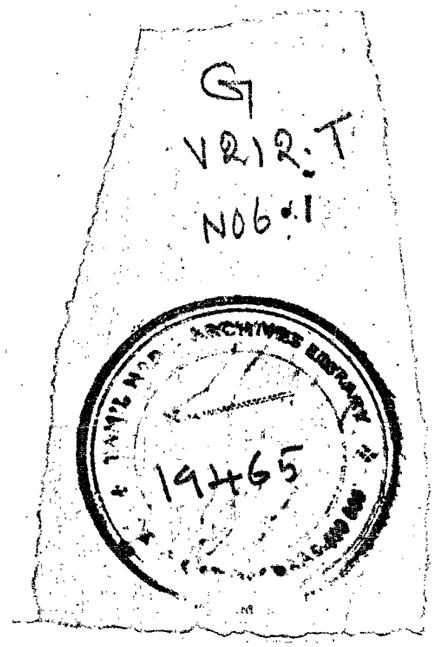
THE TRAVANCORE STATE MANUAL.



PREFACE.

Under command of His Highness the Maha Rajah, the preparation of the State Manual of Travancore was decided upon some time ago, and I was appointed to it with the simple instruction that the book was to be after the model of the District Manuals of Madras. This instruction I have faithfully carried out and I am happy to report now that the book is completed and issued in three large volumes. Although I have allowed myself some latitude in forming my own conception of the design and scope of the work and devoted my best attention and energies to their exposition and elucidation, I still feel I might have done better if I had been left to myself, to work at it leisurely, spending "a laborious day upon each page," undisturbed by limitations of time and space.

The difficulty of compiling a work of this nature will readily enlist the sympathies of those who have laboured in similar fields, for as Sir Frederick A. Nicholson points out in his Report on Agricultural Banks, at which he worked for about 3 years:—

"The delay in submitting the report is due to many causes, principally to the immensity and complexity of the subject, to the difficulty of ascertaining and then of obtaining sources of information, to the discontinuity thereby imposed when a half finished study had to be broken off till the receipt of further information, to the extreme difficulty arising from the incessant demands of a Collector's work notwithstanding two periods of special duty. ... ... For the Madras Presidency statistics and information did not exist, and it is only through much enquiry and by the courtesy of numerous correspondents that information has been obtained."

Mr. H. H. Risley's portion of the Indian Census Report of 1901 covers, according to Mr. Gait,* 136 pages of that volume —

* In the Introduction to the Report on the Census of India (1903) Vol. I. pp. xvi and xvii, Mr. E. A. Gait, I. C. S., writes:—"The Office of Census Commissioner for India was held by Mr. H. H. Risley, C. I. E., from its creation in October 1899 until September 1902 when, unfortunately for the Census, his services were required for a higher appointment and his immediate connection with the operations came to an end. At that time the reports for a number of Provinces and States still remained to be received, and it had thus been impossible to make much progress with the General Report for the whole of India. Mr. W. F. Meyer, C. I. E., took charge of the office temporarily, in addition to his duties as Editor of the Imperial Gazetteer, and I succeeded him as Census Commissioner on the 23rd January 1903. In spite of the pressure of other work, Mr. Risley has himself completed the Chapter on Caste, and the portions of four other Chapters, as noted in the margin, are also from his pen."

a circumstance which can hardly represent the magnitude of his labours or research during the 3 years he was in charge of the last Imperial Census. The Report of Sir James Thomson's Excise Committee, which was ordered by the Government of India to be submitted in 8 months *i. e.* by the end of April 1906, evidently took more time than was anticipated. It is not yet available to the public. More instances could be cited to prove that neither the quantity of matter written nor the time taken can serve as a correct gauge of the labour or research involved in an undertaking of this sort. This is the invariable experience of all past workers.

Now that the work is finished, no word of explanation or justification is needed save to remove misapprehension in certain quarters. The idea of writing a State Manual was first broached to me by Dewan T. Rama Row, C. I. E., one fine morning 14 years ago, *i. e.* even before I had begun to compile the Census Report of 1891. He said I must do the Census Report first and then take up the Manual. All this was, of course, to be done along with my heavy legitimate duties as Dewan Peishcar and District Magistrate of Quilon, which I then was. I agreed without a moment's hesitation though fully alive to the responsibility I thus took upon myself, for it was impossible for me to decline an offer so kindly made and with such flattering compliments by so estimable a chief as Dewan Rama Row. He immediately obtained His Highness' sanction and sent me official orders in the last quarter of 1891. He retired a few months later and with his retirement the matter was dropped, for nothing came of it during the six years of Mr. Shungrasoobyer's Dewanship, as he did not seem to care for it at all. Dewan Bahadur Srinivasa Raghavaiyangar, C. I. E., complains of a parallel circumstance in the writing of his book,* for he says in his Preface :—

"The departure of Lord Connemara to England and pressure of other official work led to the preparation of this Memorandum being laid aside for some time, and I was able to resume the work only in the latter half of 1891. Since then

* 'Forty years' Progress of Madras' (1893).

I have been more or less engaged on it, but as the work has had to be carried on in addition to my other official duties, it has not been possible to finish it earlier."

The matter was however revived by Dewan Mr. K. Krishnaswamy Row, C. I. E., in 1901, and during his time I devoted to it, off and on, such leisure as the pressing duties of the Settlement Department permitted. It was only in December 1904 that I took it up as a full-time officer and it may be safely said that the best part of these three closely printed volumes is the result of assiduous and sustained labours carried on since.

In reporting completion of the manuscript of the book, I wrote to the Dewan in my letter, No. 387 dated 1st October 1905, thus :—

"In continuation of my letter No. 371 dated 26th August 1905, I have the honour to inform you that I have finished the State Manual of Travancore in which I have been engaged continuously for the past nine months and my services are available for any other work which His Highness' Government may be pleased to entrust me with."

I added :—

"I take this opportunity of expressing my grateful acknowledgments to His Highness' Government for entrusting this important work to me without any solicitation on my part—a work in which I have spent much thought and study during several years past though owing to more pressing duties I could not devote to it that attention which it deserved, except at distant intervals of business. It is due to us also to add that my extremely limited staff and myself have worked at it with energy and diligence."

To this letter the Dewan made no reply. The additional time thereby gained has however proved of much advantage to the work; not only were the proofs read carefully and well, but the old data, already collected, were verified, new data added where possible, some chapters were either revised or wholly re-written, additional matter put in, the manuscript throughout was touched up and the whole book itself satisfactorily finished and passed through the Press, with a full table of contents, a glossary of vernacular terms and an exhaustive index. In the letter referred to above, *viz.*, No. 371 dated 26th August 1905, I had observed :—

"I estimated the work to be completed in 6 months at the most, but that was as I explained to you in my letter noted in the margin (No. 313 dated 23rd May 1905) under the belief that I was to be allowed a staff of 10 clerks applied for

by me, the choice of clerks from the permanent Departments who would not run away as 7 or 8 temporary clerks did during the last 7 months, and that I was to be allowed also to expend the money saved every month by shortage of hands. You disagreed to every one of these 3 proposals. So it became impossible for me to finish the work in 6 months as originally estimated in my letter of the 11th November 1904. ... ... I believe I have been very moderate in applying only for 3 months' time from the 30th June last. Under the circumstances explained above, there was ample justification for my asking for 6 months' more time. But as I have already reported, I am most anxious to be done with this work as early as possible."

Mr. Srinivasa Raghavaiyangar, the talented compiler of the *Forty Years' Progress of Madras*, took 27 months to write his book—a volume of 340 pages, speaking of quantity alone, the subject-matter of which is admittedly one of a more homogeneous and less complex nature than that of a State Manual. And yet in his forwarding letter to Government, Srinivasa Raghavaiyangar wrote of the delay in the issue of his book thus:—

"The collection and reduction of the necessary statistics and the preparation of the second part of the memorandum took up more time than I had anticipated and I was able to complete the work only last May notwithstanding that I took privilege leave for three months in the beginning of this year for the purpose."

His achievement is a safe criterion to judge of the work of other labourers in similar fields, for to my mind the late Srinivasa Raghavaiyangar was a perfect embodiment of indefatigable industry, deep thought, wide reading, unostentatious independence and high literary skill. In these circumstances, no special justification seems needed for the unavoidable delay in the issue of the Travancore Manual, a work of an encyclopædic nature spread over a space of more than 1820 pages of letter-press—to say nothing of the continued strain, the anxious and unremitting attention or the huge preliminary studies it cost.

As for the plan of the book, it is enough to say that the mass of information collected has been thrown into 21 chapters and placed in 3 volumes for convenience of handling. Under these 21 chapter-headings almost every subject of importance and interest concerning the State has been brought in. For these chapter-headings several District Manuals of Madras have been consulted, particularly the revised ones of Bellary and Anantapur by

Mr. W. Francis, I. C. S., and it is enough to observe that the Travancore State Manual is fuller and more comprehensive than the Manuals of Madras. In order to do justice to the amplitude of information collected and the labour spent upon it, the size of the book has been enlarged into *three* volumes from what was originally intended to be one moderate-sized volume. It would be false economy, I thought, to throw away the results of great labour and research in order to save some printing space. Tediousness were, in my view, a much lighter fault under such circumstances, especially in a book of this nature; but terseness has been my ambition, though after the most conscientious endeavours to clip and prune I could not do more, on the present occasion, without keeping out matter which I really wished to retain. Even as it is, I feel the chapters on 'History' and 'Castes' are capable of further amplification, particularly the latter chapter, of which only the outer fringe, so to speak, has been touched in these pages. It is a never ending theme of value and interest, and the stores of information still available on it remain unutilised. A whole volume ought to be devoted to 'Castes' alone. The chapter on the 'Gazetteer' may well be amplified in a future edition.

In the writing of this book, my aim has been to present to an utter stranger to Travancore such a picture of the land and its people, its natural peculiarities, its origin, history and administration, its forests and animals, its conveniences for residence or travel, its agricultural, commercial, industrial, educational and economic activities, its ethnological, social and religious features as he may not himself be able to form by a 30 years' study or residence in it. If this is a correct view of the object of a Manual, I trust I may be permitted to entertain the hope that a fairly successful debut has been made, notwithstanding defects or shortcomings that may exist, especially as this is only a pioneer attempt in a novel direction. It is not necessary to prejudge here what a revision might give opportunities for, in the way of condensing in some directions or amplifying in others. If I get the chance myself at a not distant

date, I should probably do both and thus try to reach the ideally perfect Manual, perhaps a vain Utopian desire, which standard of excellence however, I know, is far from having been attained in the present performance.

In the 'History' chapter in which I have spent much thought and study, I have endeavoured to give faithful pictures of Parasurama's early colonists and their autonomous governments, their landed aristocracy, their peculiar tenures and permanent tenantry, of the later kings and ministers, of wars and conquest of the dissensions of the Ettuvittil Pillamars, the Tampis the Yogakkars, their mutual jealousies and intrigues, of the fortu of the minor principalities which make up the Travancore of to-day and the events which led to their final absorption, of the chief forces that were at work during successive epochs which enabled a petty village near Eraniel to reach its present dimensions of a compact block of territory 7,000 sq. miles in area, of the European powers that successively bid for supremacy of trade on this coast and the ultimate success of the English East India Company, our early friendships with them and the staunch support which they in return uniformly gave us through all vicissitudes of fortune, ultimately resulting in a strong bond of political alliance and reciprocal trust and confidence, which assured to us internal security and immunity from external aggression, thus enabling us to achieve the triumphs of peace and good government, until step by step we reached the enviable height of being known as the 'Model Native State' of India—a title which we have maintained by wise rule and sound financial policy during successive reigns up to this day. And this has been no easy task as the narrative had to be woven out of a tangled web of falsehoods and mis-statements, of exaggerated versions and contradictory chronicles, inseparable from oral tradition, fragmentary record and a disorganised debris of scattered and confused materials. The difficulty of writing a history of events which took place long ago is great indeed, for as pointed out by John Morley, in his 'Life of Gladstone', "Interest grows less vivid; truth becomes harder to

find out; memories pale and colour fades". It is much more so in the case of a nation—the events of whose life and progress cover a space of many centuries and comprise multitudinous interests and concerns. The History chapter is dealt with in three sections, *viz.*, Ancient history, Early history, and Modern history—the last comprising a period of 10 reigns or 175 years, bringing the narrative down to the end of the year 1079 M. E. (15th August 1904), that being the last year for which full information was available on this and other headings when the book was written.

The labour involved in the task was truly gigantic, for it often entailed a wading through a mass of records of all sorts in order to get at a grain of information. The nature of the research may be judged from the following extract of my letter to the Dewan, dated 25th June 1903:—

"As suggested in your D. O. of 1st Inst., I beg to submit herewith a revised list of records to be obtained from Fort St. George. I have cut down 79 numbers from the list of 336 papers originally selected, which itself was a selection from a total of about 600 papers relating to Travancore. In a matter like this where the granting of the application for records is entirely a question of pleasure with Government, there can be no argument; all that I can say is that an indulgent view should be taken of the application and that I should be given some latitude in the choice of records. It is possible that a good many of the papers that one has to read through in the preparation of a book or report may not be ultimately utilized. In the opinion of Milman, one of the biographers of Lord Macaulay, 'The historian, the true historian must not confine himself to the chronicles and annals, the public records, the state papers, the political correspondence of statesmen and ambassadors; he must search into; he must make himself familiar with the lowest, the most ephemeral, the most contemptible of the writings of the day. There is no trash which he must not digest; nothing so dull and wearisome that he must not wade through'. In the instance which the Resident refers to, *viz.*, 'note of the firing of the usual salute on the departure of the king of Travancore to the north', I should just like to know what the actual 'salute' fired was, if such information is available from that record. It is not of course absolutely essential for my book. It may even be put down as a mere antiquarian curiosity; but if so, it is a curiosity which is justifiable, * * * * I shall content myself with the papers that are placed at my disposal."

'Archæology', 'Fauna', 'Census and Population', 'Language and Literature', 'Economic Condition', and 'Legislation and Statute-book' are *new* chapters in this Manual, not found in the revised Madras Gazetteers. 'Local Self-Government' is a heading

which I have not utilised as we have nothing corresponding to it here just yet. The information under my other chapters *viz.*, 'Religion', 'Castes', 'Trade and Commerce', 'Arts and Industries', 'Land Tenures and Land Taxes', and 'Administration' deals with the matter comprised in Mr. Francis' chapters on the People, Occupation and Trade, Land Revenue Administration, Salt, Abkari and miscellaneous revenue and Administration of Justice. The other chapters are the *same* in both the books.

I have been much exercised in the matter of arranging the order of the chapters in the Manual. What I have ultimately decided upon, though slightly different from that adopted in the Madras Gazetteers, appears to me to be the most natural order. It is thus. The first 4 chapters deal with the lie of the land, its climatic conditions and its exuberant vegetable and animal life. The next 2 chapters deal with History and its chief basis for facts, *viz.*, Archæology. The whole of the second volume (chapters VII to XII) deals with the people as a whole in all their many-sidedness, *i. e.* their growth of numbers, their faiths, ethnography, language, education and health. The first 5 chapters of the third volume deal with the economic condition of the people such as agriculture and irrigation, trade and industries and the conveniences that exist for the same. Then come 3 chapters dealing with 'administration' more or less; and the book concludes with an alphabetical description of places of interest, so necessary for a stranger to understand a country aright. This arrangement I believe is the most natural one to adopt and has been finally resolved upon.

One encouraging circumstance in the course of writing the book has been the fact that some of the chapters were perused in manuscript by Messrs. G. T. Mackenzie, I. C. S., and J. Andrew, I. C. S., our former British Residents. Both of them expressed approbation of the work done. Mr. Mackenzie who took a warm interest in the progress of the Manual from the very beginning wrote to me on the 9th October 1903 :—

"I have perused the Mss. of the first portion of the Manual and it seems to me to be excellent."

Again, he wrote on the 8th February 1904 :—

"I return these draft chapters with many thanks; they are really very good"

Again on the 19th November 1904 (the day he resigned the Civil Service and left Travancore), he was good enough to write of the 'History' chapter thus :—

"I have now perused it and find it deeply interesting. I have corrected one or two clerical errors but otherwise there is nothing to alter."

Since then, one whole chapter and a portion of another have been submitted for His Highness the Maharajah's perusal. Mr. R. C. C. Carr, I. C. S., Bar-at-Law, the present British Resident, has now perused several chapters of the Manual. He wrote on the 8th April 1906 :—

"I am much obliged to you for your kindness in sending me the advance copy of the second portion of the State Manual. It contains a great deal of interesting matter and I hope to study it shortly. I have already received the bound copy of Vol. I and am very glad to have it."

To my numerous helpers in this work I offer my grateful acknowledgments. No work of this magnitude can be satisfactorily performed except with the aid of a host of coadjutors; and I have had that aid from all sides—officers of Government, retired public servants, vakils, journalists, private individuals, land-lords, planters, bankers, merchants, agriculturists, *Vydians*, *Mantravadis*, Christian *metrans*, bishops and missionaries and numerous other correspondents of divers sorts. As was justly remarked by Sir J. A. Baines, K. C. S. I., I. C. S., in his preface to the Imperial Census Report of 1891,

"The Census deals with so many subjects each of which, in the present day falls within the province of a specialist that no single individual can safely trust to his own unaided capacity in reviewing them, but is forced like Moliere, *a prendre son bien on ill be trouve*, and I have done my best to acknowledge such depredations at the time I have found it convenient to make them."

The same may be said of my State Manual, for which if I have been compelled to make depredations, it will be noted that I have ungrudgingly acknowledged them in the body of the book itself, for such acknowledgment not only lessens the burden of my responsibility but also confirms my own opinions, thereby enhancing the value of the work achieved.

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I must next express my obligations to Mr. C. V. Raman Pillai, B. A., the energetic Superintendent of the Government Press, for the help and co-operation he has willingly rendered in passing this huge work through the press, in spite of repeated calls on him for urgent work from other departments of the State. He has also prepared the index to the Manual which I entrusted him with, under orders of Government, on account of his special experience in it as the late Indexer to the Travancore High Court. I have to commend his work to the notice of Government.

A map of Travancore specially designed for this book by Mr. G. N. Krishna Rao, Superintendent of Survey is placed in the pocket at the end of the third volume. A few photographs are also inserted to illustrate the book; more should have been put in but for the cost. If time had permitted, I should have added a volume of appendix of papers made in this connection, containing monographs on several special subjects, *Sthalapuranams* of temples and places of pilgrimage, accounts of noble families and the chiefs of petty principalities, extracts made from books, newspapers and magazines and documents examined in the course of these studies and other evidence relied on in the writing of the Manual, all of which will form a mass of valuable data, upon which to base more extended researches in the same direction in the future.

In conclusion, I beg to tender my respectful thanks to His Highness the Maharajah's Government for having vouchsafed to me the opportunity of performing so herculean a task—notwithstanding the many difficulties and obstacles I had at the outset. At one time it appeared to me, judging from the correspondence that took place, that I was engaged in a thankless work amidst inhospitable surroundings, and that though I had undertaken it years ago under favourable auspices, a change had come and I was evidently exhausting myself in an uphill work, which would give no satisfaction. The following extract of my letter to the Dewan, dated the 20th June 1905, will explain the circumstance. I wrote:—

"I do not wish to refer to the observation which you have more than once made in your letters about 'entrusting the work to other agency'. This is a matter entirely left to the pleasure of Government. I was appointed to the writing of the State Manual by His Highness' Government without any solicitation on my part; and three of your immediate predecessors who knew me and the public service thoroughly well for long years, concurred in thinking that the work should be done by me, as if they could not think of any other officer equally competent to do it, though for my part I did not show the least unwillingness to give it up, especially as I was so fully occupied otherwise. They evidently meant it to be done by me during intervals of business, as they all knew the quality of similar work I had done before, which repeatedly received the approbation of His Highness' Government."

This however was only a passing cloud and the situation soon improved. Now that the difficulties have all been surmounted and the work itself done and done to my own satisfaction more or less, there is but one feeling uppermost in my mind, and that is one of deep thankfulness and gratitude to Government for the opportunity afforded me to associate my name with a book of this nature, in which I trust Government will see ample evidence of earnest, assiduous and sustained labours on my part, for more than a year past.

It is hardly necessary to add that the views expressed and the suggestions made in these volumes, the result of years of patient study and observation, are wholly conceived in the interests of the State and the people; and as such I have no doubt they will receive careful consideration at the hands of Government in due time, for when carried out they will, I am satisfied, not only add to the credit of His Highness' enlightened rule but, in the wise words of Bacon, "make the estate of his people still more and more happy, after the manner of the legislators in ancient and heroical times."

Trivandrum,
16th August 1906.

V. NAGAM AIYA.

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THE

TRAVANCORE STATE MANUAL.

CHAPTER I.

Physical Description.

SECTION A. PHYSICAL FEATURES.

"Were there, below, a spot of holy ground
Where from distress a refuge might be found,
And solitude prepare the soul for heaven;
Sure, nature's God that spot to man had given,
Where falls the purple morning far and wide
In flakes of light upon the mountain side;
Where with loud voice the power of water shakes
The leafy wood, or sleeps in quiet lakes."

Wordsworth.

Name of the Country.—This ancient kingdom of Travancore forms the southern-most portion of the west coast of India. The country from Gokarnam to Cape Comorin has been known by different names at different times, such as, Malayalam, Parasurama-kshetram, Karma-bhumi, Cheram, Keralam, Malanad, Malavaram and Malabar. This tract of land, according to the Bhoogola Purana—a Sanskrit work on the ancient geography of the Hindus—was 100 yojanas* long and 10 yojanas broad.

The word 'Malayalam' is its Tamil name and signifies 'mala' (hill) and 'azham' (depth) i. e., the hill and dale country, or the land at the foot of the mountains.

The word 'Parasurama-kshetram' is derived from the tradition that Parasurama, the great Brahmin sage† of the race of Bhrigu, reclaimed this land from the sea.

The name 'Karma-bhumi' signifies that the spiritual salvation of the inhabitants of this land depends entirely on good actions, as contrasted with the East Coast, or 'Gnana-bhumi' otherwise 'Punnya-bhumi',

* 1 yojana is equal to ten miles.
† See Ancient History, *infra*.

particularly large one within the 'nalukettoo' itself. The place was an abandoned jungle years ago, and the credit of discovering and reclaiming it belongs to the present Dewan (Mr. T. Rama Row). The late Maharajah and his Royal brother visited Thavally often. So also did the present Maharajah as a Prince and several other members of the Royal family. So Thavally became a favourite resort with the Royal family, and during His late Highness' reign, the ground and property of Mr. Rama Row were purchased by the Sircar, and a magnificent mansion erected on it. The view from the palace tower or column is most magnificent. The peculiar combination of wood and water, of groves of tall palms and forests, of well-shaded jack and mango trees, with the blue line of distant mountains on the eastern horizon, give a charm to Thavally which can only be felt, not described. Another point of vantage in this lake scenery is the Residency, the oldest and the finest of the Residencies in the country. I have heard no end of praises being heaped on this lovely spot. On occasions of State dinners the house is decorated and the gardens are tastefully illuminated, when it may well claim the encomium passed on it by one of our late Governors that it was 'Fairy Land'. The enterprising European has not been slow to avail himself of such natural facilities; so he has with his usually keen commercial instinct established mills and manufactories which, with their noisy machinery and smoky chimneys, remind you of the veneering of a superior civilization over this otherwise quiet spot. A mile to the east is the European quarter of the town and the British cantonment with their indispensable parade ground, church, mess-house and a club, and an open sea beach for their evenings to be enjoyed. Between, is the native part of the town with its thatched huts and busy bazaars containing a mixed population of Pandi Sudras, Nairs, Mahomedans, Jews, East Indians and fishermen. The town is dotted with numerous tanks and wells, an indispensable auxiliary to the comfort of the true Travancorean. It is also well supplied with flat metalled roads, the very best, I think, of all the roads we have in the country. Travelling eastwards we pass the pretty grove of Elampalloorkavoo, the only cluster of huge trees in a large expanse of open country. This 'kavoo' or grove is an interesting oasis in the open maidan, and I counted in it 129 trees of 17 different kinds such as the belleri myrabolam, the momordicus charantia, the cinnamon, the cassia, the callicarpa lanata, the anjili, (the artocarpus hirsuta), the echites scholaris, the strychnos nux vomica, the jack tree, the mango tree, the alangium decapitatum, the Kilimaram, the Vattathamara, the Vetti, the Edana and the Mottalu. They were the growth of ages and were an object of worship to the neighbouring population, who consider it sacrilegious to touch such trees with any knife or other piece of iron. Leaving this, we come upon a fine jungly station with a number of new clearings all round, and a wild mountain torrent running by its side the force of which, however, has been arrested by the recent bund-works of an enterprising company. The whole road is lined on both sides with fine avenue trees planted by an enthusiastic former administrator of the district and bearing testimony to his goodness and forethought. Proceeding further east, we reach Ottakkal, another distance of 10 miles. The whole region is one continuous forest, and is an abundant source of inexhaustible wealth, the potentiality of which exceeds our most sanguine calculations. On both sides the road is barricaded by a tall tree fence. This is a phenomenon quite unknown in most parts of India, and but for our personal knowledge we should have found it hard to believe it. The noonday sun scarcely penetrates the thick crust of green leaves, so rich is the vegetation. From Punalur to Camp Gorge the river runs nearly parallel to the road for most part of it, and I believe the natural stream served as a guide to the original engineer in laying it out. It is impossible to describe the beauties of the road or the river in this region; they should be seen to be appreciated. The best description must beggar the reality,

cular form of addressing the king is 'Adiyen Trippadom sevikkunnu' meaning 'I, a humble slave, serve thy royal feet'.

'Malankarai' is another name used exclusively by the Syrian Christians; the Syrian Metropolitan still calls himself 'The Malankarai Metran.'

Geographical position.—The Travancore State is situated at the south-western extremity of India, between 8° 4′ and 10° 22′ North Latitude and 76° 14′ and 77° 38′ East Longitude. It is a long narrow strip of territory, measuring 174 miles in length and from 30 to 75 miles in breadth, lying between the Malabar Coast and the Western Ghauts which run almost parallel with the Western Coast of India and which divide Travancore from the British Districts of Tinnevelly and Madura.

Boundaries.—Travancore is bounded on the north by the Cochin State and the Coimbatore District, on the east by the range of Ghauts which forms a natural barrier between it and the districts of Tinnevelly, Madura and Coimbatore, on the south by the Indian Ocean, and on the west by the Arabian Sea and by portions of Cochin running down in a narrow strip between Travancore and the sea.

Shape and area.—Its shape is triangular with the apex towards the south, its two sides running in a north-westerly direction. It is of an unequal breadth gradually diminishing from the north and converging to a point at its southern extremity. The irregularity of its breadth offers an average width of about 40 miles inland. A narrow strip of land belonging to the State of Cochin makes a deep indentation on the north-west angle and destroys the contiguity and compactness of its shape.

The total area of Travancore is 7091 square miles. Compared with the adjoining British Districts, it is about four-fifths of Madura, nine-tenths of Coimbatore, one and one-fourth of Malabar and one and one-third of Tinnevelly. Compared with other Native States, Travancore is about one-twelfth the size of Hyderabad, one-fourth of Mysore, seven-eighths of Baroda, two-sevenths of Gwalior, more than 5 times the size of Cochin, and 6 times that of Pudukotta. It is smaller than the Principality of Wales by 279 square miles and bears to England and Wales together, the proportion of 1 to 8.

Lieuts. Ward and Conner estimated the area to be 6731 square miles. But they did not include the Anchanad valley together with a large portion of the High Ranges aggregating about 230 square miles, the Idiyara valley and a portion of the forest near the Alvarkurichi gap.

The following table conveying an approximate distribution of surface was drawn up between 1816 and 1820 by Lieuts. Ward and Conner:—

Rice lands.	741	square miles.
Slopes available for temporary cultivation of rice &c.	1,000	„
Areca-nut and Cocoanut topes chiefly along the coast.	356¾	„
Sandy extent covered with Palmyra.	115	„
Lakes, rivers, tanks &c.	157½	„
Site occupied by buildings.	20	„
Pasturage and superficies occupied by low chains of hills.	1,961	„
Hills and forests.	2,379½	„
Total area.	6,730¾	„

From the above table, it will be seen that about two-thirds only remain applicable to the purpose of profitable cultivation or pasturage, the whole cultivation of Travancore being generally confined to a contracted strip along the coast, narrower in the southern parts, but expanding as it approaches northwards.

General features.—The general aspect of the country is thus described by Ward and Conner *:—

"The face of the country presents considerable diversity, although its general character, except the southern parts, is extremely abrupt and mountainous. The coast, and for a short distance along the borders of the lake, is generally flat; retreating from it the surface immediately becomes unequal, roughening into slopes which gradually combine and swell into the mountainous amphitheatre that bounds it on the east, where it falls precipitately, but terminates less abruptly on the south. The collected villages, waving plains, palmyra topes and extensive cultivation of Nunjanaad, resemble in every particular the neighbouring province of Tinnevelly, except that it in no measure partakes of its comparatively arid sterility. Approaching northward, this fertile plain is succeeded by the woody and rugged surface of the genuine Malayalim; some few champaign tracts enclosed within this ocean of forest relieve the uniformity of this sylvan scene. The extent lining the coast for its whole length presents a fertility so near the sea that imparts a peculiar character to the landscape. This rich and variegated tract is flanked by a mountainous barrier and is finally contrasted with the sombre magnificence and desolate solitude of those wilds of which the elephant seems the natural master; and though the landscape may be too much made up of this wild scenery, it boasts many striking localities and peculiar beauties, if not of the sublime, at least romantic and picturesque kinds. The eye is arrested by the wild rocky precipitous acclivities and fantastic forms assumed

* Memoir of the Survey of Travancore and Cochin.

a blood red ball, into its distant waters. What mountain drive equals the Coonoor ghaut, now gashed and scarred somewhat by a none the less useful railway, upon whose forest-clad slopes white fleecy clouds gently lie, while the gigantic green feathers of the bamboos lightly wave, and the most beautiful of all butterflies flit around the traveller as he passes through tree ferns and plantains, looking up at the towering masses of rugged rocks, and the purple outline of the mountains.

"Below in Malabar, Travancore and Cochin, the beauties of the country defy description, and the forests are, of all places in this world, surely the most fascinating in which to dwell. You pass through shady aisles, which admit the sunshine by infrequent shafts, but breathe everywhere its warmth and joy, and are ever reminded of the late Laureate's happy oriental experiment,

> Me rather all that bowery loneliness,
> The brooks of Eden mazily murmuring,
> And bloom profuse and cedar arches,
> Charm.

"Tall pillar trees, with green Corinthian capitals, support the roof, festooned with vines and creeping plants, and often blooming with red, white, and purple flowers, the floor is covered with an undergrowth of tree ferns and flowering shrubs, above monkeys and squirrels leap from tree to tree, wood-pigeons coo, wood-peckers tap the tree trunks, and cicadae whirr and whistle, while now and again a startled spotted deer jumps up and disappears, or the loud crack of branches betokens the proximity of an elephant taking his meal, the picture of lazy and lordly ease.

"This spirit pervades the atmosphere. Nature, in her most bounteous and reproductive aspects, scatters her treasures around with such a lavish hand, that it speaks well for an industrious and estimable population, that, in its case, the worship of the beautiful has never ended, as some say it always does, in orgies. None the less in the forests the life of those least sensitive to the influence of the beautiful can be nothing less than one long botanical debauch in 'valleys low, where the mild whispers use of shades, and wanton winds, and gushing brooks', tempered by occasional encounters, wherein all the sterner attributes of humanity are suddenly brought into play, and the man may have to fight with the beast, for the life, which, a few minutes before, ran 'in soft luxurious flow'. The contingency, ever present for the sportsman, of this sharp and sudden contrast, adds a thousandfold to the fascination of what surely is the happiest possible life".

I may be permitted to quote here, from one of my earlier Census Reports*, the following description of one of the highest Peaks on the Ghauts:—

"What strikes a stranger most in Travancore is the eminently picturesque character of its natural features. The view of the country from one of our hill-tops on the Western Ghauts is worth getting at even at the cost of a hundred miles journey. Nature is then seen at its best. Going up an elevation of four or five thousand feet above the sea to one of those bold and isolated heights open on all sides, the traveller is treated to an intellectual repast exceeding in grandeur all that poets or novelists have discovered in the revelry of nature itself. It is one continuous feast to the eye. On one side lie a series of mountains, rising in successive tiers till the highest peaks disappear in happy confusion with the white clouds of the East. On the other side is a vast rich

* Report on the Census of Travancore, taken in 1881 A. D.

undulating plain spread out in velvet green and covered with dense jungle not penetrated even by a Kawni's hut, the picturesque view extending over many square miles of territory and presenting scenes of indescribable beauty as far as the eye can reach; there is something like a glut produced on the human eyesight by the quantity and variety of beauty simultaneously presented to it. For a while, the traveller's eye rests on regions of magnificent primeval forest as old as Parasurama himself. Here the view is relieved by neat plots of coffee land upon which is seen the industrious hand of the mighty British adventurer, a scene full of life and calling to mind associations of lacs of plants and lacs of rupees, at one time the land of dreams, but now often the grave of fortunes. Then anon is seen towering pre-eminently over all, the Agastiar Peak or the Mount Everest of our Ghauts, supposed to be the abode of pious Rishis or at any rate now of guileless birds and beasts and of untainted perennial waters. In one word, 'every corner and every turning point opens out a panorama of inexpressible grandeur'."

To which may be added another description of a sixty miles' journey across country from Quilon to Shencottah, from my Census Report of 1891:—

"A rich picturesqueness of scenery diversified by hills and dales is the chief characteristic of Travancore. To the admiring student of nature it presents peculiar fascinations, on account of the variety and wealth of its natural beauty. If the untravelled reader will go along with me, across country, say from the western ocean to the ghauts on the eastern frontier and thence descend into one of those trans-alpine villages which abound in the flat country of Pandi, he will have seen Travancore at its best. Say we start from one of the coast towns, a place of historic importance known at once as a port, a cantonment, a centre of trade and the head-quarters of a chief revenue officer. The stranger will be taken up with its broad-back[illegible]ardens into which the town is laid out, the soil of which is half sand, half l[illegible]e, the former thickly planted with the valuable cocoanut palm for which every available space is used up, thus showing an ancient agricultural occupancy; while the remaining space is filled with wooded trees of all kinds, such as the mango, the jack, the anjili and the tamarind with the highly priced pepper vine parasitically clinging to them. This pretty town I am speaking of has a reef of rocks for its beach, which prevents its corrosion by the sea, thus helping the ryot to plant his cocoanut trees so near the water's edge that the shadows fall on the beating surf, a phenomenon not met with in any other point of this coast. On the south is the beautiful bay known to the earliest mariners of Europe as affording a perfect natural protection to ships in the worst weather; and which, it is believed, might, under favourable conditions, be turned into one of the finest harbours in India. A little to the interior you have the beautiful lake scenery, so much admired by travellers from all parts of the world, affording unrivalled conveniences for travelling and traffic and adding beauty to its general appearance. There are many turns and bends to this lake, which specially attract the eye of the traveller. On one of those turns you have a magnificent mansion standing out boldly into the lake, the waters of which reflect so well its lofty column, its halls and rooms, its high balconies and well designed circular roof that the shadows on the water seem more charming than the reality. This mansion known as the Thavally Palace is very happily situated. The ground is an elevated table-land jutting out into the lake, which bounds it on three sides. The soil is of laterite formation and the water is excellent both for drinking and bathing purposes. There are two tanks in the garden and several wells, one of them a

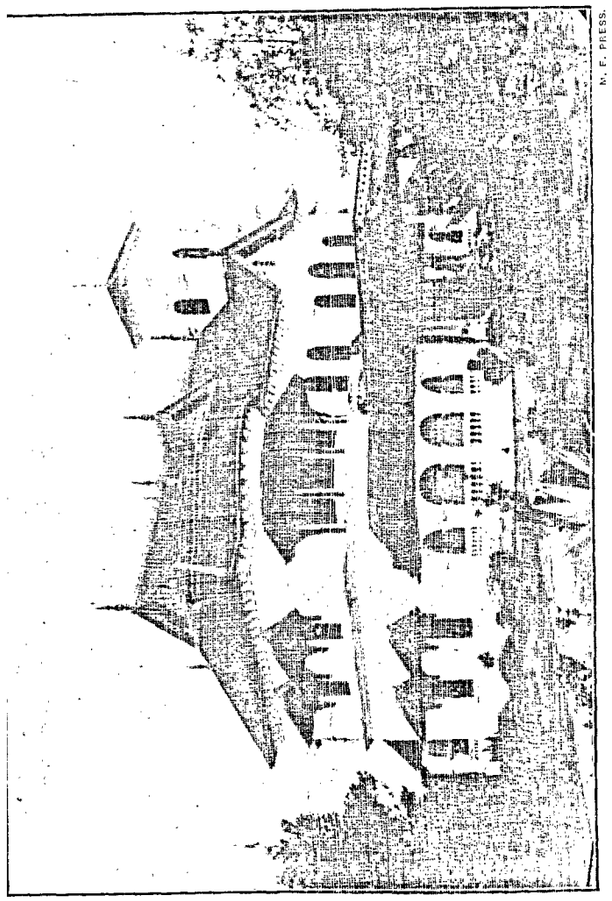


Photo by J. B. D'Cruz. Travally Palace, Quilon.

or as Mr. J. D. Rees writes:— 'Words fail me to describe the lovely scenery. Tall, upright standards of huge timber trees, palms of every kind, including the exquisitely graceful areca, tree ferns, creepers, ferns and flowers, all spring from a tangled undergrowth of iral reed. The pepper vine clings to the large timber trees, and ropes of rattan and giant branches hidden in creepers, combine to construct an ever varying but unending bower. ... ... As you travel in the chequered shade, you would say that every reach of the road had been designed by nature, to show what wealth of vegetation can be presented at once to the astonished and delighted eye.' After a night's halt in the wooden house at this lonely place (Ottakkal), you rise and see nothing but a dim daylight and a white haze all round. The tall trees and the mountains are all buried under this haze, so that one would suspect it was raining hard when it was only the morning dew. As the sun rises in the horizon, the mist disappears, and the outlines of the glorious hills and the surrounding jungle become more and more visible. Altogether this Ottakkal is a lovely station, in the heart of the forest. It composes one to fine thoughts. There is not a single human habitation within a radious of five miles. There is nothing to disturb one here except the loneliness of the spot. At night you may be awakened by a wild elephant, who pays his customary visit to the neighbouring jack tree (five yards from the wooden building) when the jack fructifying season sets in. Eleven miles further to the east is the Arienkavu pagoda. This is a small temple, with its usual accompaniments of a copper-plate-roofed quadrangle, and a cupola-shaped shrine in the centre, dedicated to the god of the woods, a place of great sanctity and renown, approached with dread reverence by the superstitious traveller. The road still lies by the side of deep and fearful ravines, thickly overgrown with moss and shrub, and through a continuous belt of tall and stately forest of the kind already described, and tenanted by the majestic elephant and the royal tiger and all the minor denizens that

'Roam the jungle free,
Graze the turf untilled,
And drink the stream unbrewed.'

Midway between Ottakkal and this pagoda is a two-roomed terrestrial paradise, used as a rest-house by the much-travelled Briton, and which is situated on the side of a precipitous and magnificent gorge, from which it takes its name. It is the most favoured of all the fair spots on which the eye of Heaven rests, and when fitted up with the equipments of modern civilization, it might well raise the envy of even an English prince. A mile to the east of this venerable pagoda, is the famous pass through the ghauts, known as the 'Arienkavoo Pass'. This beautiful glade on the ghauts is fifty miles away from where we started, and forms a sort of natural gateway through the chain of mountains which would otherwise be an impassable barrier to Travancore. The road, already described, cuts the mountain saddle at its lowest point, and connects it to British India. This road, upon which the business-bound traveller of to-day does not pause to spend a moment's thought, bears at once willing testimony to the financial genius and engineering skill of former times. It would be ingratitude in us to forget our old benefactors, though the world is so much occupied with its present self that it has no time to look back or cherish memories of the past. The road struggles up inch by inch, for several hundred feet above the sea-level, before it reaches the top of this gap, and any but the stoutest heart must have been baffled in the attempt to make it, so great are the natural obstacles of wood, rock and ravine. The topmost part is presently reached, and you stand still and take breath for a while. Then, as you slowly wind down the tortuous path, looking at all the points of the compass, new beauties rise on every side before you. At every turn, you get exhilarating views of the enchanting landscape, which for

the nonce relieves the prosaic mind of the dull monotony of daily life and fills it with sweet thoughts of fancy. On the west is seen nothing but a dense jungle of the tall teak and the stout anjili, the valuable kongu and the oily vengai, and an impervious underwood, full of animal and vegetable life, resonant with the hum of the shrill Seevudu bee*, and the gentle murmur of the forest leaves, with the perpetual rain dripping from them, and the deafening roar of the wild torrent below dashing its headlong course—altogether a scene which, by its richness and hugeness, produces something like a glut on the vision and obscures it. The eye then fondly turns to the open east, the varied beauties of which furnish still ampler food to an imaginative mind. The view on that side, as laid out by nature, is simply grand. The ground gently falls eastward, step by step, for many miles, till at a great distance you see the ruins of a magnificent 'gopuram' (tower), which reminds you that the level country of the Tamils has been reached. The zigzag line of rich avenues, with banyan trees 30 feet in circumference and perhaps as old as Queen Mangamma herself, indicate which way the cart road lies. On yonder right, flow the magnificent waters of a mighty cataract† used by millions of pilgrims from a remote past, and which, though perhaps of not equal sanctity to those of the Vedic Ganges, are yet as pure. The smoothness of the rocks, over which the water flows, reminds one of the immensity of the time that has elapsed, and the hundred little streams and channels into which the waterfall has been diverted, show how the hand of man in later ages has utilized it for religious and secular purposes. The green valley between, with their rice fields and groves of cocoanut palms in their midst, add their share of beauty to the surrounding scene. To the left, your eye falls on clusters of Hindu villages with houses closely packed to one another—an economy peculiar to this region, but unknown on the Western Coast. The houses, though small and humble, are neat and well-built ones, made of brick and chunam, and afford the inmates effective shelter from the biting winds of the monsoon, which blow here with unstinted fierceness. Further left, you catch a glimpse of an isolated rock, with a Hindu temple on its top founded according to popular tradition about the beginning of this 'yuga', but, at any rate, showing that the Hindu worshipper of old had a touch of the romantic in him. On both sides of the road the tilled red soil bespeaks the quiet and patient industry of the ryot who, though the butt of fickle fortune, has through several generations and amidst all change of circumstances yet remained a contented and loyal subject. Overhead fly troops of water-laden clouds, precipitated through a hundred gaps by the winds on which they ride as if in a hurry to convey to the anxiously awaiting villagers of Pandi the glad tidings of rain and plenty in the land of Parasurama with which their own prosperity is so indissolubly bound. In short, on every side, you are greeted with a rich and interminable prospect of Nature's beauties, sown broadcast in riotous profusion before you, such as is only possible in a Travancore landscape."

In spite of repeated tours over this pretty tract of country, my fascination remains undiminished for wood and water, for hill and gorge, for high peaks and deep chasms, for the cry of the jungle bird and the roar of the wild torrent. I am not sure if this charm will not disappear with the introduction of the Railway. This scene of never ending beauties of the Aryankavu Pass might become an old-world dream. Speedy locomotion is inconsistent with the full enjoyment of natural beauties or diversified

* A kind of bee that makes a shrill sound often met with in our jungles.

† Dr. Caldwell says, "It may be asserted without risk of exaggeration that Courtallam is the finest freshwater bathing place in the world."

landscape. One relishes them better for the dull country-cart journeys. The steam engine dashing across this 60 miles of rich scenery in a couple of hours, the natural beauty of the country will thus quickly pass the eye and escape enjoyment, like a flash of lightning. It would be as if one swallowed a whole meal in a single gulp. So sudden a change in the life of the quiet and simple Travancorean may be a matter for regret, but a vain regret after all. It is impossible to stand still in this age. Such is the current of modern civilisation. We must move on whether we will or no*.

Mountains.—The hilly region of Travancore is very extensive and is a marked of feature of the State. What the Himalaya mountains are to the Indian Continent, that the Western Ghauts are to Travancore. Without these Ghauts Travancore would be a poor tract of land, treeless and arid and inhospitable, without rivers and rains, exposed to droughts and famine even more than the worst part of the East Coast, which itself would be the much poorer but for these Ghauts. They affect all the conditions of life now peculiar to Travancore, and it is no wonder, therefore that the Travancorean worships the Ghauts, particularly one of the highest peaks in them where sage Agastya is said to dwell, and has deified their maker Parasurama who created Malayalam from the sea, the upheaved surface of which became the Ghauts. Reference is made in another part of this book to the 5 presiding deities (Sasthas) who guard the Western Ghauts.

The eastern boundary of Travancore with three small exceptions (the Anchanad valley, the Shencottah Taluk and the eastern slopes of the Mahendragiri hills) is the lofty mountain range, the chain of Ghauts that forms the backbone of Southern India. The hills are of every variety of elevation, climate and vegetation. Some of the loftier mountains are entirely detached, except near their bases, from the neighbouring heights; they often have a precipitous descent towards the west and are connected with a succession of low hills diminishing in altitude near the coast. To the north, the mountains rise to an elevation of 8,000 feet with plateaus over 7,000 feet; the more important of these is part of the group known as the Anamalays (between lat. 10° 13′ 45″ to 10° 31′ 30″ N; and long. 76° 52′ 30″ to 77° 23′ E.)

At the head of these hills stands Anamudy 8,840 feet high, round which are clustered several others, among the more important of which may be

* Since this portion of the Manual was written the Railway has been completed and the line opened for traffic between Quilon and Tinnevelly.

mentioned, Eravimala or Hamilton's plateau 7,880 feet (6 miles long by 3 wide containing about 10,000 acres of tea and coffee land), Kattumala 7,800 feet, Chenthavára 7,664 feet, Kumarikal 7,540 feet, Karinkulam 7,500 feet, and Devimala 7,200 feet. All these run in a horse-shoe shape with the opening facing towards the north-east. These hills, together with the lower ground connecting them, form the elevated plateau known to Europeans as the High Range. The broken nature of the hills here causes the scenery to be far more varied and beautiful than that generally met with either in the Pulneys or Nilgiris. The general trend of the highlands is north-north-east and south-south-west, the highest elevation being to the north-east and to the south, gradually decreasing in sloping undulating hills towards the west excepting the Anamudy mountain and its plateau, which is situated at the extreme south-south-west end of the range. Strictly speaking, the tract known as High Ranges can hardly be said to be a plateau; it is rather a succession of high hills with deep valleys between, running down to a depth of 2,000 to 3,000 feet below them. Mr. Munro, the first Superintendent and Magistrate of the Cardamom Hills, has described it thus:—

"The High Ranges of Travancore rise suddenly from the lower plateau of the Cardamom Hills and form a complete range of their own. On the south-east corner, the High Ranges begin with Sholcamalla or Currincollum (8,480 ft.) and run in a south-west direction to Gennewurra, thence still south-west to Corechy and thence to Puddikut (6,000 ft.) near Davycollum. From Puddikut, the line of walls runs in the same direction to Coorkacomboo (7,000 ft.); then running slightly more west, the Hills rise to Chokenamuddy (7,300 ft.) from which the course is north-west to the gap where the Moonaur disappears. From the gap the Hills run slightly south-west and then north-west to Worrayparathundoo; thence north to Perumputty Kullo (6,500 ft.) from which again the direction is north-east as far as Aunymuddy. From Aunymuddy the course is much broken and runs irregularly to Erevimalla where there is a deep dip into the valley of the Erevimalla Aur which separates the Erevimalla plateau (also known as Hamilton's plateau) from Perumalmalla plateau. From this valley there is a steep rise to the north-west to Katoomalla (8,100 ft.). To the west of Katoomalla, the High Ranges comprise the plateaux within Chemmun Peak (7,100 ft.), Payratmalla (7,400 ft.) and thence eastward to Coomarikul (8,050 ft.). To the east of Coomarikul and Katoomalla lies the low Unjenaad Valley which separates this part of the High Ranges from the Highlands on the slopes of Tertamalla, on which are situated the hill villages of Kelandoor, Kandel, Pootoor, and Perumalla at an average elevation of 5,000 feet. In its upper part the Unjenaad Valley is also called the Thallayar Valley where the elevation is above 4,000 feet; sloping gradually to the northeast, it opens out into the Unjenaad Valley proper which is a level terrace 2 or 3 miles wide and 5 miles long lying at an elevation of 3,000 feet. Below and to the east of Unjenaad the land slopes down rapidly to the British frontier probably at about 1,500 or 2,000 feet, a very feverish tract containing no resident population.

"To the south-east of Tertamalla runs a ridge separating the water-shed between Unjenaad and Moonaur and joining the high peaks bordering the Pulnies

at a peak called Allear Kunnoo (6,900 ft.). From Allear Kunnoo the course is bounded by a curve north north-east to Pambadyshola (8,000 ft.) and then runs north to Kuduvurratukul (6,600 ft.), where there is a deep dip into the Wuttawudda river, and here the high land may be said to cease. From Allear Kunnoo southward, the line to Sholeamalla is marked by clear-cut cliffs averaging about 8,000 feet. Exclusive of the low Unjenaad Valley which is not above 3,100 feet, the area within these boundaries may be roughly estimated at 400 square miles with an elevation of one of the peaks reaching as high as 8,837 feet".

The following are the chief plateaux in the High Ranges:—

GUDARAMALA. Between Karinkulam in the south-east corner and Devimala. Average elevation 6,000 feet, area 4 sq. miles; well wooded and watered.

DEVICOLAM. Lies to the west of the above and has an area of 3 sq. miles. Average elevation 6,000 feet; beautifully wooded and well watered.

ANAYCUDOO. Lies west of the Devicolam plateau and is separated from it by the Kazhuthaparathundoo. This beautiful valley is sheltered by the Chokkanmudy peaks. Elevation 5,120 feet. Between Vagavara and Anamudy there is a very pretty glen with an elevation of 7,000 feet.

ERAVIMALA. Lies north of Anamudy and is separated from it by a deep valley. Elevation 7,300 feet. Bare of wood on its summit but well wooded in the slopes. Has a cold bracing climate. Length 6 miles and breadth 3 miles.

PERUMALMALA. Length 2 miles, breadth 1½ miles. Elevation 7,000 feet.

To the north of this lies a plateau shelterd between Kattumala, Kumarikal and Payratmala. Length 4 miles, breadth 3 miles and elevation 7,000 feet. There is another plateau to the north of Kattumala terminating at Pudikutmala. Area 3 sq. miles. Elevation 6,600 feet.

ANCHANAD. Area 30 to 40 sq. miles. Elevation 3,100 feet. This is a level terrace, two or three miles wide and five miles long.

VATTAVADA. Length 6 miles, elevation 6,000 feet. Greater portion bare of wood but the upper portion towards the top of the pass into Bodinaickanur heavily wooded and well watered.

KUNDALA. South-west of Vattavada plateau at an elevation of 5,500 feet; length 6 miles and breadth 2 miles. A great deal of swamp land.

From the High Ranges the land slopes steeply down in three directions; north-east to the Anchanad valley, to the west into the valleys of the Kandanpara, Parishakkuthu and Idiyara rivers, and southwards to the Cardamom Hills and Peermade. These last form an extensive hill-plateau,

60 miles long and 20 miles broad, lying at an elevation of from 3,000 to 3,500 feet with peaks and hills running up to 4,000 or even 5,000 feet. This is the centre of planting industry and is largely resorted to by Europeans, who have also taken up for the purpose Camp Gorge, Ponmudi, Ashamboo &c. From the main range and from the western water-shed of the Peermade plateau and the High Range, rocky spurs run out to the west and north-west extending at times to within a short distance of the sea and forming a series of parallel valleys drained by numerous rivers.

South of Peermade, the lofty mountain range is of no breadth until we come to the beautiful sanitarium of Muthukuzhi Vayal or "The field of precious stones", 4,400 feet above sea level. For the remaining part of its length the great range becomes a mere ridge sloping down on either side and running north-north-west and south-south-east at an elevation of about 4,000 feet with isolated peaks rising here and there, the most important of which are the Agastyar peak (6,200 ft.) and the Mahendragiri peak (5,500 ft.). The Agastyar peak was once the seat of an Observatory. It is also famous as having been the abode of sage Agastya, "a savant, physician, philologist and theologian". The Mahendragiri peak stands on the area drained by the Hanuman River in the Tovala Taluk. This is the southernmost peak of the Travancore Ghauts and is supposed to be the hill from which Hanuman or the monkey God is supposed to have jumped to Lanka or modern Ceylon in quest of Sita.

Besides the peaks referred to above, may also be mentioned, Kallanad, Nedumpara, Papanasam, Amritamala, Kodiyattur, Chengamanad, Periamala, Therathandu, and Marutwamala.

Passes. BODINAICKANUR. This is the most northern of the passes of Travancore. It is ascended with great difficulty from the valley below. It connects Kothamangalam with Bodinaickanur.

TEVARAM. This connects Todupuzha on the Travancore side of the Ghauts with Kambam on the Madura side. This pass reaches the top of the Ghaut after a very steep ascent; for 2 miles from there it proceeds to Perrinjincooty 12 miles, continuing its course to the eastern Periyar 14 miles further and reaching Idumpanur, the first village in Travancore 13 miles beyond that river. This is now little frequented as it traverses a very wild and mountainous region.

KAMBAM. This pass though rugged for 1½ miles, is one of the best across the hilly tract separating the countries of Travancore and Madura. Merchants frequently pass this route.

GUDALUR. This connects Kanjirapalli with Kambam and Uttamapoliem, a distance of 44 miles. A more northern road strikes off from this at Copachetty Tavalam, 3 miles west of the Munjamulla Periyar, and proceeds by the Codamurutty Ghaut, a steep and difficult acclivity, to Erattupetta. This route runs over a rugged surface and is tolerable except near the pass which is now closed for traffic on account of the facilities it offered to smuggling.

South of Gudalur another path ascends the hills and leads to Sabarimala, but it is of no consequence being only frequented by cattle.

SHIVAGIRI GHAUT. This route is also prohibited. A road leads up to it from Rajapoliem, while another from Srivilliputtur ascends from the Satur Ghaut; but both these are difficult.

ACHANKOVIL (1,500 ft.). This lies north of the Puliyara pass and joins Achankovil to Pumblypatam and Shencottah. This has a difficult ascent for a mile from the plains stretching along its eastern foot. The road, after leaving the summit, descends partly through the bed of a stream to the pagoda, a distance of 6½ miles; thence passing over swelling ground and following the right bank of the Kulakkada river, it reaches Konni, a distance of 29 miles having crossed 9 powerful streams, the passage of which during the rains constitutes the chief difficulties of the route. This route passes from Shencottah over Konni, Pantalam and Mavelikara to Kartikapalli measuring on the whole a distance of more than 60 miles.

ARYANKAVU (1,200 ft.). This connects Quilon with Shencottah and is one of the principal passes of Travancore. It has an easy ascent from the open country on the east and passes through Manpazhatora and Pattanapuram, pursuing its course over waving ground through thick woods.

SHANAR GHAUT (1,700 ft.). This lies south of the above pass and is very difficult and little frequented. It ascends 4 miles and descends 11 miles to Kulattupuzha, from which it passes through a thick forest.

ARYANAD. The route to British territory by this pass is now closed up. The road rising from the plains on the east to the top of this pass and thence descending through a thick forest to the village of Aryanad near Nedumangad is spoken of as having been at one time a very good one.

MOTTACCHIMALA (4,500 ft.). In the Eridge estate. This is the chief pass by which cardamoms are smuggled from Balamore to Agastyar. The

road was once rideable to Pápanasam ; the Kanikkars even now go down this path for tobacco which they buy about Papanasam.

From Calacaud to Muthukuzhivayal there is a path used by canemen and cardamom smugglers.

Pass from Kadukkara to Shoravalli Madam. Much used by villagers from Alagiapandyapuram and other parts going to Panagudy. Daily the Panagudy cattle come down to the Kadukkara edge of the jungle to graze. It is also used largely by estate coolies

TIRUKKURANGUDY. About 2,000 feet; bridle-path cut on both sides. Much used by estate coolies.

Pass through Miranjimea Estate. Formerly a good path ascending the mountains from Panagudy leading to a large coffee estate; now a very bad track overgrown and not much used.

ARAMBOLY. The trunk road from Tinnevelly to Trivandrum passes through this pass. This forms the best entrance into Travancore.

YEDAMALA. A small and easy pass across the group of hills forming a ridge about 2 miles to the north-east of Marutwamala near Cape Comorin.

Rivers.—Travancore is especially fortunate in its river system. Few countries of similar extent are supplied with so many fine streams. Owing to this circumstance and to the heavy rainfall, every part of Travancore is abundantly supplied with water and that of an excellent quality. Of the numerous rivers taking their rise in the Travancore hills very few escape to the other coast. The rivers have generally a capricious course and are of varying lengths and depths. The bed over which they flow is frequently rocky in the interior, but as they leave the elevated parts, it is in most cases sandy, succeeded by a muddy sediment as they empty themselves into the lake or the sea. During the wet weather, which commences about the beginning of June and lasts till November, these rivers are filled from bank to bank with a large volume of water rolling in a strong current to the sea. The large rivers flow with turbulent and impetuous force frequently rising 12 to 14 feet above their ordinary level. The flood diminishes as the monsoon draws to a close, the rivers slowly subsiding into shallow and languid streams. In the larger rivers—the Periyar, the Ranni and the Kallada—there is always a considerable amount of water, due no doubt to the fact that the heavy forest at their sources does not allow the rains falling in the wet weather to run off too rapidly.

THE PERIYAR. The Periyar is the finest, the largest and the most important of the rivers of Travancore. It takes its rise in the Shivagiri forests. As it first emerges from the dense forest the volume of water it contains is 30 yards wide and 2 feet deep even in the driest weather. After a course of 10 miles northward it is joined by the Mullayar at an elevation of 2,800 feet. The Periyar then turns due west and continues so for about 10 miles over sandy bed. About seven miles below Mullayar Tavalam there is formed a sort of gorge by the hills rising to a considerable height on either side of the river and approaching each other very closely. It is here that a dam is thrown by the Madras Government to a height of 160 feet and a width of 1,200 feet to form a lake which greatly helps the irrigation of the land in the Vaigai valley. By the construction of the dam the river is caused to back up for a considerable distance as far as the Vazhukkappara Tavalam, and all the low lying land on the north bank of the river is submerged, the water extending up all the side valleys and reaching to within a mile of Kumili. From here a channel is tunnelled through the hill side over a mile long, by which the water is conveyed to one of the streams that go to feed the Vaigai river.

After a winding course of 8 miles from the dam, the river reaches Peermade and then passes through a narrow gorge, below which it is joined by the Perinthura river. Lower down, passing the Todupuzha-Periyar crossing, the Kattapanayar joins it and still lower the Cheruthoni or Chittar. Lower down it is joined by the Pirinyankuta Ar and a mile later by the Muthirappuzha Ar, where the elevation is about 800 feet and there is a great fall of 800 feet in 4½ miles. There is also another fall called Kokkaranippara, where the river is said to tumble over a cliff 100 feet high, close to the above. The Periyar after receiving the Muthirappuzha river flows west-north-west for about 8 miles when it pours under a large rock which probably has fallen from the hill side on account of landslip. In dry weather when the volume of water is small, the whole of it flows under the rock. This has been exaggerated into a sudden disappearance of the river underground. The water is considered to pass into a chasm and emerge again only after a very long distance.

Ten miles below the junction of the Muthirappuzha river with the Periyar, at Karimanal, the river becomes navigable or suitable for the floating of timber. It is then joined by the Deviär and passes the once populous village of Neryamangalam. From this place it flows for about 8 miles when it unites with the Idiyara or Idamala river. From here as far as Malayattur, the river, now a grand one upwards of 400 yards

and the Arutha. The original stream Pamba from which the river takes its name rises on the hills to the north of Pulicchimala and after running for a long distance is joined by the Arutha which rises on the Peermade plateau, and the two together form the Valiya Ar which after a course of 6 miles westward falls over Perunthèn aruvi (height 90 ft.) and is then joined by the Kakkada river. The Kallar which rises in the valley north of Chempazhakkara joins the main river a little above Ranni and the combined river now called the Ranni leaves the forest area as a powerful stream 200 yards broad. It then runs west for about 30 miles when it is joined by the Manimala river and 6 or 8 miles lower down the Kulakkada river joins it and after a course of about 20 miles the whole flows into the Vembanad lake.

The total length of the river is 90 miles. The chief places on its banks are:—Konni, Aiyrur, Aranmula, Chengannur, Maunar and Pulikunnu. The river is navigable for boats for 45 miles, and is specially useful for irrigation.

THE KALLADA RIVER. This is the third largest river in Travancore. The union of five large streams issuing from the mountainous valleys of the Ghauts forms the Kallada river which flows through the Taluqs of Pattanapuram, Kunnattur, Kottarakara and Quilon. The main branch rises in the most southerly of these valleys and is formed by numerous streams that rise on the elevated plateau stretching from the Alvarkurichi peak to Chemmunji. Flowing west it is joined by several small streams and after leaving the Kulattupuzha valley proper and running 5 miles passes the Kulattupuzha village situated on its left bank. Here the river is about 80 yards wide and never gets dry even in hot weather. Three miles lower down it is precipitated over the Minmutti cataract, the water rushing with immense velocity. It is then joined by the Chenthroni and Kalduritty rivers. Passing Ottakkal where it pours over another cataract, the river then runs for about 10 miles in a west-north-westerly direction and leaves the forest area 3 miles above the town of Punalur. Turning north and bending a little north-west, it passes Pattanapuram and 2 miles below Punalur it is joined by the Chalakkara Ar. It then flows in a westerly direction and then south-west until it falls into the Ashtamudi lake, a little north of Quilon, by several mouths. Its length is 70 miles of which 25 miles are navigable for boats. The chief places on its banks are:—Punalur, Pattanapuram, Pattazhidesam, Kulakkada, Kunnattur and Kallada (East and West).

THE MANIMALA RIVER. The main branch of this river rises under the Mothavara hill and drains the valley to the west of Amritamala. After

flowing for about 6 miles it is joined at Kuttukal by the Nyarampullar and then by several small streams before it joins the Ranni about 25 miles above its mouth. The length of the river is 62 miles. The villages of Peruvantanam, Mundakayam, Yerumakuzhi, Manimala, Kaviyur, Kalluppara, Tiruvalla, Talavadi, Kozhimukku and Chambakkulam lie on its course.

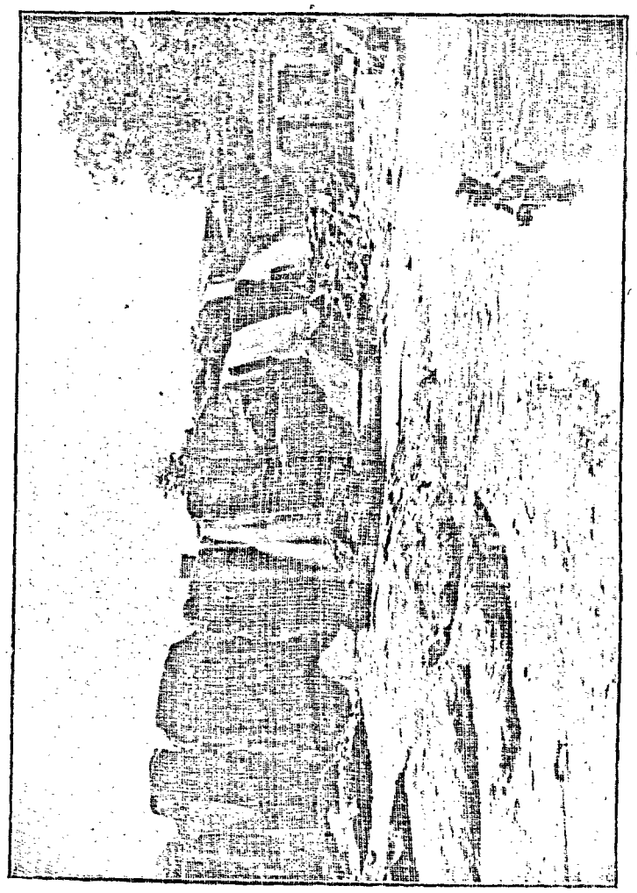
THE ACHANKOVIL OR KULAKKADA RIVER. This rises on the western slope of the Thuval mala (Coonumeal square rock) and Ramakkal peaks. It passes Achankovil village and, after receiving numerous accessions from small rivers and streams, leaves the forest area 4 miles above Konniyur. This river runs a course of 70 miles first north-west and then west and joins the Pamba river near Viyapuram. Konniyur, Omallur, Pantalam, Mavelikara and Kandiyur are situated on its banks. It flows through the Taluqs of Chengannur, Kunnattur, Mavelikara, Tiruvalla and Kartikapalli. Navigable for boats 40 miles and specially useful for cultivation purposes.

THE ATTUNGAL OR VAMANAPURAM RIVER. This rises on the peak of Chemmunji north-east of Trivandrum and on the spur running out from the main range as far as the cliffs of Ponmudi. It then descends rapidly and runs at first in a northwesterly direction, then west for 23 miles between high banks and over a sandy bed when it passes the village of Vamanapuram. From here it runs south-west and empties itself into the Anjengo estuary after a course of 35 miles. Nelnad, Vamanapuram, Attungal, Kuntallur and Chirayinkil are the chief places on its banks.

THE ITTIKKARA RIVER takes its rise in the low hills situated near Madatturakani and those to the south-west of Kulattupuzha. After small accessions it leaves the forest area near Manarkoda and proceeding in a north-westerly direction is joined by a large stream. From here it flows south-west and west and falls into the Paravur backwater. Length 30 miles. Chadayamangalam, Pallikal, Kummallur and Nedungolum lie on its banks.

THE KILLIYAR. This petty river rises in the Nedumangad hills. Its course is generally towards the south and after flowing for 15 miles it joins the Karamana river near Tiruvallam. This river irrigates a small tract of rice land by means of anicuts and channels taken off from it and supplies water to all the principal tanks of the Capital.

THE KARAMANA RIVER. This rises on the ridge to the north of the Agastyar Peak and an outlying spur terminating in the Sasthankotta rock. It flows over a partially narrow rocky bed confined by high banks through a comparatively wild, woody and uneven country. Its direction



Tipparappu Falls.

Photo by J. B. D'Cruz.

M. E. PRESS.

is first west, then south and finally south-west and it flows into the sea 3 miles near Puntora, at the foot of the head-land termed Covalam, after a course of 41 miles.

THE NEYYAR. This rises on the slopes of the Agastyar peak at an elevation of 600 feet and descends with great rapidity until it reaches the foot of the hills. It then runs in a southerly direction and passes downward over a cataract 300 feet high, visible from Trivandrum. From here it flows over a partially rocky bed confined by bold banks and discharges itself into the sea near Puvar where a small lagoon is formed. Its length is 35 miles.

THE PARALAYAR OR KUZHITTURA. This rises on the mountains north of Mahendragiri hills. Passing through a wild tract, it enters the plains at Tiruvattar and flows in a south-westerly direction. After a course of 23 miles from its source it is joined by the Kothayar. It flows through the two Taluqs of Kalkulam and Vilavankod and reaches the sea at Tengapatnam. The total length of the river is 37 miles. Tiruvattar, Munchira, Kuzhittura, and Arudesapattu lie on its banks. It is intercepted by dams at Ponmana.

THE KOTHAYAR. This rises on the southern extremity of the Muthukuzhi Vayal plateau and to the east of Valiyamala peak at an elevation of 4,500 feet. It descends slowly at first and then more rapidly. After flowing for 14 miles it reaches the Mottacchi valley (1,800 ft). It continues to descend with rapidity tumbling over falls 30 feet high and eddying among huge boulders, until at last it reaches the elevation of 250 feet. From here it flows leisurely and is joined by two streams rising on the Motavan Potha and the Thacchamala hills. Proceeding south we find the remains of the Aryanad dam now in ruins. This dam was built with the intention of diverting the water into the Paralayar above the Pandyan dam and eventually into the Pazhayar whose stream is so largely used for irrigating the paddy lands of Nanjanad. After passing the Aryanad dam and about 4 miles lower down it is precipitated over the Triparappu fall (50 ft. high), a very sacred place where there is a large pagoda. From here it proceeds south and is joined above Kuzhittura by the Paralayar. Length 20 miles.

Project works on a large scale are now going on to divert the waters of the Kothayar to supplement the existing irrigation system of Nanjanad. A detailed description of the Project is given under 'Irrigation' in the Chapter on 'Agriculture and Irrigation.'

THE VATASSERI RIVER. Also called the Pazhayar. This is the most southerly river in Travancore. Many small streams combine to form

this river, one of which rises south of the Mahendragiri peak and passing down a steep gorge reaches the low country a little to the west of Anantapuram, another in the Kunimuthu Chola Estate and another drains Black Rock (Mr. Cox's Estate). All these pass out of the forest before they unite to form the main river. This flows through the Taluqs of Tovala and Agastisvaram in a south-easterly direction and flows into the Manakudi estuary after a course of 23 miles passing the towns of Bhutapandi, Kottar, Nagercoil, Tazhakudi and Suchindram. This is a very useful river for irrigation.

These are the chief rivers of Travancore. The number of smaller streams is very large but as they are otherwise insignificant any detailed description of them is unnecessary here.

Canals and Backwaters. Among the many natural advantages possessed by Travancore, one of the most important and one which adds materially to its wealth and prosperity, on account of its affording great facilities for water communication from one end of the country to the other, is its extensive backwater system. The backwaters or *kayals*, as they are locally called, are inlets from the sea which run in a direction parallel to the coast. From Trivandrum as far as Ponnani in the District of Malabar, a distance of over 200 miles, there is a succession of these backwaters or estuaries, connected together by navigable channels constructed from time to time. The total area occupied by the surface of the lakes amounts to 227¼ sq. miles of which 157½ are within Travancore. Their breadth is very unequal, in some places spreading into a wide expanse, at others diminishing to a small stream, presenting on the whole a very irregular and broken figure.

Formerly there was uninterrupted navigation only as far as Quilon. It was in 999 M. E. that Her Highness Parvathi Bayi sanctioned the construction of 2 canals, one from Trivandrum to the backwater of Kadinangulam and the other to connect Quilon and the Paravur backwater, both of which projects were contemplated by Col. Munro; but the work was commenced only in 1000 M. E. (1825 A. D.) and completed in 3 years under the supervision of Dewan Vencata Row. The 2 canals measure in length upwards of 17 miles, which including 4 bridges cost about 4 lacs of Rupees. These canals bear the name of Her Highness Parvathi Bayi whose beneficent reign is still gratefully remembered by the people.

There were still the Varkala cliffs, standing as a barrrier against direct and free communication from Trivandrum to Quilon. This was removed by the construction of two tunnels at an enormous cost in the reign

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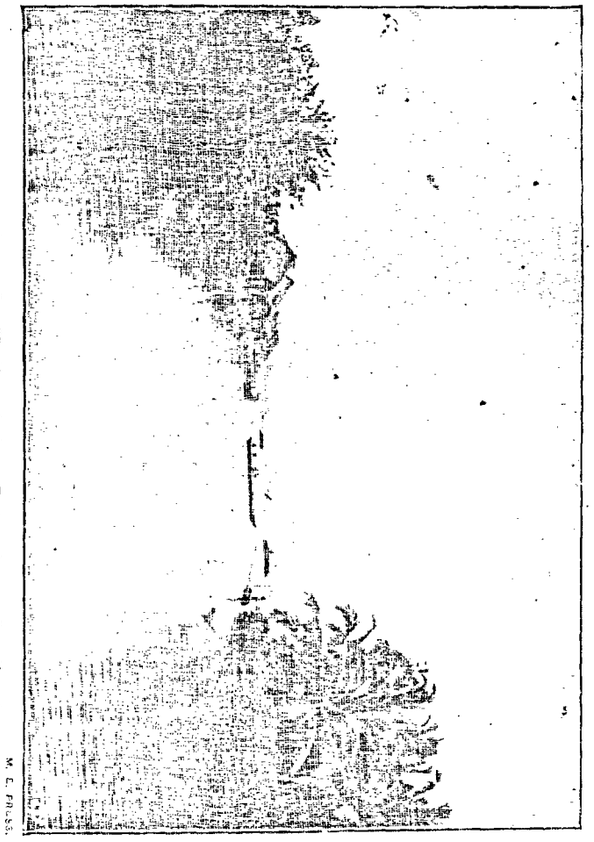


Photo by J. B. D'Cruz.

Entrance into the Kadinamkulam Lake from the Canal.

of His Highness Rama Varma (Ayilliam Tirunal-1860 to 1880 A. D). The length of one tunnel is 924 feet and of the other 2,364 feet. The first tunnel was opened to traffic on the 15th January 1877; the second tunnel and the whole of the Barrier works were completed and opened to traffic in 1880. They cost upwards of 17 lacs of rupees.

Many of these backwaters are not very deep, yet they are all navigable for boats of any size. Their bed consists generally of a thin layer of soft black mud, incumbent on a fine dark sand, often with som mixture of soil. On account of the large volume of water these backwaters receive during the monsoon time, their water, except in the immediate vicinity of their mouths, is quite fresh; in some places they are always so in the interval of the tides, while in others, they continue to be so from July to October. The places where these backwaters meet the sea are called *Azhis* or *Pozhis*, according as the opening is permanent or temporary. The chief *Azhis* are those at Quilon, Kayangulam and the mouth of the Periyar; and the *Pozhis* are those of the Veli, the Paravur and the Edawa. The flood during the monsoons leaves behind a slimy deposit which effuses an abundance of fertility over the lands exposed to it. The backwaters also foster the growth of many weeds and aquatic plants. The shores of the lakes are filled with houses and plantations of cocoanut trees and present the appearance of a perpetual garden.

Starting from Trivandrum there is first, at a distance of 3 miles, the Veli Kayal which looks like an expanded canal. On one side the shore is overhung by a high cliff and the other side is skirted on by an extensive range of cocoanut plantations. Passing the Veli backwater, by the Parvathi Puthenar canal above referred to, we come to the Kadinangulam Kayal. Here again both the banks are lined with the cocoanut palm and a low brushwood. This backwater is a little larger than the Veli. The water is not deep. Going by the canal, we next pass Anjengo, formerly a place of note on account of the English factory and the early commercial relations between the British Government and Travancore, but now a small port and fishing village. Here is the Anjengo Kayal. The length of this Kayal is 12 miles, breadth $\frac{3}{4}$ of a mile, and area 8 sq. miles. This receives the Attungal or Vamanapuram river and is formed chiefly by its waters. It is connected with the sea by a narrow bar.

A few miles beyond Anjengo, the Varkala cliffs are reached. Before the construction of the tunnels, travellers used to land at a place called Kozhi-

thottam (the main line of communication ran by Kozhithottam to Edava, a distance of 12 miles), from where they walked to Edawa until the backwater is reached, the road used being by the sea-beach, at times climbing over the summit of the cliffs that stretched into the sea. The view from these cliffs is extremely beautiful and the whole landscape charming. Here stands the village of Varkala famous for its ancient temple dedicated to Janardanaswamy, to which Hindus from all parts of India resort.

Passing the tunnels, about 6 miles northwards there is the Nediyara Kayal. This again is of minor importance. Passing the Nediyara backwater a canal runs in a northwesterly direction for some 3 miles whence the Paravur canal and backwater lead to Quilon. The Paravur Kayal, though only a small one, is very deep and dangerous on account of its being very close to the sea and in the wet weather the bar opens of itself, sometimes suddenly. The Paravur and Quilon canals aggregating about 11 miles in length, were cut between 1826 and 1829, at a total cost of Rs. 90,929. Passing the Paravur backwater we reach Quilon by the Eravipuram and Quilon canals, a distance of about 5 miles.

On leaving Quilon the traveller enters the romantic and enchanting Ashtamudi Kayal. The name 'Ashtamudi' is derived from the fact that the lake branches off into 8 creeks, called by different names. One portion near the Quilon Residency is called the Asramom lake and the other close to the Cutchery is called Kureepuzha or Loch Lomond. On either side we see a laterite bank 50 or 60 feet high enclosing little bays with deep blue waters. The broken side and the fragments of rocks are filled with various kinds of small shrubs while on the summits there are thickly planted gardens. About 2 miles north of Quilon the water opens out into a very spacious bay into which the Kallada river empties itself. There is an outlet to the sea at the western end which is locally known as the Neendakara bar. It is of sufficient depth for small vessels and the barges built at Tuct in Quilon are safely launched into the sea at this point. It covers an area of 20 sq. miles, its extreme length and breadth being 10 and 9 miles respectively. The banks are covered with many kinds of plants. Five miles beyond Quilon the backwater ends and the Chavara canal begins and the scenery becomes monotonous.

We next come to a very small inlet called the Puneara Kayal. This is followed by the Ayiramtengu Kayal which again leads us to the extensive Kayangulam Kayal. The Kayangulam lake has an outlet bar of the same name which admits of small coasters from the Arabian sea. This made Kayangulam a place of considerable commercial

importance in former days. This lake borders the two Taluqs of Karunagapalli and Kartikapalli. Its extreme length is 19 miles and extreme breadth 4 miles; area 23 sq. miles.

Passing the Kayangulam Kayal we reach Karumadi near Ampalapuzha by a natural stream through Trikkunnapuzha and Thottapalli chera. Proceeding along on our way, we see extensive rice fields on either side, the country here being flat and almost submerged in water. From Ampalapuzha, Alleppey is 12 miles distant. There are no backwaters to be passed but only canals, which at these places are very broad and join the Pallathurithy river flowing into the Vembanad lake near Alleppey. Alleppey town is reached by a canal, before entering which there is a deep basin 40 to 50 feet in depth infested by alligators of enormous size.

Alleppey is now the first commercial port of Travancore, its greatest advantage as an emporium arising from its singularly natural breakwater formed in the open roadstead and the long and wide mud bank which helps large vessels to anchor safely even in the stormiest weather.

Beyond Alleppey we come to the very large and spacious bay, the Vembanad Kayal. This stretches across to the east for a distance of over 10 miles. The waters of the Pamba, Muvattupuzha and Minachil rivers are emptied into it. It borders the Taluks of Ampalapuzha, Shertallay, Vaikam, Yettumanur, Kottayam and Changanachery. Its extreme length is 52 miles and breadth 9 miles and the area covered by it is 79 sq. miles. It has a small beautiful island in the centre known as Patiramanal, or 'the mysterious sand of mid-night', filled with cocoanut plantations and luxuriant vegetation. According to tradition, it was brought into existence by the piety of a Nambudiri Brahmin, who, while travelling in a canoe, jumped into the lake to perform his evening ablutions. The waters, it is said, gave way and land arose from below forming a small island. Pallippuram and Perumpallam are two other islands in the lake.

There are many pretty places along the borders of this lake, perpetually clothed with beautiful groves of cocoanut and other trees and with an endless succession of houses, churches and pagodas. Midway between Alleppey and Cochin stands on its eastern bank the sacred village of Vaikam where there is a large Siva temple to which thousands of pilgrims resort in the months of Vrichigam and Kumbham for the Ashtami festival. From here to Cochin the backwater is of varying breadths and depths containing small patches of land here and there always adorned with cocoanut trees.

From Cochin the water communication is by backwater to the north of Cranganore whence it is continued by creek, channel and backwater *via* Chowghat to Ponnani, and across the Ponnani river to Tirur Railway station. Thus the system is complete for a distance of 213 miles from Trivandrum to Tirur.

Among other backwaters may be mentioned:—

The Kodungalur Kayal in the Taluk of Parur. Extreme length 9 miles and extreme breadth 5 miles; area 10 sq. miles. Has an outlet in the Cranganore bar which is always open.

The Sasthankotta Kayal in the Kunnattur Taluq.

The Vellani Kayal in the Neyyattinkara Taluq.

And lastly the Manakudi Kayal in the Taluq of Agastisvaram. This is a small lagoon formed by the course of the Pazhayar before it discharges itself by a narrow mouth.

As early as 1860 the great Victoria Ananta Martandan canal was projected for connecting Trivandrum with Cape Comorin; but it had to be abandoned owing to several obstacles, though considerable sums of money had been spent on it.

Coast Line. The Travancore coast has been surveyed by the Marine Department in connection with the Coast Survey of the Madras Presidency and the following is extracted from their report:—

"The Travancore coast, from Alleppey to Comorin, is generally low and sandy, fringed with cocoanut trees. Patches of red cliffs of slight elevation here and there break the otherwise continuous line of sand. The Travancore mountains, though generally spoken of by navigators as a part of the Western Ghauts, are indeed separated from the latter by a low neck of land, the Palghaut valley, which has proved a most useful feature in the railway communication between east and west coasts. The length of this southern mountain chain, extending from a few miles north of Cape Comorin to the valley of Palghaut, is nearly 200 miles. The western brow, overlooking the coast of Travancore, is, with little exception, abrupt. On the eastern side of the culminating range the declivity is in general gradual, the surface in many places forming extensive table-land, sloping gently and nearly imperceptibly to the eastward. In the last half of the year many cascades of great height are visible from seaward, pouring down the steep declivity of these western ghauts, which present so vast and lofty a front to the violence of the south-west monsoon. The principal peaks of the Travancore Ghauts are: Mahendragherry between 3,000 and 4,000 feet, about 20 miles north of Comorin, and Cootchimulla, nearly 5,000 feet, the same distance north-east of Trivandrum. Between these peaks the culminating range has a north-westerly direction, but afterwards trends a little east of north, more away from the coast. Its highest mountains, though loftier, are not so often visible at sea. They form the boundary between the State of Travancore on the west, and the British province of Tinnevelly on the east. To the east of Quilon there are broad, high

peaks, estimated at 5,000 feet above, and more than 30 miles from the sea. The southern portion of the Western Ghauts, from Comorin to Palghat, run like a spine from south to north, thus forming the water-parting between the east and west coasts rivers. They are exposed to all winds from east, round by the south-west, and there is scarcely a day when rain-clouds may not be seen hiding for a time the summits of the high land. Towards the vernal equinox (after which the air gets saturated with moisture and is hazy) the ghauts north of Quilon up to Calicut can seldom be seen. Midway between the ghauts and the low sea-coast, the country has several hills of moderate elevation, useful as landmarks. Beginning from the south, mention may be made of the isolated conical mount, in lat. 8° 8′ N., and long. 73° 30′ E., near Cape Comorin, which is taken for the cape by seamen when approaching the coast from the west. The next conspicuous peak is Maravattoor, nearly midway between Mahendragherry and the Crocodile Rock, and 10 miles north-west of the conical mount. On the south-east of Trivandrum, and again to the north of that capital, hills, averaging about 400 feet, lie parallel to the shore, some 4 or 5 miles off. Near Anjengo there are a few low hills. Above this place extensive backwaters become the peculiar feature, overspreading great portions of the low tract of country. Vessels bound for any port on the west coast of Hindostan, and to the Persian Gulf during the north-east monsoon, from China, Australia, and the Bay of Bengal, or from Europe, should sight Ceylon, and make the coast of India somewhere near Cape Comorin, and thence hug the coast to profit by the land and sea breezes. The coast from Cape Comorin takes a general north-westerly direction for nearly 300 miles to Mount Deliy."*

Ports and shipping facilities.†—ALLEPPEY (lat. 29° 48′ N., and long. 76° 18′ 46″ E.) is the principal seaport town of Travancore and the seat of the Commercial Agent. It is the chief depot of the Travancore Government for the sale of forest produce, chiefly cardamoms, and is a place of considerable foreign trade in teak, cocoanut, betel-nut, ginger, coffee, pepper and fish. Many European and American Firms have their representatives here and extensive industries are carried on. It is a safe roadstead all the year round being protected by a soft mud bank on which a vessel might ride at less risk than at any other part of the coast. A shoal-bank of from 6 to 9 feet extends about 1½ miles off shore. During the south-west monsoon, although the surf breaks on the shore to the north and the sea is white with foam outside, there is at Alleppey a large extent of smooth water, on the outer part of which a vessel might conveniently anchor in 4½ fathoms and keep up a communication with the shore. In the fine season, a vessel not drawing more than 18 feet water may anchor in 4 fathoms or a trifle less, the bottom being soft mud. The anchorage in the roads during the south-west monsoon is with the lighthouse from N. E. to E. N., in 5 or 6 fathoms water. In the fair season from October to May, vessels may anchor in 3 or 4 fathoms with the lighthouse bearing

* The Madras Manual of Administration Vol. ii.

† The information under this head is chiefly based on the results of the Marine Survey above referred to.

E. by N., the soundings being very regular. During the south-west monsoon trade cannot sometimes be carried on with Cochin, but the port of Alleppey is always available. Alleppey has a flag-staff and near it is a lighthouse with a revolving white light attaining its greatest brilliancy every minute. The light is of the second order of the holophotal description elevated 100 feet above mean sea-level and is visible in ordinary weather 20 miles. It was first exhibited on the night of the 28th March 1862. Between Cochin and Alleppey the coast is very low, covered with trees, and may be approached to 6 fathoms in a large ship, the bank being very even to 5 fathoms, about 1 or 1½ miles from the shore.

PORACAD. (lat. 9° 91″ 35″ N., long. 76° 23′ E.). This is a village of considerable extent, coir, plank and timber for ship-building and pepper being exported from here and the adjacent places. The port has declined since the opening of Alleppey port. There is an extensive mud bank here. Steamers call in the worst part of the monsoon weather, when Alleppey is closed. A portion of the village was formerly submerged in the sea and the eastern gate of the pagoda which escaped destruction at the time is still seen standing. The coast here continues low and uneven and is safe to approach to 5 or 6 fathoms. The anchorage is opposite the village in 5½ or 6 fathoms, 1½ or 2 miles distant.

QUILON. (lat. 8° 53½′ N., long. 76° 34′ E.). The coast between Alleppey and Quilon except near Tangasseri, is sandy and nearly straight, but 10 miles north of Quilon there is a slight indent which does not however amount to 1 mile from a straight line drawn between the two places. The shore is safe to approach into the depth of 5 fathoms mud.

During the early centuries of the Christian era Quilon was a very important port trading with China and Arabia. Throughout the middle ages it was one of the chief seats of the Saint Thomas Christians. In 1503, the Portuguese established a factory and fort which was captured by the Dutch 150 years later. A considerable British garrison was stationed here until 1832, when it was reduced to one regiment. Till 1829 it was the principal town and head-quarters of the Travancore Government. It has still considerable inland and foreign trade. As a port it is next in importance to Alleppey. Steamers and ships call here. It is the chief entrepot of ginger and pepper on the Malabar Coast.

The beach near Quilon is steep and sandy as far north as Tangasseri cove, where rocky coast begins and continues to the northward for 2 to 3 miles. Two buoys had been laid at Quilon to mark the safe passage

to the anchorage. Vessels for Quilon should keep well out until the large factory chimney (of the Scottish Indian Company) bears N. E., and steer direct for the chimney keeping between the buoys. The coast between them is low, covered with trees, and may be approached to 6 fathoms till near the entrance of Ivica river (Azhimukam). Quilon bank of hard ground extends from the bay round Quilon point, a projecting part of the coast, where it becomes uneven and dangerous to approach under 12 or 13 fathoms.

TANGASSERI. (lat. 8° 54′ N., long. 76° 38′ 15″ E.). Originally there was a fort built on a head-land of laterite jutting into the sea, portions of the old wall of which are still visible, as also the ruins of an old Portuguese town. The Tangasseri reef, a bank of hard ground, extends 1½ miles to the south-west and 3 miles to the west of the Quilon point, and 6 miles along the coast to the northward. The bank should not be approached under 13 fathoms water by day, or 17 fathoms at night.

To the south-east of the reef the coast forms a bight, where ships may anchor off the town and military station of Quilon in 5 or 6 fathoms sand with Tangasseri flag-staff bearing N. W., 1 mile distant. From November to April shipping vessels can lie close inshore with safety. When approaching Quilon from the northward, vessels should not shoal to less than 13 fathoms, as, off Tangasseri point, the foul ground extends westward to within less a mile of this depth. The most convenient anchorage and where a vessel will be close to the Port Office, is with the chimney of the Coffee Company's factory bearing about N. E. at the extreme of Tangasseri point west-north-west in from 4½ to 5 fathoms sandy bottom. Off Quilon point, there are 20 fathoms at 5 miles offshore; but further to the north, that depth will be found farther from the coast. A lighthouse has recently been constructed here for the guidance of mariners.

ANJENGO. (lat. 8° 40′ N., long. 76° 45′ E.). Three miles to the southward of Quilon, the coast may be approached to 10 fathoms, which will be 1½ miles from the shore. Anjengo flag-staff is between 4 or 5 leagues to the west-north-west of Trivandrum Observatory. Anjengo was once a place of considerable importance and the earliest settlement of the late East India Company on the Malabar Coast, but now it has a forsaken appearance.

Four miles to the north of Anjengo there is a red table-land, which denotes the approach to it, in coming from the north. The anchorage off Anjengo, under 10 fathoms, is foul rocky ground: but outside of that

depth, the bottom is sand and shells. A convenient berth is with the flag-staff about N. E by E. and Brinjaul hill (Mukkunnimala) about S. E by E., in 11 or 12 fathoms mud, off shore 1 mile. A considerable surf, generally prevailing on the coast, particularly to the southward, renders it frequently unsafe for boats to land.

PUNTORA. Vessels communicating with Trivandrum should anchor off the coast here. There is a flag-staff on the sandy beach. It is 2 miles south-west of Trivandrum Fort. No boats should attempt communication with the shore when there is a heavy surf in the north-east monsoon. The coast is sandy with cocoanut and other palms. Vessels should anchor in 12 fathoms sand, ½ a mile from the flag-staff bearing N. E. and nearly in line with the Trivandrum Observatory which is distinctly made out in passing by its three domes.

Passing Puntora we come to Covalam (Ruttera point), a piece of low level land, terminating in a bluff cape higher than the contiguous coast. The coast here is low abounding with trees. It is bold to approach, having 12 or 13 fathoms at a mile's distance, 25 or 26 fathoms about 2 or 2½ leagues' distance.

VIZHINJAM. This is a small fishing village 7½ miles to the east of Covalam, and is "formed of steep bold land, or reddish cliffs, considerably elevated, having on the northern side a small river and village (Puvar) at the northern extremity of the high land, that form the point." The coast hereabouts is all sandy and fronted with cocoanut trees. From this point the coast takes a direction about S. E. by E. to Cadiapatnam point distant 6 leagues.

COLACHEL. (lat. 8° 10' N., and long. 77° 14' E.). This is a very ancient seaport. The Danes once had a factory here with a Commercial Resident. Its safe harbour was well known to ancients. It has trade with the coast and Ceylon. The coffee produced in South Travancore is exported from here. The outlying rocks form a partial breakwater, within which landing is comparatively easy. Ships of good size can sail between some of the outlying rocks and ride at anchor to leeward of them in smooth water. It has a flag-staff, and a buoy which is used during the shipping season to mark the vicinity of a dangerous rock.

CADIAPATNAM POINT. (lat. 8° 7½' N., and long. 77° 18' E.). This is 14 miles from Cape Comorin. A first order dioptric fixed whitelight, intended to mark the vicinity of the Crocodile rock, is exhibited here. It is visible 20 miles in clear weather. The column is 80 feet high and is built of granite and its focal plane is 135 feet above sea level. A heavy surf prevails all along the part of the coast, between Comorin and Cadiapatnam. Only catamarans are used by the natives and no ships' boats attempt landing. To the south-west of this point there are two rocky islets, about 1¾ miles from each other and distant 1 and 2½ miles from the point, surrounded by rocks under water and foul ground.

The Crocodile Rock lies south-west at a distance of about 3 miles. A part of this appears above water sometimes; but it does not break at all times nor is it visible at high water when the sea is smooth. At night it should not be approached under 25 fathoms water. In passing between these rocks and Covalam from 22 to 26 fathoms, is a good track with the land wind. The coast may be approached to 18 or 20 fathoms occasionally. The coast from here as far as Cape Comorin is low and sandy close to the sea, rising in a gentle acclivity to the base of the mountains situated a few miles inland.

MANAKUDI. (lat. 8° 5' N., and long. 77°32' E.). This is a village port about 4 miles to the west of the Cape and stands on the edge of the lake of the same name.

CAPE COMORIN. (lat. 8° 5' N., long. 77° 36' E.). This, the southern extremity of Hindustan, is a low Cape with two bare rocks beyond the point. On the mainland at the water's edge is a Hindu Pagoda, a low square white-washed building, and beside the temple is the village of Kanyakumari. West of the temple stands the Residency. The shore to the west of it is bare of vegetation but to the east it is wooded. About a mile from the Cape and beyond the fishing village, a sandy spit ending in a line of rocks runs out into the sea, and beyond this point is an anchorage with sandy bottom to which native crafts run for shelter when the weather hinders them from rounding the Cape. As the south-west monsoon at this locality blows from the north-west, this anchorage is sheltered. Ships anchor bearing N. E. of the rocks that are off Cape Comorin and S. W. of the Vattakotta Fort, a conspicuous stone fort on the beach. The Government of India have been moved to make a Hydrographic Survey of this anchorage and the Travancore Government have located a customshouse on the shore and have constructed a road to the spot. A port has recently been opened under the name of the Sri Mulapuram Port.

Among other ports may be mentioned, Rajakamangalam, Muttam

"The common gneisses are felspathic quartzose varieties of white or grey colours, very largely charged 'with' garnets. A particular form of them is an exceedingly tough, but largely crystallized, dark-grey or greenish felspathic rock. Massive horn-blendic gneisses are not common. Indeed horn-blende may be said to be a comparatively rare constituent of the Travancore gneisses.

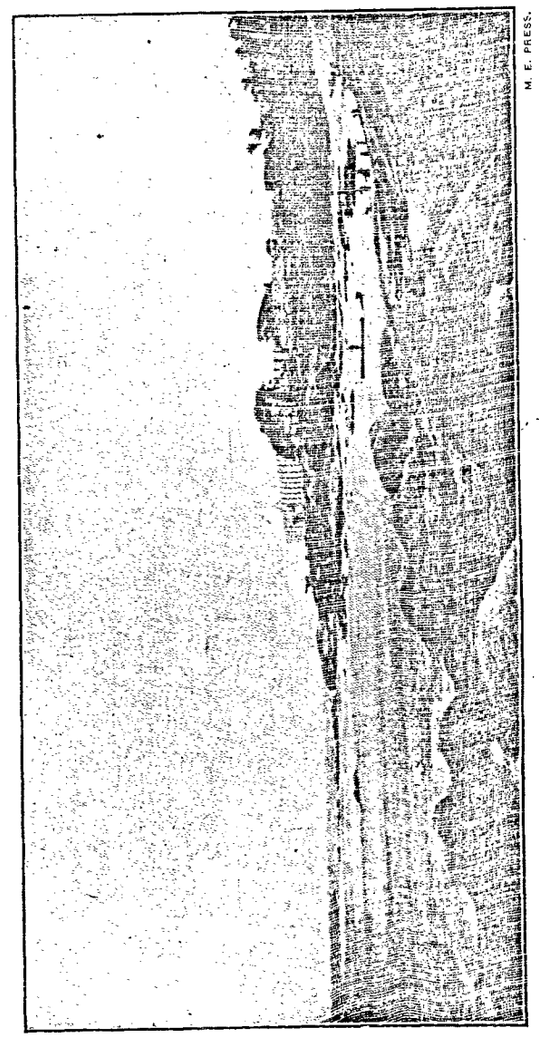
"All the gneisses are more or less charged with titaniferous iron in minute grains; they are likewise—only more visibly—as a rule, highly garnetiferous. In fact, one might say that Travancore is essentially a country of garnetiferous gneisses. The garnets themselves are only locally obtainable, it being impossible to break them from the living rock while they are generally decomposed or weathered. They are generally of small size, but are very rich in colour, the precious garnet being very common. Other minerals such as red, blue and yellow sapphire and jacinth, are found among the garnet sands so common on the seashore at certain places. The sea-sands are also full of titaniferous iron grain. I may instance the beautiful and long known constitution of the shore sands at Cape Comorin where, on the beach, may be seen the strongest coloured streaks or ribbons, of good width, of bright, scarlet, black, purple, yellow and white sands of all these minerals and the ordinary silica.

"The general lie of the gneisses is in two or three parallel folds striking west-north-west to east-south-east. There is, perhaps, rather a tendency of the strike more to the northward in the broad part of the hills about Peermad, and on towards the Cochin territory. Thus between Trivandrum and Tinnevelly on the west coast or for some twelve to twenty miles inland, the dip is high to the south-south-west inland of the terraced or plateau country, or among the first parallel ridges there is a north-north-east dip; then, on the mountain zone, there is again a high dip generally to the south-south-west. Thus the inclination of the beds is generally high, right across the strike with a crushed-up condition of the folds; but they are often at a low angle, and the anticlinal on the western, the synclinal on the eastern, side are plainly distinguishable. About Kurtallam (Courtallum), on the Tinnevelly side, the rise up from the synclinal is very well displayed, and in their strike west-north-westward into a broad mountain land, the beds of this place clearly take part in a further great anticlinal which is displayed in a great flat arch of the Peermad strata. With this widening out of the mountain mass there is rather an easier lie of the strata. Southwards from the Ariankow traverse there is much crushing up of the beds; but they roll out flatter again towards the southern extremity, and there are good indications of a further synclinal to the south-south-west in the northerly low-dipping beds of Cape Comorin.

"Foliation is very strongly developed: indeed it is here, practically, bedding and lamination, of which there are some wonderful exhibitions. At Cape Comorin, indeed, some of the gneiss in its weathered condition (not lateritized) is scarcely to be distinguished, at first, from good thick-bedded and laminated sandstones and flaggy sandstones.

"There is no special development of igneous rocks either in the way of granites or greenstones, though small veins and dykes are common, generally running nearly with the strike of the gneiss. In South Travancore, or north of the parallel of Trivandrum, there are stronger occurrences of granite in which mica is abundant and in largish masses.

"The great feature about the gneisses in Travancore and indeed also in Cochin and Malabar, is their extraordinary tendency to weather or decompose, generally



Sea and Temple View at Cape Comorin.

M. E. PRESS.

into white, yellow, or reddish felspathic clayey rocks, which, in many places and often very extensively, ultimately become what is here always called *laterite*. .....Very soon after one begins to leave the higher ribs of the mountains and to enter on the first long slopes leading down to the low country, the gneiss begins to be weathered for some depth into a clayey rock, generally of pale colours, streaked and veined with ferruginous matter, and having always an appreciable upper surface of scabrous or pisolitic brown iron clay, which is, of course, probably largely the result of ferruginous wash, and less so, of ferruginous infiltration. Also the ferruginous and lateritoid character is devolved to a certain extent according to the composition of the gneisses; but, on the whole, there is no doubt that the upper surface generally over large areas is lateritized to a certain depth irrespective of the varying constitution of the strata. Then as the rocks are followed or crossed westward the alteration becomes more frequent, decided, and deeper-seated; though still, all over the field, ridges, humps, and bosses of the living rock rise up from the surrounding more or less decomposed low-lying rock areas.

"This generally irregular and fitfully altered condition of the gneisses begins at an elevation of about four hundred feet above the sea, and thus it extends as a sort of fringe of varying width along the low slopes of the mountains. At a yet lower level, say from two hundred to one hundred and fifty feet, and so nearer the sea coast, there is a better defined belt of more decidedly lateritized form of weathered gneiss, in which the unaltered rock occurs less frequently, and then always in more or less flatly rounded humps and masses, which never rise above a general dead level. This belt is, in fact, a country of undulating downs or tolerably uniform level stretches of forest land. Occasionally, it also shows a plateau surface or it is broken into small and low flat-topped hills. Always it is very deeply indented by river or stream valleys, or even by some of the backwaters which have high and steep shores.

"It is remarkable of this coastal belt of country that its laterite (an altered or ferruginously infiltrated condition of weathered or decomposed gneiss) is not to be distinguished from any other laterite, except that which is made up of obviously detrital material. Whatever the laterite of Travancore or Malabar may have been originally, it is a useless form of the rock, being crumbly and soft as a general rule, and oftener of a red colour than brown. The character of the climate does, in fact, appear to militate against the changing of the red peroxide of iron in the rock to the brown peroxide, during which change the proper cementing and hardening of the sound rock, such as that on the east coast or in the Deccan is evidently brought about."*

Regarding South Travancore, Mr. Bruce Foote writes:—

"In no part of the peninsula, is there a greater and finer display of the ancient crystalline rocks than in the southern Ghauts in their southern half, and in the great spurs and outlying masses on their western or southern side. The disposition of the beds in South Travancore shows the existence of a great synclinal curve, probably an ellipse, the major axis of which passes through or very near to the great mass of Mahendragiri; while the north-western focus (if the ellipse be a complete one) will be found somewhere to the north-eastward of Allepy. I had inferred the existence of this great synclinal ellipse from studying the course of the great gneiss beds on the eastern foot and flanks of the mountains southward of Courtallum, and Mr. King's examination of the gneiss

* General Sketch of the Geology of Travancore, W. King B. A., B. Sc.—Records of the Geological Survey of India, Vol. XV.

country across the Shencotta pass and southward to Travancore independently demonstrated the existence of the central part of this huge synclinal fold. The topographical shape of the ground points strongly to the fold being a true ellipse, the extreme north-western extremity of which is probably hidden under the alluvial bed north of Allepy, while the extreme south-eastern apex lies most likely in the sea to the E. N. E. of Cape Comorin. The curve of the coast from Cape Comorin north-westward to close up to Trivandrum coincides with the south side of the great synclinal, and the different ridges inland also coincide absolutely with the strike of the harder beds of the series. Several southerly dips were noted in the rocks on the coast westward of Kolachel which looks as if the axis of an anticlinal had there been exposed, but they may possibly only represent trifling vandyke-shaped bends or crumples, in the side of the great synclinal. To the north of the area under consideration the rocks roll over northward into a great anticlinal fold.

"The true bedding of the gneiss on a large scale is extremely well displayed in the great outlying mass known as the Udagiri or 'Munroovattoor' mountain. Both strike and dip are admirably seen from the Travellers' bangalow at Nagarkoil. One of the finest examples of a sheer naked wall of rock to be seen in Southern India is shown in the tremendous cliff forming the south-east front of the Thiruvana Malai, the great eastern spur of Mahendragiri. This bare precipice must be fully 2,000 feet or more in height, many hundred feet in the central part being absolutely vertical, or even overhanging a little. As might be expected, this great mass has attracted much notice; it forms the Cape Comorin of some sailors, and of Daniel's famous view of that Cape, though in reality some 16 miles from the nearest point on the coast and 28 miles from the Cape itself. Even the Hindu mind has connected this noble mountain with the name Hanuman, the famous monkey God, who is said to have planted one foot on each of the two peaks and to have jumped across the Gulf of Mannar and alighted on Adam's Peak, a standing jump of 220 miles and odd being a trifle for the long-tailed divinity. Another grand precipice occurs on the south-east face of the Taduga Malai at the western end of the Arambuli Pass. The cliff-faces in both these splendid scarps coincide with the great planes of jointing.

"The predominant character of the gneiss rocks in this quarter is that of well-bedded, massive, quartzo-felspathic granite gneiss, with a very variable quantity of (generally black) mica and very numerous small red or pinkish garnets. This is the characteristic rock at Cape Comorin and very generally throughout South Travancore, and Tinnevelly District as well.

"Scattered grains of magnetic iron are commonly met with in the weathered rocks. No beds of magnetic iron were noted by me, but some may very likely occur, and would go far to account for the numerous quantity of black magnetite sand cast up on the beach at frequent intervals along the coast and of which the source is at present unknown, unless it has been brought by the south-westerly current prevailing during the south-west monsoon. The source of the garnets which form the crimson sand which is of nearly equally common occurrence, is not far to seek, for it is hardly possible to find a bed of rock which does not abound in garnets. The so called 'fossil-rice' found at the extreme point of land close to the Cape is merely a local variation of the quartz grains set free by degradation of the rock. They assume the 'rice' shape after undergoing partial trituration in the heavy surf which beats incessantly on the southern coast.

"The sub-aerial decomposition of the felspathe-ferruginous varieties of the gneiss produces in the presence of much iron a pseudo-laterite rock very largely developed over the gneissic area described by Dr. King in his Sketch of the Geology of Travancore under the name of lateritised gneiss, a rock which is popularly called laterite in Travancore and Kabuk in Ceylon. In numberless places this peculiar decomposition of the gneiss, which is preeminently characteristic of very moist climates, has altered the rock *in situ* to variable but often considerable depths, and the original quartz laminae of the gneiss remain in their pristine position, and often to all appearance unaltered, enclosed in a ferruginous argillacious mass formed by the alteration of the original felspar, mica, garnets and magnetic iron. The colour of this generally soft mass varies exceedingly from pale whitish pink to purple, red and many shades of reddish brown and brown, according to the percentage of iron and the degree of oxidation the iron has undergone. The bright colours are seen in the freshly exposed Kabuk or pseudo-laterite, but the mass becomes darker and mostly much harder as the haematite is converted into limonite by hydration, and more ferruginous matter is deposited, as very frequently happens, by infiltration. The pseudo-laterite formed by accumulation of decomposing argillo-ferruginous materials derived from distant points is to be distinguished generally by the absence of the quartz laminae as such. The quartz grains are generally much smaller, and are scattered generally through the whole mass of new-formed rock. One excellent example of the pseudo-laterite formed by the decomposition *in situ* is to be seen in a steep bank in the Zoological gardens in Trivandrum, close to the Tapir's den. Equally good examples are very common in many of the cuttings along the high road east of Trivandrum.

"The washed-down form of pseudo-laterite often forms a rock intermediate in character between a true sub-aerial deposit and a true sedimentary one, and consequently by no means easy to classify properly. In fact, in a country subject to such a tremendous rainfall, the sub-aerial rocks must, here and there, graduate into sedimentary ones through a form which may be called 'Pluvio-detrital.' Such pluvio-detrital forms occur very largely in South Travancore, but it is impossible in most cases to separate them from the true sedimentary formations they are in contact with."*

The Varkala or Cuddalore Sandstone Series.—To quote Dr. King again:—

"The next succeeding rock formations, namely, the Quilon and Warkilli beds, occur as a very small patch on the coast between the Quilon and Anjengo backwaters. The Quilon beds are only known through the researches of the late General Cullen who found them cropping out at the base of the low laterite cliffs edging the backwater of that place, and again in wells which he had dug or deepened for the purpose. I was myself not able to find a trace of them†. They are said to be argillaceous limestones, or a kind of dolomite in which a marine fauna of univalve shells having a eocene *facies* was found; and they occur at about forty feet below the laterite of Quilon, which is really the upper part of the next group.

"The Warkilli beds, on the other hand, are clearly seen in the cliffs edging the seashore some twelve miles south of Quilon, where they attain a thickness of about one hundred and eighty feet, and have the following succession in descending order:—

* Records of the Geological Survey of India, Vol. XVI.

† Mr. Logan says that these have since been satisfactorily identified as occurring at a place called Parappakkara on the Quilon backwater about 6½ miles north-east of the Residency.

Laterite (with sandstone masses).
Sandy clays (lithomarge).
Sandy clays (with sandstone bands).
Alum clays.
Lignite beds with logs of wood &c.).

"The bottom lignite beds rest on loose white sand, and nothing is known of any lower strata.

"It will be seen how this set of strata has an upper portion, or capping of laterite, which is however clearly detrital. On the landward edge of the field of those Warkilli beds, there is in places only a thin skin, representative of these upper beds, of lateritic grits and sandstones lying directly on the gneiss, which is itself also lateritized; and it is very hard as may be supposed, to distinguish the boundary between the two unless the detrital character of the former deposits is well displayed. Thus the upper part of the formation has overlapped the gneiss. It is also this upper portion which overlies the Quilon beds, which are also apparently overlapped.

"These Warkilli beds constitute, for so much of the coast, the seaward edge of the plateau or terraced country above described, and they present similar features. The Warkilli downs are a feature of the country—bare, grass-grown, long, flat undulations of laterite, with, about Warkilli itself, small plateau hills forming the higher ground—one hundred and eighty to two hundred feet above the sea. These downs, too, and the small plateaus or flat-topped hills, are partly of the Warkilli laterite and partly of the lateritoid gneiss.

"Whatever form of denudation may have produced the now much-worn terrace of the gneissic portion of the country, the same also had determined the general surface of the Warkilli beds. Indeed, it gradually dawned on me while surveying this country, having the remembrance of what I had seen of the plateaus and terraced low lands in Malabar in previous years, that here, clearly, on this western side of India is an old marine terrace which must be of later date than the Warkilli beds. These are, as I have endeavoured to show in another paper,* of probably upper tertiary age and equivalent of the Cuddalore sandstones of the Coromandel. Hence this terrace must be late tertiary or post-pliocene, and it marks, like the long stretches of laterite and sandstones on the eastern side of the country, the last great or decided elevation of Southern India, prior to which, as is very probable, the Indian land rose almost directly from the sea by its Western Ghauts and had an eastern shore line which is now indicated very well by the inner edge of the Tanjore, South Arcot, Madras, Nellore and Godaveri belts of laterite and sandstone.

"Mr. Foote has already generalised in this way for the eastern side of Southern India in particular; but I think he makes the elevation too great, including, as he does in his laterite deposits, patches of the laterite gravels and rock masses ranging up to a height of five hundred feet at least which are not so definitely part and parcel of the proper coastal developments."

The following account of the Cuddalore Sandstone series, marine beds, blown sands, coral reefs and soils is extracted from the very exhaustive paper on The Geology of South Travancore by Mr. Bruce Foote from which we have already quoted:—

*The Warkilli beds and reputed associated deposits at Quilon—Records of the Geological Survey of India, Vol. XV.

"A very careful examination of the beds near Quilon by Dr. King who had the advantage of seeing the fresh cuttings made through plateaus of these rocks in connection with the new tunnel at Warkilli has unfortunately thrown no positive light on their true geological position. The vegetable remains associated with lignite beds at base of the series proved insufficient to allow of determination of their own character and consequently most unsuitable to assist in settling the homotaxy of the strata they occurred in. The sedimentary beds forming the belt of small plateau fringing the coast of South Travancore must, on petrological grounds, be unhesitatingly regarded as extensions of the Quilon beds, or Warkilli beds of Dr. King. None of these formations which I traced from Villinjam, nine miles south-east of Trivandrum, down to Cape Comorin afforded the faintest trace of an organic body; thus no light was thrown on the question of the geological age or homotaxy, but somewhat similar sandstones and grits are found on the Tinnevelly side of the extreme south end of the Ghauts range, and in a coarse gritty sandstone, much resembling some of the beds in Travancore, a bed of clay is intercalated, in which occur numerous specimens of *Arca-rugosa* and *Cytherea* of a living species. The locality where these fossils of recent species were found occurs on the right bank of the Nambi-ar, about two miles above its mouth and a few hundred yards from the bank of the main stream. All the subfossil shells I found here are of living species; hence the deposits enclosing them cannot be regarded as tertiary; and if the agreement of these Nambi-ar beds with the Warkilli and South Travancore beds, on the one hand, and the Cuddalore, Madras, and Rajamundry beds be assumed, as they must be on petrological grounds, the Cuddalore sandstones and their equivalents elsewhere must be accepted as of post-tertiary age. As far as it goes the evidence is clear and distinct; but more evidence is required as to the age of some of the intermediate connecting beds, such as those south and east of Kudankulam.

"The typical section of the Warkilli Rocks near Quilon, given by Dr. King shows the following series:—

Laterite	30 to 40	feet.
Sands and sandy clays or lithomarge	58	„
Alum clays	25	„
Lignite beds	7 to 15	„
Sands	„ „	„
Total ...	120 — 138	„

with which we may compare the series seen in the fine section formed by the beautiful cliffs in Karruchel bay, 11 miles south-east of Trivandrum.

"The section here exposed shows the following series of formations:—

4. Soil—dark red, sandy loam, lateritic at base—8 to 10 feet.
3. Sandstone—hard, gritty, purplish or blackish—?
2. Sandstone—gritty, rather soft, false-bedded, often clayey in parts (lithomargic), variegated: in colour red, reddish brown purplish white yellow—40 to 50 feet.
1. Sandstone—gritty, rather soft, false-bedded, red, purple, pink, white, variegated; shows many white clay galls producing conglomeratic appearance in section—40 feet.

Base not seen, hidden by sandy beach.

"The total thickness of these beds I estimated at about 100 feet; the upper

part is obscure, from pluvial action washing down the red soil over the dark grits. The middle and lower parts of the section are extremely distinct, and the colouring of the beds very vivid and beautiful; but the beds are by no means sharply defined.

"The beds dip north-easterly (inland), and from the slope of the ground on the top of the cliff the angle of dip may be inferred to be from 25° to 30°. Further inland, near Pinnacolum, the dark gritty sandstones lie horizontally at a considerably lower level than at the top of the Karruchel cliffs, but rise again to the eastward. The middle gritty series is exposed along the western side of the Karruchel lagoon, but is highly lateritised by weather action. Three miles or so to the north of the lagoon, purplish gritty beds show strongly and form a small well-marked plateau overlooking the valley in which lies the village of Cottukal. That the gritty beds are sometimes replaced by clays is shown by the materials turned out of two deep wells sunk into the plateau at two points several miles apart; one of these wells lies rather more than half a mile to the northward of Mullur. Here the section, which is from 80 to 100 feet deep passes through mottled gritty sandstone and into blue and white mottled clay. The other section revealing clays below the gritty beds is a well sunk close to the new road from Valrampur to Puvar.

"A section in the low cliff forming the small bay immediately east of Villinjam shows a mottled vermiculated clayey rock showing mostly no bedding at all. Traces of bedding are, however, revealed as the cliff is followed southward by the appearance of thin bands of grit near the base of the section which rests on the underlined quartzo-felspathic garnetiferous gneiss. This mottled clayey rock I believe to represent the bluish white mottled clay turned out of the lower parts of the well section near Mullur before referred to. It is locally considerably discoloured and stained by the percolation of water through the overlying pseudo-lateritic dark-red sand. As will be seen by any one who follows the coast line these Warkilli sandstones rest upon a very rugged and broken gneiss surface. Many great tors and knolls of granite gneiss protrude through the sandstone plateau or tower over them from adjacent higher ridges, which have been completely denuded of the younger rocks.

"The greater part of the surface of the tract occupied by these Warkilli beds west of the Neyar is thickly covered by sandy loam, generally of dark red colour, which conceals the sub-rock very effectually, excepting where the loam is deeply eroded. A well marked patch of purplish grit forms a knoll, about a mile south-west of Valrampur. Traces of the former more easterly extension of these beds are to be seen at intervals along and to the north of the Trivandrum-Tinnevelly road between Valrampur and Neyatankarai.

"In the tract lying east of the Neyar few sections exhibiting the grits &c., were met with, and all were small and unsatisfactory. The surface of the country is either largely covered with the deep red soil or else the extremely broken surface of the gritty beds is extensively lateritised. The appearance of the country, when seen from elevated points is, however, characteristically very different from the gneiss and Kabuk tract lying to the northward. This may be well seen from Colatoor Trigonometrical station hill, as also from the high ground close to Cauracode, but yet more striking from the Kodalam Pothai, a hill 2 miles west-north-west of Paurashalay. Sections in which the fine character of the rock is to be seen occur on the high ground close to the junction of the new roads leading from Puvar and Martanda Putentorai respectively to Paurashalay, also to the southward near Shoolaul, where a large rain gully cuts deeply into the grits and underlying clayey beds; also along the ridge of high ground north and

north-east of Yeldasaput. Traces of the former eastward extension of the grits were noted on the eastern flank of the Kodalam Pothai and on high ground half a mile or so to the northward of the Cutcherry at Paurashalay. The beds composing this patch of Warkilli rocks have undergone greater superficial denudation than those in the Karruchel patch to the north-west.

"In the small patch lying east of the Kulitoral river some instructive sections of hard rock grits and underlying clayey grits of the usual, reddish, bluish, and white mottled colour are to be seen south of Killiur. Some of the sections show regular miniature 'canons' 15′ to 20′ deep, with vertical sides and numerous well-formed pot-holes. Hard purplish grits show on the surface between Killiur and Padukaddi and soft mottled grits in a well section close east of the D. P. W. bungalow at Tengapatnam. At the southernmost point of Killiur patch, the grits become coarsely conglomeratic over a small area. A little to the north of this the grits, when resting on the basset edge of a bed of granular quartz rock present the characters of a perfect arkose, made up of the angular gneiss debris. In places this arkose might be most easily mistaken for a granitic rock.

"A distinctly conglomeratic character is shown by the grit beds close to Madalam. This Madalam patch of Warkilli sandstones is on its southern side deeply cut into by a gully which exposes regular cliffs with from 35 to 40 feet of coarse or conglomeratic mottled grits, capped by thick red soil. The grits contain many large clay galls and lumps of blue or mottled colour.

"In the Kolachel patch the grits are extremely well exposed in deep cuttings (miniature canons) made by the stream rising just west of Neyur. They are of the usual mottled description. Where seen at the eastern side of the patch near the Eranil Cutcherry they are quite conglomeratic. They are exposed also in a gully crossing the road which runs north from Kolachel to join the main road, and in a well section on the high ground a mile north-eastward of the little town. The south-eastern part of the patch is entirely obscured by a great thickness of dark red soil. They peep out, however, below the red soil at the western end of the great tank 3 miles south of Eranil.

"A very thin bed of conglomeratic grit underlies the teri, or red sand-hill, capping the high ground north of the Muttum headland. Further east a few poor sections only of whitish or mottled grit prove the extension of the Warkilli beds in that direction, nor are they well seen again till close into Kotar, where they show in various wells and tanks, but are still better seen in a deep rain gully south of the Travellers' bungalow at Nagarkoil and in a broad cutting immediately to the east of the bungalow. The variegated gritty sandstones here seen are very characteristic, and strongly resemble some of the typical varieties in South Arcot and Madras districts.

"To the south of Kotar the grits are to be seen in stream beds opening to the Parrakay tank, and in a series of deep rain gullies on the eastern slope of a large red soil plateau to the south-west of Parrakay.

"A small patch of gritty sandstones of similiar character to the above occurs immediately north and north-west of Cape Comorin. As a rule, they are badly exposed, being much masked by the red blown sand of a small teri. The most accessible section is a small one seen in the bottom of a good sized bowrie, a little south of the junction of the roads coming from Trevandrum and Palamcotta. This section can only be seen when the water in the bowrie is low. A considerable spread of similar greyish or slightly mottled grits is exposed about half a mile to the north-east of Covacolum and 1½ miles north-west of the Cape. Lying between the two exposures just mentioned,

but separated from either by spreads of blown sand, is a different looking vermiculated mottled grit of much softer character. This is extensively exposed in the banks of a nullah and head water gullies falling into the Agustesbwar. The colour of this soft grit ranges from red, through buff to whitish. The beds roll to the northward. This grit is full of vermicular cavities filled with white or reddish Kankar (impure carbonate of lime). The grit seems to graduate upward into a thick red gritty soil full of small whitish red, impure (gritty) calcareous concretions. There is good reason, however, for thinking that this graduation is merely apparent, and that the red gritty soil is only the base of a red sand-hill, or teri, undergoing change by percolation of calciferous water. A hard brown grit is exposed for a few square yards just north of the junction of the two roads above referred to. This rock has, except in colours, considerable resemblance to the red-white grit just described, and both probably overlie the pale mottled grits near Covacolum.

"The last patch of grits to be mentioned lies about the extreme easterly angle of the Travancore territory and lies to the eastward of the southernmost group of hills and along its base. Not many sections of the grit are here exposed owing to a thick red soil formation which laps round the base of the hills, and is only cut through here and there by a deep rain gully or a well. The grits here seen are like those exposed near the Travellers' bangalow at Nagarkoil; but show much more bedding and are almost shaly in parts. The colour of the grit is white, pale drab or grey mottled with red and brown in various shades. They lie in depressions in the gneiss; and were either always of much less importance and thickness than the beds to the west, or else have been denuded to a far greater extent. They are best seen in gullies to the south-west and west of Russhun Kristnapur, 7 miles north of Cape Comorin, and in the beds of the small nullahs west and north-west of Comaravarun opposite the mouth of the Arambuli pass. None of these Warkilli grit beds occurring between Trevandrum and Cape Comorin have yielded any organic remains as far as my research has gone, and I fear none will be obtained by subsequent explorers. The alum shales occurring in Dr. King's Warkilli section have not been traced in South Travancore, and I had not the good fortune to come across any lignite. It is said to occur not unfrequently to the south of Kolachel, and to be turned up by the people when ploughing their fields. I have no reason to doubt this, for it is extremely probable that some of the clayey beds should contain lignite. From the configuration of the ground, too, the paddy flat along the southern boundary of the Kolachel grit patch would coincide in position with some of the clayey beds near the base of the series which are lignitiferous at Warkilli; and why not at Kolachel?

"The recent discovery of lignite in the Cuddalore sandstones at Pondicherry adds greatly to the probability of the correctness of Dr. King's and my conclusion (arrived at by us separtely and independently before we had an opportunity of comparing notes) that this gritty bed in Tinnevelly and Travancore should be regarded on the grounds of petrological resemblance and identity of geographical position as equivalents of the Cuddalore sandstones of the Coromandel Coast.

Marine Beds.—"At Cape Comorin and two other places along the coast to the northward are formations of small extent but very considerable interest, which, by their mineral constitution and by the abundance of fossil marine shells they enclose, show themselves to be of marine origin, and thus prove that the coast line of the Peninsula has undergone some little upheaval since they were deposited. These beds are to be seen close to the Cape at the base of a small cliff which occurs immediately south of the Residency bangalow and only about two hundred yards west of the Cape itself. The rocks seen in

the surf and immediately behind it on the beach are all gneiss. The base of the small cliff is composed of friable gritty calcareous sandstone, full of comminuted shells. The base was not exposed at the time I examined the section, some heavy gale having piled up the beach sand against the foot of the cliff, and for this reason it was impossible to trace the probable connection of the sandstone with another exposed at a slightly lower level at a few yards distance to the west. This lower bed is similar in mineral character, but very hard and tough, and offers great resistance to the surf but has nevertheless been deeply honeycombed and in places quite undermined. The roofs of the miniature caves thus formed have in some cases fallen in, but have been partly re-cemented by deposition of the calcareous matter in the lines of fracture. To return to the cliff section, the basement sandstone is overlaid by a similar but slightly harder yellowish friable bed, which contains many unbroken shells (all of living species), in addition to a great quantity of comminuted ones. The base of the lower bed is hidden by sands, but from the proximity of the gneiss it cannot exceed 5 or 6 feet in thickness, while the overlying shelly bed measures about the same. It is overlaid in its turn by a massive bed, 6 to 10 feet thick locally, of a kind of travertine formed of altered blown sand, composed mainly of fully comminuted shells. This travertine contains immense numbers of shells and casts of *Helix vittata*, the commonest land shell in the south. Owing to the soft character of the marine sandstones, the cliff has been much undermined by the tremendous surf which breaks on this coast in bad weather, and great masses of the hard travertine of the Helix bed have fallen on to the beach, forming a partial breakwater against the inroads of the sea.

"The shells contained in the upper sandstone bed were all found to be of living species, where sufficiently well preserved for specific identification; the majority of the specimens are too ill preserved for specific identification. Four miles north-north-east from the Cape, stands the little stone-built fort of Wattakotai, which is built upon a small patch of calcareous sandstone, full of marine shells, exposed in the moat along the north face of the long curtain wall which joins Wattakotai fort with the extensive series of fortifications known as 'Travancore lines'. The marine limestone may be traced for nearly half a mile inland in the bottom of the moat. This marine bed is overlaid by a very thin bed of travertine limestone full of *Helix vittata*; it has been cut through in the formation of the moat. The thickness of the shelly marine bed is unknown, but the Helix bed is not seen to exceed 10″ or 1′ in thickness. As far as seen in the very small exposure, both formations lie nearly horizontally. Another small exposure of the marine bed occurs at the western end of a little backwater to the north of the fort. The sandstone here contains many well-preserved marine shells, all of living species; but further west, where the bed is exposed below the Helix bed in the moat, the enclosed shells are all broken and comminuted. The surface of sandstone, as seen at the end of the little backwater, is raised but a very little distance above the sea-level, probably not more than 4 or 5 feet at the outside. The rise of the ground along the moat is extremely small, and even at the furthest point from the sea at which the sandstones are exposed the elevation is probably not more than 10 or 12 feet at most, which would correspond with the top of the sandstones as seen in the little cliff at Cape Comorin.

"About two miles north-east-by-north of Wattakotai fort a small patch of white shelly limestone occurs peeping out of the low belt of blown sand which fringes the coast at that spot. The village of Kannakapur which lies immediately to the north is the last within the Travancore boundary. The limestone only

stands out a few inches above the surface of the surrounding sands, and no section could be found to show its thickness, but in point of elevation above the sea-level it agrees perfectly with the Wattakolai and Cape Comorin beds. The limestone which is fairly hard is quarried for economic purposes, and unless a good deal more of the bed than now meets the eye remains hidden under the sands, it will, before many years are over, have been removed by human agency.

"The shell remains occur as impressions and casts of great beauty and perfectness, but the shelly matter has disappeared entirely, being probably slightly more soluble than the enclosing limestone. The limestone contains a large number of specimens of *Helix vittata* which were evidently carried out to sea and there entombed in a shallow water formation. To any one who has noticed the enormous numbers of this Helix living in this neighbourhood, and in the southern districts generally, the large numbers of it occurring fossil in this marine bed will be a matter of no surprise.

Blown Sands.—"Two very marked varieties of Æolian rocks occur along or near the coast of South Travancore, as well as along that of Tinnevelly. They are the red sands, forming the well-known teris of Tinnevelly, where they are developed on a far larger scale, and the white sands forming the coast dunes. In South Travancore, as far as my observation went, the red sand hills are no longer forming; all are undergoing the process of degradation by atmospheric agencies at various rates of speed. The red sands have in many places ceased to yield to the influence of the winds and have arrived at a condition of fixity and compaction caused by the action of rain falling upon the loose sands percolating through them and during heavy showers flowing over their surfaces and washing the lighter clayey and smaller, though heavier, ferruginous particles down the slopes of the hills or into hollows on the surface, where, on drying, a fairly hard, often slightly glazed, surface of dark red loam has been formed. This loam is very fairly fertile and soon becomes covered with vegetation, which further tends to bind the mass together and render the surface secure from wind action. The loose sand, deprived of the clayey and finer ferruginous particles, would, unless unusually coarse in grain, be carried off by high winds elsewhere or remain in barren patches on the surface. I believe this process has gone on extensively over many parts of South Travancore, and explains the existence, on the surface of the country and resting indiscriminately on the gneiss and the younger rocks as the Warkilli sandstone, of the great thick sheets of pure red loam which have not been brought there by ordinary aqueous deposition nor formed *in situ* by the decomposition of the underlying rocks. The percolation of the rain water through the mass has in many places given rise to the formation of concretionary ferruginous masses, which are often strongly laterite in their aspect. The quantity of clayey matter and of iron ore in the form of magnetic iron is very great in the sand of many of the teris. The greater quantity of the water falling on the teris, as on their blown sand surfaces, escapes by percolation, and it is a common phenomenon to find springs issuing around the foot of the sand mass during the rainy season and becoming dry in the hot or rainless season.

"The teris in South Travancore which still retain their character as accumulations of moving red sands are four in number and all very small, the largest not measuring one sq. mile in area. They are all close to the coast and with one exception stand high and conspicuous to ships passing along at a fair distance. The largest and most conspicuous is that at Muttum which caps the high ground with a new lighthouse. The process of fixation has gone on here largely and the moving sands cover a much smaller space than does the fixed portion. The same may be said of the teri resting on the south-eastern extremity of the Kolachel sandstone plateau. To the north-west of Kolachel are two much smaller

teris at the distance of 3 and 5½ miles respectively. In both of these also the area of the fixed sand far exceeds that of the loose. Especially is this the case in the more northerly teri near Melmadalathorai. Here the fixed part has undergone tremendous erosion and is traversed by long and deep rain gullies, with vertical sides up to 20 or 25 feet high. Gullies on a yet larger scale are to be seen at the south-east corner of the Kolachel sandstone patch and at the eastern side of the Muttum patch. Very large but shallower gullies are to be seen at the south-east corner of the Nagarkoil patch, where there is a very large fixed teri.

"The small teri immediately behind the Cape Comorin is a very poor specimen of its kind, and, in fact, hardly deserves to rank as one owing to its pale colour and poverty in iron sand, but it will not do to class it as a coast dune, as it consists mainly of silicious sand, while the true dune at the Cape consists mainly of calcareous sand composed of comminuted shells, corallines, nullipores &c.

"The sand of the typical teris is silicious or ferruginous (magnetic iron), the former being well rounded and coated with a film of red-oxide of iron, which is removable by boiling in Nitric acid for a few seconds. Common as garnet sand is on the beaches of South Travancore, I never yet found a grain of it in the teri sand, where the latter was pure and had not been mixed with beach sand.

"The coast dunes of South Travancore are, except close to the Cape, in no way remarkable. A large patch of small hillocks to the north-west of the mouth of the Kulitorai river was caused by the wind shifting a great mass of sand turned out when the new canal was dug and heaped up on the north bank of the canal.

"Some tolerably high ridges occur three miles south-west of Kolachel. The sand here contains so much fine magnetic iron that it looks in parts of a dark grey colour, shading here and there almost into absolute black.

"A considerable quantity of blown sand fringes the coast from the Muttum headland eastward to Cape Comorin, and between Pullum and Cullaclevella forms some considerable hills. At Covacolum the highly calcareous beach sand which forms many low hillocks has been solidified in several places into coarse shelly limestone. The Helix bed at Cape Comorin already referred to, when treating of the Marine beds, is really an altered sand dune, the calcareous matter of which has, by percolation of acidulated water, been dissolved and re-deposited, on evaporation of the water, as a sub-aerial travertine. Countless thousands of *Helix vittata* and a considerable number of shells of *Nanina travancorica*, the two commonest land shells in this part of India, have been enclosed and fossilised in the formation of this travertine, which is evidently in constant progress. The immense wealth of shell fish of all kinds, added to large quantities of corallines and nullipores, incessantly thrown up by the surf, furnishes an abundant supply of calcareous sand for the formation of this travertine, which forms a bank more than a mile long and rising some 80 feet or more above the sea at its highest point. Its inland extent cannot be ascertained, as it is covered by loose sands. It probably only extends 300 to 400 yards inland and abuts against a low ridge of gneiss.

Coral Reefs.—"A few tiny fringing reefs are to be seen half to three-fourths of a mile west of the Cape, half in the surf at low tide, and wholly in it at high tide. They are now to be considered as dead reefs, abandoned by the polypes that built them. I examined most of them carefully, without finding any live coral, and was inclined to doubt the correctness of my inference, drawn from their tabular shape and many shallow basin-like cavities; but later on, when

examining some identical fringing reefs off the Tinnevelly coast to the south of Kudankulam Trigonometrical station (the south point of the Cape Comorin base-line), I found a considerable quantity of live coral lining the sides of the little basins and equally large quantities of coral quite recently dead in adjoining basins.

"A great deal of shell debris, sand and broken stone, is included in the mass of the reefs which in several places have formed around masses of rock standing in rather shallow water, and joined up many loose blocks of stone tossed on to them by the surf into tremendously coarse conglomerates. Some similar reefs but of rather larger size, occur along the coast to the north-east of Cape Comorin; in these the tabular mass extends from 10 to 40 and 50 feet in width, from the shore to the constantly surf-beaten outer edge. In one or two places parts of the reef had evidently been founded on sand, which had been washed away, leaving an unsupported surface of many square yards in extent which the surf of the next high tide or first gale of wind would either break up or else again support with sand washed under it. These little reefs are worthy of much closer examination than I was able to bestow upon them.

"The coral fauna of the Cape Comorin sea is on the whole a remarkably poor one, as far as one may judge by what is to be found thrown up on the beach. Dredging might reveal much more, but unfortunately no boats are found there, only Kattumarams (Catamarans) which would not be the most convenient form of craft from which to carry on scientific observations. The sea here is, however, so very rich in animal life in many forms, that it could assuredly afford a rich reward to any one having a suitable vessel at command. I obtained in a very short time, a far larger number of species of shells here than at any other place on the Indian Coast.

Soils.—"The prevalent soils (of South Travancore) are red ones varying in the quantity of their ferruginous element. The red soils seen inland near the main trunk road are chiefly formed of gneissic debris by sub-aërial decomposition. The origin of the deep red sandy or clayey loams has already been discussed. They occupy no inconsiderable area. True alluvial soils occur very rarely, if at all, now-a-days; those which fill the bottoms of the many valleys and creeks in which paddy is cultivated being greatly altered from their original condition by centuries of cultivation, and the addition of various mineral, vegetable and animal manures. Estuarine beds full of sub-fossil shells, *Cytherea*, *Telloniidæ*, *Melania* &c., of living species are exposed in the salt pans at the mouth of the Kolachel nullah.

"The Alluvium in the valley of the Paleyar, which flows south from the west flank of Mahendragiri past Nagarkoil is, where pure, a coarse gritty silt."

Smooth Water Anchorages. There are two anchorages on the Malabar Coast, known to mariners from early times. The bottom of these anchorages consists of a very fine, soft, unctuous mud which has over and over been supposed to act as a barrier against the force of the waves of the sea. Ships can not only ride safely in these roads, but they can also sometimes take in fresh water alongside, the sea beneath them being so diluted with fresh water from inland sources. At times the smooth surface on one of the banks may be broken by huge bubble "cones" as they have been called, of water or mud from the sea-bed, and even roots and trunks are reported to have floated up with these ebullitions.

Again the banks of mud are not fixed in position but move along the coast within ranges of some miles in extent; or one of them remains comparatively stationary while the other moves, and these movements do not take place year by year with the monsoons but continue over many years. Similar, though insignificant, patches of smooth water banks are found in various points along the Malabar Coast. But the best-marked and most generally known are those near Cochin and Alleppey. That near Cochin or the Narakal bank may be said to lie between Cochin and the Cranganore river 11¾ miles to the north. For many years its position has been about the middle of the range. The Alleppey bank ranges from a mile or two north of Alleppey to Poracad, a distance of 12 to 15 miles. It is now at the southern end of this range and indeed is often called the Poracad mud-bank. The mud-banks lie close along the beach but extend some miles seaward presenting a more or less semicircular or flat crescentic edge to the long rollers and tumbling waves of the monsoon weather.

Ordinarily the sea is tolerably smooth only rolling on the shore with more or less of a surf, and these patches are only to be distinguished by the soundings of mud below them. It is only a few days after the bursting of the monsoon, when the whole line is affected and the mud in these particular places stirred up, that the patches are distinguishable. Then the muddy waters calm down and remain so for the rest of the monsoon.

The mud itself is essentially characteristic and unique. It is of a decided dark green colour slightly tinged with brown, very fine in texture, very soft and oily feeling, altogether just like a very fine soft ointment or pomatum. After a time it dries and hardens, loses its oily feel and becomes harsh like ordinary mud. Its oily consistency has been proved beyond doubt; the specimens analysed have been found to give off, when subject to distillation, some brownish yellow oily matter lighter than water and looking not unlike petroleum. The muds also contain a considerable quantity of foraminiferal and infusorial remains.

Capt. Drury thus wrote on the origin of these banks:—

"The origin of this deposition of so large a quantity of mud in the open sea about two or three miles from the shore and so many miles from any bar or outlet from the backwater has never been satisfactorily accounted for. From the circumstance of there being no natural outlet for the vast accumulation of waters which are poured down from the various mountain streams into the basin of the backwater nearer than thirty-six miles on either side, it is not improbable that there exists a subterraneous channel communication with the sea from the backwater through which the large quantity of mud is carried off and thrown up again by the sea in the form of a bank".

Mr. Crawford, for a long time Commercial Agent at Alleppey, was of opinion that the perfect smoothness of the water in the roads and at the Alleppey beach was attributable not so much to the softness of the mud at the bottom as to "the existence of a subterranean passage or stream or a succession of them which, communicating with some of the rivers inland and the backwater, became more active after heavy rains particularly at the commencement of the monsoon than in the dry season, in carrying off the accumulating water and with it vast quantities of soft mud". He found that at the periods of deficient rain the mud-banks were less effective as anchorages. He also observed that after or during heavy rains the beach suddenly subsided, slightly at first but gradually as much as five feet, when a cone of mud suddenly appeared above the water, bursting and throwing up immense quantities of soft soapy mud and blue mud of considerable consistence in the form of boulders with fresh water, debris of vegetable matter decayed and in some cases fresh and green.

Mr. Rhodes, the successor of Mr. Crawford, confirms the above observation and states that he has seen mud volcanoes bursting up in the sea during the rainy season, which appeared "as if a barrel of oil had suddenly been started below the surface". He thinks that the mud thus formed is gradually floated away to the southward by the littoral current and fresh banks are formed whenever the hydraulic pressure of the inland backwater increases sufficiently to overcome the subterranean resistance of the stratum of fluid mud which is formed at certain places; and as a further proof, he adduces the fact that the extent of the mud-bank at Alleppey increases and diminishes as the level of the inland water rises and falls, as was most observable in 1882.*

The range of the coast exhibiting the phenomena is about 92 miles long, tolerably straight, without any indentation giving the form of a bay except at the extreme ends, viz., at Quilon and Cranganore. There is no indication of a bay near Alleppey, the name 'bay' having perhaps been adopted from an imaginary bay of smooth water enclosed within the semicircle of breakers outside. The shore line is straight, low lying or only a few feet above sea level and made up of alluvial deposits and sand. Between Alleppey backwater

* In regard to the formation of the bank, Mr. Philip Lake of the Geological Survey in his Note on the Mud-banks says:—"The chief point then in which I differ from previous observers is in considering that the Alleppey bank is formed not from the backwater mud but from an older river deposit found only at particular points along the coast. This would explain its non-appearance at other points where the conditions seem equally favourable. With regard to the existence of subterranean channels, it may well be doubted whether any could exist in such unstable deposits as are found here."

and the sea there is no visible communication, the principal rivers that enter it flowing northwards behind the range of the mud-bank. To all appearance the flat lands of the coast are entirely recent alluvial deposits consisting of layers of sand and mud overgrown with vegetation. The lumps of blue clay described by Mr. Crawford as turned up in the cones of Alleppey, answer to the lumps of clay of the lower part of the Varkala cliffs already described. Mr. Crawford also mentions his having passed through a crust of chocolate-coloured sandstone or a conglomerate mixture of the sandstone and lignite corresponding to certain rocks at Varkala.

It is clear that both the Alleppey and Narakal banks have practically the same constitution, behave similarly and have the same accompaniments with the exception of the violent discharges of mud or oil which are confined to the Alleppey bank.

It has already been remarked that the mud of these banks is full of organic matter and that it contains a sensible amount of oil probably partly derived from the decomposition of organisms. The mud is easily stirred up on all seasons and never settles down into a uniformly compact deposit but the upper stratum is in a greater state of liquidity than its lower depths. It occupies particular areas and within these well defined limits its movement is from north to south.

Regarding the water over the mud, Dr. King says*:—

"It is only known to calm down during the S. W. Monsoon. The calming of the anchorages does not take place until after the monsoon has commenced and there has been a stirring up of the sea and mud. The quieting of the waters is intensified according to the amount of rainfall during the monsoon; but even if no rainfall, there is a certain amount of quiescence. The calmness continues throughout the monsoon, apparently without any fresh stirring up of the mud. In one locality at least, the water is subject at times to violent agitation through the bursting up of gigantic bubbles of water, mud or gas,— it is not quite clear which; and these features also appear to be intensified during heavy rainy weather in the monsoon periods. The water over the banks becomes considerably freshened even to the extent — as I was told by Mr. Crawford — of being drinkable; also according as the monsoon rains are light or heavy. At such times, also, the water gives off fetid odours, and the fish inhabiting it are killed off in large numbers; but whether owing to the freshening of the sea-water, or the exhibition of poisonous matter and vapour in the water, is not clear; perhaps this destruction of life may be due to both causes.

The soothing of the troubled waters of the sea must surely be due to the oily constitution of the mud. An experiment performed sometime ago in the harbour of Peterhead, when a stream of oil

* Considerations on the smooth-water anchorages, or mud-banks of Narakal and Alleppey on the Travancore Coast—Records of the Geological Survey of India, Vol. XVII.

was cast upon the heavy seas at the harbour's mouth with such success that vessels were enabled to run in with comparative ease, clearly proves this. Thus the action of oil on troubled waters is confirmed not only by tradition and anecdote but by actual fact; but the long continuance of the quiescence without any fresh stirring up is not easily accounted for. The amount of oil derived from the decomposition of the animal and vegetable matter of the organisms in the mud would be hardly sufficient to account for the features exhibited; hence we must look to other sources for the oil and even for the continued supply of mud itself which is evidently carried away and distributed by littoral currents.

The consensus of opinion certainly leads to the conclusion that there is an underground discharge of water at any rate into the sea from the lagoon and river system behind the Alleppey-Poracad Coast during flood-time, the inland waters being at a higher level than the sea. This passage of underground waters must, more particularly during heavy rains, force out large quantities of the mud on which the Alleppey Poracad land rests like a floating bog, as it were, elastic and capable of yielding to pressure or exerting pressure by its own weight, while a continuous stream of the same oil and mud may be kept up under the lower pressure of the ordinary backwater level. In the monsoon time the heavy floods, which however occur only at long intervals, cause great discharges of mud, oil and gases, and at such times new banks might be formed, the old ones being distributed down the coast by littoral currents and finally dissipated into the open sea.

The presence of petroleum has to be accounted for by the fact that besides the alluvial deposits large lumps of clay or compact mud, more or less decayed, and vegetable remains are brought to the surface during the prevalence of the violent ebullitions. Such clays are met with in the Varkala deposits associated with lignite beds, in which occur trunks and roots of trees in every stage of decay. It is probable that the Varkala deposits may extend north under the Alleppey Poracad alluvium and even again at Narakal, where also fragments of similar clays are thrown up by the sea; and that it is in these deposits as being deeper-seated, older and lignitiferous that the earth-oil is generated.

Thus according to Dr. King, the mud banks, their smoothening influence, and their position within certain ranges of the coast, may be entirely due to the following causes:—

"1. The discharge of mud from under the lands of Alleppy, Poracaud and Narrakal, being effected by the percolation or underground passage of lagoon water into the sea.

2. The presence in this mud of oily matter, derived perhaps in part from the decomposition of organisms, but principally from the distillation of oil in subjacent lignitiferous deposits belonging presumably to the Warkilli strata.

3. The action of littoral currents which, slowly and through long periods of years, carry the mud down the coast to certain points whence it is dissipated seawards,—by the Quilon river at Narrakal, and at Poracaud because it is there beyond the range of replacement."

Economic Geology. According to Mr. Bruce Foote, valuable minerals and metals are conspicuous by their absence in South Travancore and this remark may be truly applied to the whole of Travancore.

The development of the gold industry in Southern India having raised hopes of gold likely to be found among the quartz out-crops of Peermade and the adjacent country, Dr. King was requested to examine those parts and report on the same. His report is conclusive. He says:—

"These out-crops are not reefs as usually understood but are true beds of quartz rock lying between and running with other beds of the country rock which is of the crystalline or gneiss series. Reefs or veins of quartz generally run across the country rock as in Wainad or in the Kolar region of Mysore. Secondly the size of these out-crops is small, only one of them being sufficiently large to allow any expectation of what might be called a good tonnage of stone. Thirdly, and most important of all, the quartz of the out-crops, though it shows on a close assay traces of gold, is certainly not rich enough to be called auriferous quartz in the usual acceptance of the term."

He found on examination that the ordinary crop of the Peermade Hills consists of a thin bed of quartz rock, largely made up also of felspar. He says that in all of the main outcrops of Peermade,

"the rock is more or less of the same constitution, that is, a quartz rock with very often a good deal of felspar distributed through it in small crystalline masses sometimes as large as peas, generally coarsely crystallised dull white and glassy quartz; and less often a more compact rock like that of vein or reef. It is generally of a white colour, but at times it is stained red or even a golden yellow from ferruginous matter and scattered through it, there is often a small quantity of iron pyrites or frequent small particles of magnetic iron ore."

PLUMBAGO.—General Cullen was the first to discover graphite in 1845. In 1855 Dr. Royle discovered some specimens which were lamellar and soft but brilliant. Some samples were forwarded from a place south of Trivandrum for examination but were considered too soft and scaly for the manufacture of pencils. The matrix appeared to be a pseudo-laterite formed of decomposed gneiss *in situ*. Deposits were also found near Vellanad, the veins in which plumbago occurs being said to cross the strike of the gneiss. The plumbago found here is much purer than others. Mining work is carried on in three mines viz, Vellanad and

Cullen mines in Coozhamalakal Proverty, Nedumangad Taluq, and the Venganur mine in the Kottukal Proverty, Neyyattinkara Taluq.

The total output of plumbago during the last four years was as follows:—

		1901	1902	1903	1904
Vellanad	Tons	1526	2401¾	1828¼	1571¾
Cullen	,,	906½	2173½	1421½	1431½
Venganur	,,	57½	...	144	248
	Total	2490	4575¼	3393¾	3251¼

Messrs. Parry and Co. and The Morgan Crucible Company who work these mines pay a nominal Royalty to the Government of 4 or 6 Rs. per ton according to the quality of the plumbago mined.

IRON—Iron ore is found throughout Travancore in large quantities but as imported iron is much cheaper than the locally manufactured iron, the industry is given up. In the Shencottah Taluk iron is obtained as black sand in the brooks in Pulangudiyiruppu and Achanputhur villages. It is said that two persons working daily can take up 7½ Kottas or 126 Parahs of the sand in a month, and that 4 Parahs of this sand smelted with 40 Parahs of charcoal and ashes yield about 80 pounds of iron. The selling price of this iron is 4 Rs. while the cost of manufacture comes to about 5 Rs. Hence the industry has been given up. It is also found at Pralakat in Cheranallur Proverty, Kunnattur Taluk, where an unlimited quantity of the ore is obtainable. Here the out-turn is said to be 10 lbs. for every 100 pounds of the ore. Iron ore is reported to be found at Aramboly in large quantities at a depth of 15 or 16 feet. This place was once noted for its iron smelting industry. As large quantities of foreign iron began to be imported the industry had to be given up here also.

At Myladi till about thirty years ago the people earned their livelihood by gathering iron ore at the foot of the Poranathumala after heavy showers when the ore is washed down from the top of the hill. This they used to remove in baskets to the nearest rock and holding up the baskets at sufficient height, allow the contents to drop down by degrees against the smart and steady breeze which carried away the sand and rubbish leaving the ore behind. They used to take the ore thus sifted to their houses where they smelt it into lumps of varying size and sell the same

to the blacksmiths, who turned them into agricultural implements &c. It is reported that tools made of this iron would last considerably longer than those made of imported material.

LIMESTONE—This is found in considerable quantities near Layam in the Tovala Taluq, Tirupurathur in Neyyattinkara and Kazhakuttam in Trivandrum. It is dug out from pits varying from about 5 to 8 feet and it is reported that limestone of a superior quality is obtainable at greater depths. The lime made here is chiefly sold to the Public Works Department. It is used for paving sides of wells and tanks and for making tubs.

GRANITE—The gneiss near Cape Comorin is generally like those of the Nilgiris but more quartzose. The Cape Comorin type of rock abounding in South Travancore is a well-bedded massive quartzo-felspathic granite gneiss abounding in small rich-coloured garnets. The rock also contains mica in glistening scales. Granite is used chiefly for metalling roads and erecting buildings, bridges &c. In the Chenganmur Taluq which is noted for its excellent workmanship in granite, some good specimens of images, flutes, rose-water sprinklers &c. are made out of it.

The supply of beautiful building stones is practically unlimited in South Travancore but not much use is made of them except for temples and fort walls. The extensive Travancore lines are mostly built of gneiss, the Vattakotta Fort being a very fine sample of excellent well-cut masonry. To the extreme south end of the lines, blocks of marine sandstone have been employed in the walls to some extent but have been much affected by weathering.

MICA—This occurs chiefly in the Eraniel Taluk. It is worked by regular mining operations. The out-put for 1899 was 12,706 lbs. The following is an extract from a letter from Messrs. Henry Grail and Co., London, dated 11th May 1900 regarding the quality and quotation of Travancore mica:—

"Several parcels of Travancore mica have been offered and sold here lately and to-day's values are as follows with a good demand and good prospects for the future.

Travancore amber plates free from specks &c.

2½" by 3½" —	— 6d per lb.	in good demand.
2½" by 4½" —	—1/6 d per lb.	
3" by 8" —	—2/6 d per lb.	—not in great demand.

Travancore amber mica would come into severe competition with Canadian, hence the necessity of careful preparation."

But the mineral has already become very scarce, the income to the Sirkar in 1903—1904 being only about 30 Rs.

Before concluding this part of the subject, it may be well to state that according to the Royal Proclamation issued on the $\frac{14\text{th June } 1881}{2\text{nd Mithunam } 1056}$, Government have reserved to themselves the right to all the metals and minerals discovered on private properties. It has also been notified on the 30th July 1898 that prospecting for or mining of metals and minerals, whether in Sirkar or private lands, is strictly prohibited except under a license obtained from the Government in accordance with the rules in force for the purpose.

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CHAPTER II.

Climate, Rainfall, and Meteorology.

"Sing a hymn, pleasing to Varuna the king. He sent cool breezes through the woods, put mettle in the steed (the sun) milk in the kine (clouds), wisdom in the heart, fire in the waters, lightning in the (clouds), placed the sun in the heavens, the Soma on the mountains.—He upset the cloud-barrel and let its waters flow on Heaven, Air, and Earth, wetting the ground and the crops.—He wets both Earth and Heaven, and soon as he wishes for those kine's milk, the mountains are wrapt in thunder-clouds and the strongest walkers are tired." (Rig Veda)

Climate. A warm humidity is one of the special features of the climate of Travancore. Small as the country is, its high mountain ranges, its valleys and plains and its coast-line greatly influence the atmospheric condition. The temperature varies according to the height of the locality above the level of the sea. But the most noticeable variations are common only in the mountains. The climate of the plains is much more constant and is subject to comparatively few irregularities. The thermometer rarely shows a higher reading than 90° and even in the coldest season it never falls below 70°. This uniformity of temperature is explained to be due to (1) the superheated condition of the surface soil, (2) the cool sea-breezes and the abundance of rain throughout more than half of the year and (3) the process of evaporation.

In the whole of Malabar and Travancore, there is no thick layer of cool earth on the surface capable of quickly absorbing the sun's rays, as in the Temperate Zone. Hence the surface soil becomes very heated and is constantly radiating its heat day and night, and consequently a uniform high temperature is maintained.

The cool sea-breezes, always saturated with moisture, blow steadily and regularly every day during the hot weather. These, combined with the abundance of rain that falls in the country, moderate the intensity of the heat and maintain a uniform temperature.

In the process of evaporation a large amount of heat becomes latent. This goes on in the hours of the hottest sunshine. As the country is well equipped with back-waters and rivers and as it is on the sea-board,

evaporation plays an important part in moderating the heat and reducing the temperature.

The hills present every degree of temperature from the fever heat at their base to near the freezing point upon the summit. At the foot of the hills and in places beyond the influence of the sea-breeze, the thermometer rises 5° or 6° higher. On the hills, the temperature varies with the elevation. In the Periyar valley near Peermade, the country being completely shut up by high land, the extreme range of temperature is very great, varying from little more than 45° to over 90°. As we go higher, the air is naturally much cooler. The Kanni Elam hills, one of the divisions of the Cardamom Hills, are about 3,000 to 3,500 feet high and are within the influence of the sea-breeze and consequently pretty free from bad fevers. But the Makaram Elam hills, though higher, are during some months very unhealthy. From July to January they are healthy and the temperature is low; but from the end of February or early in March, fevers of the worst type prevail and continue till June. On the High Ranges the thermometer ranges from 45° to 60° in March and April and between 29° to 60° in November, December and January. The meteorological effects of the whole of India, if not of the whole world, are thus presented to us in Travancore in a small compass. On some of the peaks we have the pinching cold of the northern regions of Europe. Lower down on an elevation of between three and four thousand feet (the Ashamboo or Peermade Range for instance), one meets with the bracing temperature of England. The genial warmth of an Italian sun with its clear and cloudless sky is experienced all over the country for a few weeks after the cessation of the monsoons. From January to May there is intense heat which in some Taluqs present the aspect of a true equatorial region and epidemics rage with virulence. The three months after the partial cessation of the rains are the most agreeable and salubrious, "the air being cool and refreshing and the face of the country clothed with a luxuriant verdure". The dewy season is not agreeable to the working classes. On the whole, the climate of Travancore is enervating, depressing the nervous system and retarding the recovery of strength when it has been prostrated by illness.

Seasons. Our ancient Sanskrit writers have divided the year into six seasons or *Rithus*, each comprising a period of two months. Of these the first, *Vasanta Rithu* or Spring, is the season of mirth and gaiety and begins in March. "The mango is then covered with fragrant blossoms of which Manmatha the Indian Cupid makes his shafts

and the landscape is gay with the beautiful and the sweet-scented flowers of the *kakke* or Indian laburnum. The southerly breezes that blow during the night are the voluptuous zephyrs of this vernal season." The next two months are designated *Grishma Rithu* or the Summer season. *Varsha Rithu* or the rainy season comes next. The South-west monsoon blows steadily during this period. During the next season, *Sarad Rithu* or Autumn, the fruits of the earth ripen. This season closes with the change of the monsoon. The *Hemanta Rithu* or Winter next sets in with chilly mornings and bright sunny days. The *Sisira Rithu* or cold season closes the circle of the year.

The year in Travancore may, however, be divided into four seasons, viz., the Dry or dewy season, the Hot weather, the South-west monsoon proper or wet season and the Retreating South-west monsoon period, based on the mean data of the meteorological elements given in the following tables, I and II, obtained from the Trivandrum Observatory.

TABLE I.

Months.	Mean pressure.	Mean temperature.	Mean aqueous vapour pressure.	Mean humidity.	Mean cloudiness.	Total rainfall.	Mean number of days on which thunder-storms occur.
	Inches.	Degree.	Inch.	Per cent.		Inches.	
January	29·725	76·5	·686	73·9	3·4	·702	2
February	·706	78·0	·685	72·1	3·6	·577	3
March	·659	80·3	·774	75·9	4·1	1·320	9
April	·642	80·7	·828	79·8	5·0	4·636	14
May	·602	80·0	·843	83·0	6·9	9·877	13
June	·635	77·5	·810	86·2	7·7	12·469	3
July	·643	76·7	·795	87·0	7·9	6·894	1
August	·667	76·7	·785	86·0	7·4	4·241	2
September	·678	77·0	·781	84·7	6·7	3·748	2
October	·685	76·9	·786	85·4	7·0	10·126	9
November	·698	77·0	·781	84·7	6·1	6·224	8
December	·711	76·4	·708	78·4	4·8	2·093	2
Year.	29·676	77·8	·770	81·5	6·0	65·207	57

The following table gives means for the four seasons corresponding to the data of Table I.

TABLE II.

Season.	Mean pressure.	Mean temperature.	Mean aqueous vapour pressure.	Mean humidity.	Mean cloud amount.	Total rainfall.	Mean number of days on which thunder-storms occur.
	Inches.	Degree.	Inch.	Per cent.		Inches.	
Dec. to Feb. ...	29·714	77·0	·686	74·9	3·9	3·372	7
March to May ...	·654	80·3	·815	79·6	5·6	16·133	26
June to Sep. ...	·656	77·0	·793	86·0	7·4	27·352	8
Oct. to Nov. ...	·692	77·0	·784	85·1	6·6	16·350	17

The dry season lasts from December to February, and is characterised by moderate humidity and cloud, and by very light rain and absence of thunder-storms. This is the dewy season or the cold weather, but referred to here as the dry season on account of the fact that the air contains the least aqueous vapour in this season.

The hot weather lasts from March to May, its most prominent features being moderately high temperature, occasional rain (increasing in quantity with the advance of the season) and frequent thunder-storms. Throughout this season, there is an intense and oppressive heat which is very intolerable in March and April. No doubt the season is slightly relieved by a few showers; but still the continued heat is insufferable and some of the places present the aspect of a true equatorial region from which it is not far distant. The country of Nanjanad though fully exposed to the severity of the sun's heat, is relieved of much of its intensity by the strong sea-breezes which sweep across the plains. During these months, in the lower hills, the violence of the heat is extreme. As we recede from the coast, the country becomes less healthy. During this and the previous season, fever, generally in the hills and in the valleys, and some of the epidemics, especially small-pox and cholera, break out occasionally with very great virulence. The borders of the lakes, however, always afford an agreeable climate.

The South-west monsoon proper or wet season continues from June to September, and is characterised by clouded skies, high humidity, copious

rain and absence of thunder-storms. Sometimes the monsoon commences towards the end of May and the regular rains are ushered in by thunder and lightning. Till the end of August the rains are very heavy and by September the rainfall becomes much lighter.

The retreating South-west monsoon period includes the months of October and November. Its chief feature is rain diminishing in amount with the advance of the season. The rains are, as a rule, preceded by thunder-storms of greater or less intensity. But the greater part of the rain registered in Travancore is brought by the S. W. monsoon. The amount varies considerably, being least in South Travancore, but gradually increasing along the sea-board to its northern limit. Towards the end of October, the N. E. monsoon begins and all through the month of November, a heavy shower is experienced in the afternoons though the mornings are generally fine.

By the beginning of December, the rains become less frequent and the country begins to dry up; by the end of December, the dry weather is fairly begun. Dewfall begins at nights in November and lasts till February. The sudden changes in the temperature of this season, from intense heat in the day to excessive cold in the night, often generate and foster the development of the epidemics, especially cholera. The land winds that prevail in the months of November, December and January produce many unpleasant ailments such as rheumatism, coughs, disordered stomach and pains all over the body. Jungle fever prevails near the foot of the hills; the moist heat at this part of the year is very depressing and is the cause of the above mentioned disorders.

Temperature*—DIURNAL VARIATION. In Trivandrum, the mean epoch of minimum temperature occurs at 4-51 A. M. on the average of the whole year. Thence the temperature goes on increasing till it agrees exactly with the mean temperature of the day at 8-16 A. M. and attains its maximum at 1-34 P. M. Thenceforward the temperature goes on decreasing till it is once more identical with the mean of day at 6-58 P. M. and finally reaches its minimum again at 4-51 A. M. The following table exhibits the diurnal oscillation of temperature at Trivandrum during the four seasons and for the whole year:—

* For the account of temperature, rainfall, winds, storms and earthquakes, I am indebted to Mr. Velu Pillai, Head Assistant of the Trivandrum Observatory.

TABLE III.

Season.	Mean temperature.	Diurnal range.	Variation from mean of day of		Mean epoch of		Epoch of zero variation from mean of day.	
			Minimum.	Maximum.	Minimum.	Maximum.	A. M.	P. M.
					A. M. h. m.	P. M. h. m.	h. m.	h. m.
Dry	77·0	13·9	—6·8	+7·2	5-5	2-12	8-34	7-33
Warm	80·3	11·2	—5·2	+5·9	4-47	1-27	8-11	6-54
South-west monsoon ...	77·0	8·3	—3·8	+4·5	4-47	1-26	8- 6	6-39
Retreating south-west monsoon ...	77·0	10·2	—4·7	+5·5	4-40	0-46	8- 3	6-41
Year... ...	77·8	10·7	—5·1	+5·6	4-51	1-34	8-16	6-58

ANNUAL VARIATION. Temperature increases with fair regularity from the middle of December to the beginning of April. It then falls, at first very slowly in April and May and then slightly more rapidly in June and the first half of July, to a secondary minimum in July (76·3°) on the 13th, differing only by 0.08° from the absolute minimum on the 16th and 17th of December.

During the remainder of the year, the mean daily temperature ranges irregularly within narrow limits (between 76·2° and 77·5°), indicating that the normal seasonal changes of temperature of this period are very small compared with the variations due to local and occasional actions or causes, such as rainfall &c. The chief feature of the progression of temperature during this period, however, appears to be that it increases slightly and somewhat irregularly from the 13th of July (76·3°) to the 28th of September (77·5°) and thence decreases with approximate regularity to the 15th of December. The following table gives, in brief, data of the chief maximum and minimum epochs of the variation of temperature during the year.

TABLE IV.

Epoch.	Character of phase.	Normal daily temperature on date.
		°
16th and 17th of December ...	Absolute minimum ...	76·21
2nd and 3rd of April ...	Absolute maximum ...	81·01
13th of July	Secondary minimum ...	76·29
27th and 28th of September...	Secondary maximum ...	77·46

It may be observed that the average or normal daily temperature is above the mean of the year for only 115 days, *i. e.*, from the 15th of February to the 9th of June and is below it during the remainder of the year. The mean diurnal range of temperature for the 12 months and for the year is given below :—

TABLE V.

Months.	Range.	Months.	Range.
	°		°
January ...	15·2	July ...	9·0
February ...	15·1	August ...	9·6
March ...	14·2	September ...	9·8
April ...	12·4	October ...	10·4
May ...	10·4	November ...	11·8
June ...	9·5	December ...	13·5
		Year ...	11·8

Table VI gives the mean actual daily and monthly temperatures at Trivandrum derived from the series of observations taken during the period 1856-1864, and Table VII gives the mean hourly temperatures for each month and for the whole year.

TABLE VI.

Date.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
	°	°	°	°	°	°	°	°	°	°	°	°
1	76·99	77·20	79·73	80·48	80·34	78·14	76·75	76·49	77·15	77·26	77·55	77·04
2	75·98	77·67	79·51	81·36	81·14	77·74	76·70	77·15	76·71	77·64	76·95	76·55
3	76·18	76·98	80·34	80·94	80·93	78·66	77·38	76·70	76·80	78·07	76·80	76·44
4	75·73	77·15	80·20	81·31	80·95	78·16	77·29	77·22	76·36	77·32	76·33	76·50
5	75·88	77·08	80·01	80·62	80·62	79·02	77·45	76·94	76·67	77·01	76·51	76·53
6	76·07	77·38	80·07	80·32	80·32	78·25	77·74	76·54	76·60	77·01	76·60	76·91
7	75·93	77·45	80·30	80·65	80·33	78·32	76·71	76·70	76·80	77·16	76·80	76·41
8	76·00	77·30	80·40	81·34	81·28	77·57	76·21	76·53	76·85	77·21	77·38	76·60
9	76·09	77·44	80·43	81·41	80·75	78·09	77·29	77·44	76·21	77·64	77·79	76·37
10	77·59	76·87	79·76	80·57	80·41	78·41	77·34	77·10	76·68	77·66	77·99	77·78
11	77·12	77·22	79·94	80·69	80·97	78·57	77·10	76·31	76·97	77·69	77·99	77·65
12	77·19	77·13	80·53	81·10	80·78	78·97	77·25	76·46	77·01	77·31	77·88	77·99
13	76·96	77·51	79·95	80·78	80·97	78·54	76·75	76·49	77·28	77·11	77·60	77·31
14	76·21	77·77	80·15	80·97	81·04	78·04	76·52	76·74	77·29	77·07	77·54	77·28
15	76·45	77·68	80·73	80·94	80·98	77·75	76·30	76·37	76·92	77·14	77·54	77·28
16	77·04	78·28	81·01	80·91	81·12	78·40	76·73	77·39	76·16	77·14	77·54	77·28
17	77·01	78·11	79·98	80·70	80·70	78·73	77·37	76·28	76·84	76·96	76·36	77·65
18	76·65	78·09	79·98	81·01	80·95	78·47	76·41	76·18	76·33	76·42	76·05	76·24
19	76·47	77·77	79·48	80·95	80·97	78·54	76·78	76·24	76·02	76·04	75·93	75·65
20	76·04	78·37	79·82	80·67	80·67	78·57	77·49	76·06	77·02	76·54	76·26	76·29
21	75·15	78·66	79·63	80·63	80·67	78·74	76·75	76·05	77·41	76·05	76·39	76·36
22	75·96	78·74	80·15	80·63	80·65	78·81	76·88	76·42	77·43	76·05	77·24	76·75
23	76·21	79·47	80·29	80·55	81·24	78·80	77·80	76·05	77·67	77·03	77·62	77·62
24	76·70	78·95	80·42	81·79	81·24	78·80	77·59	76·92	77·48	76·71	76·98	76·89
25	76·04	78·54	80·60	79·28	80·49	78·32	76·93	76·99	77·42	76·39	76·95	76·40
26	76·11	78·99	81·41	80·49	80·46	78·52	77·19	76·86	77·07	76·86	76·47	76·70
27	76·66	78·45	81·12	79·46	80·19	78·45	77·13	76·26	77·56	76·86	76·93	77·7
28	76·45	76·63	81·52	79·84	79·84	78·76	76·93	77·07	77·26	77·28	76·93	76·43
29	76·63	76·88	81·81	80·56	80·56	78·77	77·34	76·95	77·47	77·12	77·05	76·95
30	76·88	77·65	81·13	—	80·77	78·47	76·78	76·80	77·57	77·03	77·17	76·90
31	77·65	77·65	81·13	—	80·77	78·47	76·78	76·37	—	77·69	—	76·77
Mean	76·50	78·02	80·32	80·69	80·77	78·55	76·66	76·70	77·03	76·94	77·03	76·41

TABLE VII.

Hours.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
	°	°	°	°	°	°	°	°	°	°	°	°	°
Mid-night	72·57	74·28	76·74	77·50	77·27	75·03	74·22	74·06	74·28	74·05	74·13	72·61	74·73
1	71·83	73·49	76·17	77·19	77·04	74·87	74·04	73·84	73·64	73·79	73·78	72·10	73·95
2	71·22	72·78	75·67	76·89	76·79	74·70	73·86	73·67	73·38	73·55	73·41	71·70	74·01
3	70·60	72·02	75·06	76·47	76·43	74·43	73·57	73·41	73·02	73·22	72·91	71·19	73·57
4	69·92	71·23	74·33	76·01	76·05	74·10	73·24	73·05	72·15	72·87	72·39	70·58	73·07
5	69·50	70·74	73·89	75·90	76·03	74·02	73·12	72·93	72·00	72·79	72·34	70·24	72·87
6	69·94	71·16	74·40	76·61	76·75	74·63	73·58	72·86	73·54	73·41	72·97	70·80	73·42
7	71·67	72·91	76·22	78·34	78·30	77·57	74·77	74·56	74·95	74·90	74·72	72·56	74·98
8	74·54	75·81	79·11	80·81	80·32	79·73	76·47	76·35	76·93	77·01	77·16	75·26	77·28
9	77·79	79·13	82·21	83·33	82·24	79·62	78·21	78·25	79·06	79·16	79·60	78·11	79·69
10	80·53	81·95	84·65	85·27	83·62	80·54	79·53	79·76	80·64	80·82	81·44	80·33	81·59
11	82·30	83·79	86·14	86·39	84·42	81·28	80·39	80·69	81·54	81·74	82·51	81·64	82·73
Noon	83·24	84·72	86·80	86·86	84·87	81·65	80·66	81·17	81·90	82·06	83·00	82·30	83·27
13	83·75	85·17	87·09	86·98	85·13	82·07	81·37	81·99	82·02	82·79	83·17	82·68	83·51
14	83·66	85·87	87·17	86·83	85·17	81·98	81·32	81·95	81·73	82·41	83·06	82·88	83·52
15	83·12	85·18	86·85	86·25	85·13	81·64	80·60	80·90	81·36	81·11	82·52	82·64	83·15
16	83·12	84·30	85·85	85·13	84·76	80·84	79·87	79·99	80·49	80·11	81·42	81·67	82·20
17	81·49	82·69	84·20	83·56	83·45	79·62	78·73	78·71	79·07	78·83	79·91	80·02	80·77
18	79·44	80·70	82·33	81·89	82·09	78·30	77·47	77·40	77·72	77·55	78·37	78·15	79·20
19	77·53	78·86	80·73	80·50	80·01	77·19	76·40	76·36	76·65	76·53	77·14	76·58	77·88
20	76·14	77·63	79·64	79·56	79·25	76·45	75·68	75·96	75·96	75·84	76·31	75·51	76·96
21	75·18	76·65	78·90	78·92	78·68	75·98	75·20	75·22	75·50	75·34	75·71	74·77	76·34
22	74·35	75·92	78·21	78·40	78·13	75·60	74·63	74·81	75·08	74·88	75·15	74·06	75·78
23	73·46	75·13	77·45	77·91	77·64	75·28	74·20	74·40	74·64	74·43	74·60	73·30	75·22

The following table gives the data for the diurnal variation of the amount of vapour present in the air and also for the diurnal variation of humidity for each of the four seasons of the year and the average for the year in Trivandrum :—

TABLE VIII.

Hour.	Cold weather-December to February.			Hot weather-March to May.			S. W. Monsoon-June to September.			Retreating S. W. Monsoon October and November.			Year.	
	Vapour pressure.	Grains of vapour in cubic foot of air.	Relative humidity.	Vapour pressure.	Grains of vapour in cubic foot of air.	Relative humidity.	Vapour pressure.	Grains of vapour in cubic foot of air.	Relative humidity.	Vapour pressure.	Grains of vapour in cubic foot of air.	Relative humidity.	Vapour pressure.	Relative humidity.
0	·701	7·54	·961	·825	8·80	·899	·759	8·58	·940	·786	8·44	·910	·779	·905
1	·695	7·48	·971	·817	8·78	·897	·796	8·54	·943	·781	8·39	·944	·776	·912
2	·695	7·38	·975	·810	8·73	·901	·792	8·51	·945	·773	8·31	·945	·769	·915
3	·698	7·32	·974	·806	8·67	·908	·787	8·46	·947	·764	8·23	·948	·759	·918
4	·692	7·05	·970	·801	8·59	·916	·781	8·40	·951	·756	8·14	·951	·751	·922
5	·691	6·94	·952	·804	8·58	·913	·779	8·38	·951	·753	8·11	·949	·746	·921
6	·690	6·92	·811	·806	8·60	·901	·789	8·38	·934	·756	8·13	·932	·747	·904
7	·694	6·96	·749	·806	8·60	·857	·784	8·40	·904	·762	8·18	·892	·752	·865
8	·687	7·00	·690	·802	8·57	·792	·787	8·40	·855	·769	8·22	·836	·758	·808
9	·683	6·99	·624	·798	8·45	·726	·788	8·39	·806	·775	8·24	·789	·757	·749
10	·657	6·94	·592	·788	8·40	·678	·788	8·37	·769	·778	8·25	·739	·757	·704
11	·657	6·95	·582	·802	8·38	·656	·789	8·37	·750	·781	8·27	·719	·758	·680
12	·652	6·95	·583	·819	8·42	·651	·790	8·37	·712	·783	8·28	·713	·761	·673
13	·672	7·08	·588	·814	8·50	·653	·791	8·38	·739	·785	8·31	·714	·765	·673
14	·684	7·21	·599	·817	8·54	·656	·788	8·37	·738	·785	8·32	·719	·769	·675
15	·694	7·31	·624	·818	8·58	·656	·788	8·35	·745	·786	8·34	·734	·772	·685
16	·702	7·42	·667	·824	8·62	·690	·789	8·38	·766	·791	8·39	·761	·776	·709
17	·711	7·54	·720	·830	8·70	·729	·793	8·34	·802	·796	8·46	·803	·781	·748
18	·720	7·66	·759	·836	8·79	·774	·800	8·33	·845	·803	8·56	·847	·789	·795
19	·728	7·77	·803	·834	8·87	·812	·807	8·31	·881	·808	8·63	·883	·795	·835
20	·730	7·81	·822	·824	8·91	·837	·819	8·37	·905	·808	8·64	·904	·797	·861
21	·726	7·77	·833	·823	8·88	·853	·809	8·66	·918	·803	8·59	·916	·794	·876
22	·717	7·70	·843	·827	8·84	·865	·805	8·62	·926	·797	8·55	·924	·788	·886
23	·709	7·61	·848	·827	8·81	·878	·801	8·59	·933	·791	8·49	·933	·783	·896

Rainfall. The territorial distribution of rainfall in Travancore exhibits two well-defined characteristics. One is the gradual diminution of rainfall from Parur to Cape Comorin, and the other the gradual increase of the fall proceeding from the coast towards the mountains. Besides, it is also true that up to a certain height the rainfall over the mountains gradually increases in amount. Considering the variation of the mean annual rainfall, Travancore may be divided into three narrow belts, namely, (1) the littoral or the lowland, (2) the submontane or the central and (3) the mountainous or the upland belt. The litoral belt has an average annual rainfall of 67·6 inches, the submontane 92·9 inches and the mountainous or the upland 110·1 inches. Thus it is seen that the amount of the precipitation of vapour increases from the coast towards the ghauts, the weight of the fall over the mountains being a little less than twice the weight of the fall near the coast.

The S. W. monsoon winds blowing over the Arabian sea take a north-westerly bend before they come into contact with the coast lands of Malabar and are felt as north-north-westerly to west-north-westerly winds in Travancore. The direction of the wind partly depends upon the trend of the coast-line, and the rainfall will depend on the angle which the monsoon currents make with the ghauts. It is not improbable that the maximum of precipitation occurs at the place of incidence of the monsoon current on the Malabar coast, which may vary in position from year to year. The law of the variation of rainfall along the coast is one of gradual decrease from this point, as the current reaches nearer and nearer to the Cape. A slight variation from this rule resulting in a diminution of the amount of rainfall at Shertallay, Kartikapalli and Karunagapalli is also perceptible, but it is difficult to offer an explanation for this diminution. The mean annual rainfall at some important stations on the coast is given below:—

	Inches.		Inches.
Parur	117·2	Chirayinkil ...	66·9
Shertallay	93·2	Trivandrum ...	64·7
Alleppey	114·2	Neyyattinkara ...	59·4
Ampalapuzha ...	91·2	Rajakamangalam	41·1
Kartikapalli ...	83·7	Tamarakulam ...	38·1
Karunagapalli ...	77·8	Variyur ...	32·6
Quilon	91·1		

The mean falls of the four Administrative Divisions are as follow :—

			Inches.
Kottayam	...	...	115·1
Quilon	...	...	90·3
Trivandrum	...	...	69·8
Padmanabhapuram		...	38·4

The Kottayam Division receives three times as much rain as the Padmanabhapuram Division, while Trivandrum has nearly 77% of what Quilon receives. Though the most favoured locality in Travancore as regards rainfall is apparently the Cardamom Hills, data are wanting to corroborate the belief. Of individual stations, Peermade has the greatest rainfall averaging to 198·4 inches annually. Todupuzha has the next greatest amount, viz., 145·2 inches. The least recorded fall is seen at Aramboly where it averages to 29·1 inches.

Annual variation.—The annual variation of rainfall in Travancore follows a regular curve that has two maxima and two minima. The absolute maximum and minimum occur in June and January respectively, while the secondary maximum and minimum fall respectively in October and September. The least amount of rainfall is received in the month of January. Precipitation then goes on moderately increasing till the commencement of the S. W. monsoon, which takes place generally about the last week of May. June is preeminently the month of maximum rainfall throughout Travancore. Then a slight diminution takes place in the amount of the rainfall received in the several stations during the months of July and August, and the secondary minimum is arrived at in the month of September. There is a sudden increase in the amount of rainfall in the month of October. This rain is locally known as *Thulavarsham*. The fall then decreases slowly in the month of November and rapidly through December and January, which last is the driest month of the year. More than 87% of the annual rainfall is received during the prevalence of the S. W. monsoon, viz., from May to November.

Periods of deficient rainfall.—As for periods of deficient rainfall, it is on record that the year 1860 was a year of famine in South Travancore. The rainfalls in Trivandrum for 1855 and 1870 also indicate years of scarcity. Beyond this, it is impossible to accurately determine the years of deficient rainfall before 1885, as it was only from that year that an extensive system of rainfall observations was begun. During the year 1884, however, rainfall records were received from 13 stations,

and the amount of rainfall in all of them was far below the normal, the actual amount in one of them being 64% less than the normal. In 1886 and 1890 the fall was below the normal at 27 and 30 stations respectively out of the 36 stations at which rainfall was gauged. At the stations at which the rainfall was below the normal, the deficiency was 28% of the normal in 1886 and 23% of the normal in 1890. In 1894 and 1895 the rainfall was below the normal by 518·25 and 565·37 inches respectively i. e., by 17·0% and 18·6% of the normal. Out of the 36 stations, 30 stations in 1894 and 31 stations in 1895 had rain below the normal. In the years 1892 and 1893, a considerable deficiency in the amount of rainfall seems to have taken place in the Padmanabhapuram Division alone. The actual amounts received were 65·6% of the normal in 1892 and 53·3% in 1893. Thus it may be inferred with a fair degree of accuracy that the years 1886 and 1890 were years of deficient rainfall throughout Travancore. The biennial period of 1894 and 1895 must also have been more than usually dry throughout Travancore. The years 1892 and 1893 seem to be years of drought in South Travancore though the intensity of the drought may have been feeble.

A table giving the mean monthly and annual rainfall at 36 stations in Travancore is given below:—

TABLE IX.

Stations.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
Parur ++	0·04	0·37	1·55	4·27	9·37	34·88	24·71	14·49	8·32	12·77	4·81	1·16	117·24
Alangad	0·02	0·37	0·70	1·94	4·64	23·08	20·41	9·49	3·26	7·17	2·83	0·49	74·30
Kunnatnad	0·10	0·61	0·87	2·97	3·91	18·73	20·52	9·95	5·26	6·62	5·12	0·98	75·63
Muvattupuzha *	0·32	0·49	1·71	6·79	7·61	28·05	27·31	19·11	9·48	15·71	7·59	1·85	123·03
Todupuzha	0·18	1·35	2·63	10·06	10·33	31·39	30·75	19·82	12·31	18·03	7·23	1·53	145·22
Vaikam ++	0·25	0·54	1·27	3·33	4·69	24·98	17·28	8·53	4·07	9·87	3·73	1·27	85·31
Shertalley	0·35	0·73	2·27	3·61	8·97	25·38	20·39	9·37	5·50	10·65	5·28	1·83	93·23
Ettumanur *	0·27	0·41	1·60	7·43	11·83	31·91	23·82	12·09	5·54	10·50	5·83	1·74	119·12
Minachil	0·60	1·45	4·31	10·53	9·46	28·34	26·28	17·21	9·93	17·69	8·54	2·98	139·69
Kottayam	0·33	0·89	2·77	5·85	11·03	29·97	20·95	12·89	7·90	14·12	6·21	2·52	110·33
Peermade ++	0·30	1·18	2·60	7·37	11·03	46·02	47·20	33·70	17·48	22·23	7·55	1·66	198·44
Changanachery ++	0·26	0·67	2·78	6·79	9·67	25·98	13·38	10·51	7·09	16·30	6·83	3·17	100·33
Alleppey ++	0·69	1·68	2·39	6·63	11·69	26·60	19·85	10·61	7·53	16·26	9·32	2·86	114·22
Ampalapuzha	0·37	0·71	2·32	5·60	7·85	19·84	15·43	8·67	4·18	11·57	5·84	1·84	91·22
Tiruvalla *	0·17	0·76	1·61	4·77	8·43	24·53	18·30	8·76	6·66	10·48	5·20	1·80	91·17
Chengannur	0·44	0·93	3·33	7·17	8·93	23·94	16·53	9·81	7·78	13·35	6·97	2·37	101·69
Kartikapalli	0·02	0·64	1·47	3·66	7·75	21·30	14·52	7·56	5·30	18·22	6·05	2·09	83·67
Mavelikara *	0·16	0·74	1·16	5·13	7·57	23·61	18·31	10·56	7·27	15·38	7·42	2·23	99·67
Karunagapalli	0·19	1·11	1·90	4·32	6·88	18·43	12·63	6·31	6·60	13·16	5·19	1·67	77·79
Kunnattur	1·33	1·33	2·02	7·27	7·78	21·06	15·65	8·83	6·60	18·27	5·88	2·15	92·17
Shencottah ++	0·28	1·61	2·29	3·48	7·35	5·99	4·78	2·18	1·49	6·39	7·31	3·38	41·43
Pattanapuram	0·35	1·99	3·32	8·13	8·41	25·39	15·85	9·89	7·33	15·45	7·56	2·14	101·12
Kottarakara	0·33	1·57	2·92	8·86	7·70	24·17	14·04	8·35	6·68	14·88	7·31	1·87	97·33
Quilon ++	0·34	0·90	1·94	5·64	9·91	19·27	12·97	8·49	6·55	16·33	7·12	1·69	91·15
Chirayinkil	0·49	0·83	1·08	4·00	5·78	18·24	9·95	4·24	3·73	11·81	5·39	1·39	66·93
Nedumangad	0·03	1·62	2·14	4·50	8·30	18·43	9·31	5·36	3·58	15·06	9·01	3·43	88·42
Trivandrum ++	0·50	0·72	1·87	4·65	6·99	13·28	6·73	4·29	3·38	12·20	6·02	2·71	62·84
Neyyattinkara	0·62	0·62	1·32	5·10	6·31	12·70	6·91	2·76	2·42	11·38	7·06	2·88	59·44
Vilavankod	0·22	0·57	1·14	3·05	2·81	7·49	3·05	1·29	1·47	8·07	5·23	1·65	36·04
Padmanabhapuram ++	0·86	1·11	1·88	5·74	4·02	8·85	3·61	1·88	1·94	10·78	8·67	2·78	51·97
Eraniel	0·27	0·50	0·98	3·38	2·40	7·14	2·11	0·94	1·29	6·57	5·71	1·62	32·91
Rajakamangalam ++	0·93	0·43	1·71	3·91	2·88	8·53	2·88	2·03	1·60	9·55	6·98	2·63	44·06
Agastisvaram	0·82	0·70	1·37	3·56	1·70	6·20	2·31	1·42	0·94	8·57	7·16	2·86	37·61
Tamarakulam	0·72	0·37	1·78	3·04	1·37	6·15	2·09	1·45	1·22	9·89	6·76	3·27	38·11
Variyur	0·95	0·37	1·56	3·06	0·94	5·12	1·60	0·94	0·59	7·15	7·56	2·74	32·58
Aramboly ++	0·53	0·55	1·27	3·11	0·87	3·72	1·65	0·78	0·93	6·90	6·33	2·21	29·15

N. B. ++ The mean of these stations is derived from 20 years' observations (1883—1902).
Do. * Do. 19 Do. Do. (1884—1902).
Do. Do. Do.

Wind. About the general character of the air movement at Trivandrum, Mr. J. Elliot writes*:—

"During the period from November to April when north-east winds generally obtain in the south and centre of the Bay (of Bengal) and the air movement is continued across the Deccan, Mysore and South Madras as north-easterly to easterly winds, Trevandrum is sheltered by the high Travancore hills from these winds. The air motion at Trevandrum during this period consists of an alternating movement between land and sea (*i. e.*, land and sea-breezes) and of a feeble general movement from directions between north and west common to the Konkan and Malabar coasts at this period. The direction of the movement is apparently determined in part at least by the trend of the coast. During the remainder of the year, from about the middle of May to November, South-west monsoon winds of greater or less intensity prevail in the Arabian sea. They usually set in on the Travancore coast in the last week of May. They have their greatest extension and also the greatest intensity in the months of July and August. They begin to fall off in strength in September and continue to decrease in intensity in the south of the Arabian Sea in October and November, but withdraw gradually during these months from the north and centre of the sea area, being replaced by light variable winds. During the period of the full extension of the South-west monsoon over the north of the Arabian sea into upper India in July and August, the current in the south-east between the Laccadives and Maladives and the Malabar coast not only falls off to some extent, but in the lower strata instead of rising directly and surmounting the Travancore hills it tends to be deflected towards the south by these hills and to pass south-eastwards along the coast and join that part of the current which passes to the south of Ceylon and enters the Bay. There is hence a slight northerly shift of the winds on the Malabar coast from the beginning to the middle of the South-West monsoon."*

Variation of wind velocity. The annual variation in the strength of the winds in the south and centre of the Arabian sea is reflected in the winds at Trivandrum. The air movement is least at Trivandrum in December, or at the end of the S. W. monsoon. It increases slightly during the next three months and rapidly from April to July and is absolutely greatest in August. It falls off very rapidly in October and November attaining the minimum in December.

The diurnal variation of velocity differs considerably in character at different seasons of the year. From November to April it is determined by the alternating movement of the sea and land breezes. There are hence during this period two maxima and two minima, the former corresponding with the greatest intensity of the land and sea breezes, and the latter with the average of the shift from one to the other which, of course, varies considerably from day to day. The day maximum of the sea-breeze is very strongly exhibited as is also the evening minimum. The morning maximum and minimum of the land-breeze are, as might be expected, less marked than the corresponding phases of the sea-breeze, but are clearly shown. They are most

* Indian Meteorological Memoirs; Part i., Vol. X.

pronounced in December, January and February; and it is hence in these months that the land and sea breezes are probably most prominent and form the chief feature of the air movement. The land winds are strongest at about a little after sunrise and the sea-breeze at 2 P. M. or at nearly the same instant as the maximum of temperature. The morning minimum is accelerated as the season advances, whilst the evening minimum is retarded. The effect of the increasing temperature from January to April is hence to lengthen the period of the sea-breezes and diminish that of the land-breezes (by a total amount of 5 hours) between January and April. The diurnal variation during the remainder of the year, May to October, consists of a single oscillation, the maximum velocity occurring from about 2 P. M. and the minimum shortly after midnight. The ratio of the maximum to the minimum velocity in the diurnal variation is fairly constant throughout the period.

The following is a picturesque description of the setting in of the monsoon in Travancore by Mr. J. A. Broun F. R. S., a late Director of the Trivandrum Observatory:—

"There is no place in India where the magnificent phenomena which precedes the bursting of the monsoon can be seen and studied with more ease than on the Agustia Peak. For a month or more before the final crash of the tempest, the whole operations of the great atmospheric laboratory are developed at our feet, while the summit of the mountain itself is rarely visited by the storms which rage over its western flanks. In the morning, chains of finely formed cumuli seem to rest over the sea horizons of Malabar and Coromandel. Frequently it is evident that what appears a serried file of cloud masses is only cumuli irregularly distributed over the country; their shadows, projected near noon, spot and chequer the plains and the undulating country below from sea to mountain. Early in the morning the vapours begin to rise near the western precipices; the cloud accumulates and seeks to pass by the lowest *cols* into the eastern valleys; it seems opposed by a repulsive influence, for no breath of air is felt; it ascends at last, after noon, in mighty masses crowned with cirrous clouds which spread eastwards like an immense parasol over our heads. Then the lightning begins to play, darting in varied and ramiform circuits from cloud to cloud; the thunder rolls, at first in sharp separate crashes, and at last continuously; the rain is heard drenching the forests below. After an hour, or several hours, according to the distance from the monsoon, the clouds quit the mountains, move more westwards, and then disappear; the sun shines out again over the western sea, assuming before setting the most fantastic forms; the stars sparkle in all their beauty, and the morning again appears with its chains of clouds on the horizon. As the time for the monsoon draws near, the cloud masses seek with more and more energy to pass the mountains eastwards; sometimes two such masses present themselves,—one creeping up an eastern valley, the other entering the *col* from the west. Nothing can be more interesting than to watch this combat of the vapours. Day by day the western clouds enter a little farther; at last they come driven on by a giant force,—rise to the tops of the mountains, and pour over their walls into the eastern hollows, like the steam from a great caldron; they plunge first downwards Niagaras of cloud, and then as they curl upwards, they disappear, absorbed in the hotter eastern air. The storm, with deluges of rain, sweeps over the mountain, and the monsoon reigns over the low lands of Malabar."*

Storms. The storms that usually frequent the Indian Peninsula and the adjacent seas belong to the class called "Cyclones". In a cyclone, the wind blows in spiral curves, more or less circular in form, round a centre of low pressure, increasing in force as it approaches the centre. The whole cyclone thus constituted, besides turning round a focus, has a straight or curved motion forwards, so that, like a great whirlwind, it is both turning round, and, as it were, rolling forwards at the same time.

It is an important feature of the climatology of Travancore that it is mostly free from the track of storms of any kind. The chief causes that contribute towards this end are its geographical position and its natural features providing it with a mighty wall of mountains on its eastern border. It is well known that the immediate vicinity of the Equator is never frequented by cyclones. According to Mr. Elliot, Lat. 8° N. appears to be the boundary line to the south of which cyclonic storms are seldom or never generated. Further, cyclones do not form so generally on land as over sea area, and Travancore is effectively protected by its mountains from the few storms that, having originated in the Bay of Bengal, enter the Arabian sea across the Peninsula. Mr. Elliot says:— "It is probable that it is only storms which extend to an exceptional height into the upper atmosphere which surmount this obstacle.....It may be taken as generally true that any storm crossing the Peninsula into the Arabian sea, no matter what its original or subsequent intensity, will have relatively little influence on the weather over the narrow strip of land intervening between the Ghauts and the Arabian sea or over the sea adjacent to the west coast of the Peninsula." This is because of the circumstance that on the storm encountering the Ghauts, the whole of the lower circulation is broken up, and the descent subsequently effected is carried out slowly, not by the sudden and abrupt descent of the disturbance, but by a gradual downward extension of the cyclonic motion into the unaffected surface strata of the air. Hence it is not till the cyclone has advanced to some distance from the coast-line that the full effects of the phenomenon are experienced, and that the storm becomes fully recognisable. Thus the occurrences of storms in Travancore are few and far between. Besides, it is only a heavy torrential rain accompanied by a

* Trevandrum Magnetical Observations, Vol. I.

barometric depression that is often felt on land as the effect of the passage of many a cyclone through the Arabian sea near the Travancore coast.

Two instances can, however, be traced of severe storms that have been felt in Travancore, one in April 1779 and the other in December 1845. About the middle of April 1779 a hurricane was felt off Anjengo in which the East India Company's ship *Cruiser* was lost. At the close of November 1845, a cyclonic storm was formed over the Bay of Bengal, which passed across the Indian Peninsula and travelled north-westward into the Arabian sea. That this storm raged throughout Travancore can be inferred from the following excerpts:—

TRIVANDRUM.—The wind blew very strongly at 1 A. M. of the 3rd December, and a violent gale lasted from 2-30 A. M. to 3 A. M. The wind then abated for half an hour after which it recommenced with greater violence than ever, and continued till about day-break. Three inches of rain fell during the second. The barometer fell three-tenths of an inch between 8 A. M. on the 2nd and 2 A. M. on the 3rd, while it rose upwards of 0·3 inch during the next 7 hours. The barometric readings at Trivandrum during the passage of the storm are given below.

November	29th	...	...	29·930
,,	30th	...	...	29·864
December	1st	...	...	29·844
,,	2nd	...	...	29·900
,,	3rd	...	...	29·990
,,	4th	...	...	29·928
,,	5th	...	...	29·854
,,	6th	...	...	29·822

QUILON.— The Master Attendant wrote:— "The gale commenced at 10 P. M. of the 2nd and continued till 7 A. M. 3rd."

ALLEPPEY.— The Master Attendant wrote:— "A gale of wind with rain commenced about midnight, 2nd, and continued till day-light, 3rd, when it blew a hurricane."

Mr. Bailey wrote to General Cullen from Kottayam:—"We were visited at Kottayam, on the morning of the 3rd instant by the same gale of wind to which you refer. Many trees were blown down, or rather broken off near the roots. A good many tiles were blown off the roof of our printing office. Many persons had very narrow escapes, and three individuals at some distance from us lost their lives, and it is supposed many more."

Earthquakes. Earthquake shocks of greater or less intensity have passed through some portion or other of the Travancore territory on the following dates:—

1.		February	1823
2.	19th	September	1841
3.	23rd	November	1845
4.	11th	August	1856
5.	22nd	August	1856
6.	1st	September	1856
7.	10th	November	1859
8.	8th	February	1900
9.	28th	May	1903

A short account of the occurrence of each of these earthquakes is given below.:—

FEBRUARY 1823. This shock was felt at Palamcottah slightly, and by the Rev. C. Mault at Nagercoil, and, an account of the shock as felt at the latter place was published in the Madras Government Gazette, by Captain Douglas, then stationed at Nagercoil. Nothing further is known of this earthquake.

19TH SEPTEMBER 1841. The shock as felt at Trivandrum seems to have been pretty severe, as the people at church at the time of the shock, immediately left it, fearing that the building might come down on them. The vessel supplying water to the Wet Bulb thermometer in the Observatory was shaken off its stand and broken, and several mud houses were thrown down in the Fort and elsewhere. It began in the east and passed off to the west. This shock was felt throughout South Travancore and at Palamcottah. The time noted at the Trivandrum Observatory was 11 h. 20 m. A. M.

23RD NOVEMBER 1845. Rev. B. Bailey (in a letter to General Cullen dated 8th December 1845) wrote:—"On Sunday the 23rd ultimo (November) we were visited at about 2 o'clock P. M. by a slight shock of earthquake, succeeded by a rumbling noise resembling that of distant thunder...when my house was shaken to the foundation and the whole of the beams and timber gave a sudden crack as if the house rocked east and west. The shock was felt all over Kottayam". This shock does not appear to have been perceived at Trivandrum.

11TH AUGUST 1856. A shock was felt on this date at 5h. 51m. 25 s. A. M. as noted down by the Assistant on watch in the Observatory. The

shock lasted 20 seconds. The magnetic instruments do not seem to have had any vibration or change of mean positions. The shock has also been felt at Parassala, Quilon, Courtallam and Pallam. It was not felt near Cape Comorin nor at Nagercoil and Agastyamala. Mr. Broun considered that the shock must have come from a direction between north and west.

This earthquake was thus described by Mr. Broun in a letter to the *Madras Athenaeum* in 1856:—

"The Assistant in the Trivandrum Observatory having the watch on the morning referred to (11th April 1856), was entering an observation when he heard a low rumbling sound which he thought at first was distant thunder towards the north-east; in about 3 seconds the rafters of the building began to crack, the windows to rattle and a mirror resting on the table to shake; he immediately looked at the clock and found the time 5 h. 51 m. 30s. which allowing for the clock error would give the mean Trivandrum time of the commencement of the sound 5h. 51 m. 25s. He then went out to look towards the north-east and immediately thereafter the sound ceased with a louder 'boom'; on looking again at the clock the time by it was 5h. 54 m. and he estimated the duration of noise and shock at nearly 20 seconds. He now examined the magnetical instruments, but could perceive neither vibration nor change of mean position. It is not impossible however that the magnets might have had swinging or dancing motions without being remarked by the observer as vibrations round a vertical axis only are noted. An examination by myself since, of the observations made before and after the shock, confirms the fact of the steadiness of all the magnets. The velocity of the winds from north-west was nearly as usual at the same hour; the sky was nine-tenths clouded, the clouds moving from north-west, the temperature of the air was nearly 73°, the maximum temperature of the day being nearly 78°. The shock it seems was felt at Quilon 'about six o'clock' and Mr. Liddell at Charlios Hope near the road between Quilon and Courtallam says, 'we had a smart shock of an earthquake about 10 minutes before six on Monday morning.'

"I was on the summit of our highest mountains, the Agustier Malay (about 30 miles W. N. W. of Trivandrum) on Monday the 11th but did not perceive any shock. The testimony on the whole seems to indicate a southerly and easterly point as the direction of the origin, all agreeing that the sound was heard before the shock was perceived".

22ND AUGUST 1856. The shock was felt at 4 h. 25 m. 10 s. P. M. The magnetic instruments were found dancing up and down with sharp jerks and a brass weight hanging in a closed box was observed by means of a telescope to dance perceptibly 15 m. after the shock. The shock passed from west-north-west to east-south-east. The Bifilar magnetometer vibration at 4 h. 30 m. was 3·0 scale division, whereas at the hours before and after, it was only 0·6 scale division. This shock was also felt at Quilon about 4 h. and 16 m. and at Pallam. No shock was felt at Cochin or at Courtallam, nor to the south of Trivandrum.

1ST SEPTEMBER 1856. The time of the shock was 12 h. 44 m. 58 s. noon*. The direction of the shock as ascertained by a lead weight hung by a silk thread 17 feet long was from N. 30° W. to S. 30° E. The Bifilar magnetometer vibrated through 14·6 scale divisions at 1 h. 30 m. This shock was felt at Cape Comorin, Nagercoil, Neyyur, and the Tinnevelly District. It does not seem to have been felt at any place north of Trivandrum.

10TH NOVEMBER 1859. A shock was felt at 10 h. 31 m. 47 s. A. M. both the Unifilar and the Bifilar magnetometers were observed to dance up and down. The long pendulum referred to above had a slight motion from N. 30° W. to S. 30° E.

8TH FEBRUARY 1900. A pretty severe shock was felt at 2h. 56 m. A. M. On this date the magnetic instruments were not observed. The shock was felt to pass from N. to S.

28TH MAY 1903. A slight shock was felt at 2h. 46m. P. M. The magnetometers were visibly affected, and the Bifilar vibrated through 10·7 scale divisions.

Besides the above, the magnetic instruments in the Observatory have often indicated the occurrence of earthquakes elsewhere but not felt in Travancore. The most important of such indications were those of the shock that passed through the Districts of Madura and Tinnevelly on March 17th 1856 and the famous Calcutta earthquake of 12th June 1897. An examination of the magnetometer observation on the night of the 17th March 1856 at Trivandrum and Agastyamala shows that the shock may have passed the line of the Ghauts and Trivandrum before 11 h. 30 m. P. M. Mr. Broun says, "the time of the night and the little habit the natives have of observing, may partially explain the fact that the shock was not felt at Trivandrum".

* In a letter published at Page 113, Vol. I New series, of the Madras Journal of Literature and Science, Mr. Broun, the then Government Astronomer gives the time as 15 m. 0 s. after noon.

CHAPTER III.

Flora.

"Righteous Rama, soft-eyed Sita, and the gallant Lakshman stood
In the wilderness of Dandak,—trackless, pathless, boundless wood.
But within its gloomy gorges, dark and deep and known to few,
Humble homes of hermit sages rose before the princes' view.

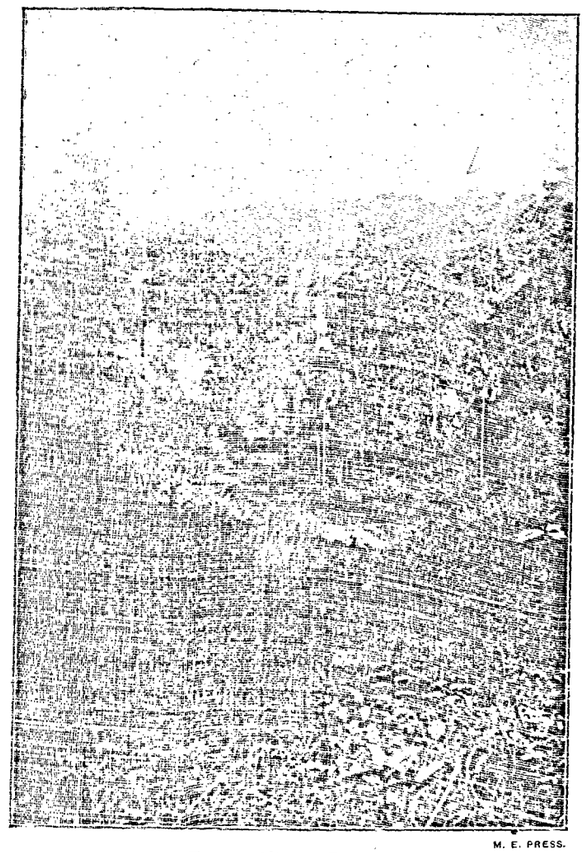
* * * * *

Creepers threw their clasping tendrils round the trees of ample height,
Stately palm and feathered cocoa, fruit and blossom pleased the sight,
Herds of tame and gentle creatures in the grassy meadow strayed,
Kokils sang in leafy thicket, birds of plumage lit the shade,
Limpid lakes of scented lotus with their fragrance filled the air,
Homes and huts of rustic beauty peeped through bushes green and fair,
Blossoms rich in tint and fragrance in the checkered shadow gleamed,
Clustering fruits of golden beauty in the yellow sunlight beamed!"

Ramayana (R. C. Dutt.).

The special characteristics of Travancore flora are its diversity, beauty and economic value. The peculiar climate of the country, its rich forest soil and the extraordinary rainfall foster the growth of the several species of the indigenous trees and shrubs. From the middle of June to the middle of December the hills and plateaus are filled with rank vegetation and present a rich green appearance. During this period several valleys are impervious to men and some glens are inaccessible even to day-light. Hundreds of shrubs rise in the shade of the gigantic trees and entwine themselves with the climbing creepers that almost cover the trees. The rains cease with the beginning of December and most of these shrubs and creepers probably die before January closes. In the hot months, the dried underwood may be seen burning on all the hill tops. These fires are sometimes caused by excessive heat of the sun but more often by the hill Kanis for purposes of cultivation.

Of the forest trees, the Teak is the most valuable, being fit for all purposes where strength and durability are required. The Poon is found in the less accessible spots and is specially fitted for masts by its height and straightness. The Anjili affords excellent planks which are largely used in house-building. The stately Cotton tree is generally used for boat-making. The Arayanjili and the Caryota yield good fibres specially adapted to the manufacture of cordage and ropes. The Bamboo and the allied reeds are plentiful on the river banks. The wild Mango, the wild Jack, and the black, red and iron wood trees are common everywhere; those yielding gamboge, dragon's blood, *Muttippal* and other



M. E. PRESS.

Forest View, Pallode.

Photo by J. B. D'Cruz.

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kinds of aromatic gums are met with amongst the species of resin trees. Travancore seems to be the home of the Palm of which there are at least six species in the forests, two cultivated—the *Borassus flabelliformis* or Palmyra palm and the *Corypha umbraculifera* or the Talipot palm, and four wild—the *Pinanga dichronii, Caryota urens, Bentinckia condapana* and *Arenga wightii.*

The plains are not so thickly wooded and in certain places are bare as in parts of South Travancore, though this part of the country and the adjacent districts of Pandi must have been at one time covered with dense jungle. The low country trees are of the ordinary type and there is a lamentable absence of good fruit trees. The Jack and the Mango, generally of the inferior sort, are met with in every compound and garden. The Palmyra abounds in South Travancore as does the Cocoanut in Central and North Travancore ; the Tamarind is but poorly represented considering the facilities for its growth. The Bamboo is practically unknown in the plains though the banks of rivers and channels afford fine soil for its growth. The avenue trees are chiefly Banyan, Arasu, Poo-arasu, Ichi and Naval interspersed occasionally with the Mango, Jack and Tamarind. There is a large variety of medicinal plants, and those yielding fibres, gums, resins, and dyes, a reference to which will be made later on.

Mr. T. F. Bourdillon, the Conservator of Forests, after commenting on the similarity of the flora of Travancore and Assam thus observes in an interesting article on the Flora of Travancore* :—

"From this it is reasonable to infer that one continuous forest of uniform character stretched from the west coast of India to Assam and Burma, and that the plants now found in the opposite extremes of India are the descendants of a common ancestor. The forests that still remain are the relic and the development of the great forest that covered the continent, and in the interests of science, the preservation of these remains from complete destruction has not come a day too soon."

Of the general characteristics of the Travancore flora, he writes :—

"Undoubtedly the most remarkable feature of the forests of Travancore is the extent and variety of the Flora. Many writers have commented on the small number of the species in temperate and arctic climates as compared with the variety of species in tropical countries from the time that Darwin published his 'Voyage round the world.' Readers of that inimitable work will remember his description of the dark and sodden forests that clothe the Island of Tierra del Fuego, composed of one species of tree only.

"The most recent authority who has referred to the subject is Gamble, in his preface to the new edition of his Manual of Indian Timbers. He there places

* The Malabar Quarterly Review June 1903

'the limiting number of species in the woody vegetation of India' at 5,000. This includes shrubs and climbers as well as trees. With this he compares the 397 species mentioned in the Forest Flora of France, which includes many quite small plants, and the 134 species mentioned in Hooker's Student's Flora, as occurring in England.

"Now in Travancore more than 600 species of trees are known to occur which attain a height of 20 feet and upwards, excluding climbers and bushes of all sorts, and so little do we know of the trees that inhabit the interior that it is very probable that another 50 to 60 species will be added to the list when all parts of the forests have been explored. We may say that in this State which covers an area of about 7,000 square miles, there are to be found no fewer than 700 kinds of trees or one new kind of tree for every 10 square miles. When it is remembered that about half of the area is open inhabited country, rich in paddy fields and cocoanut topes and watered by numerous lakes and rivers, the variety of species becomes the more remarkable. This variety is due no doubt to differences of elevation from 0—9,000 feet and to differences of aspect and of rainfall, for according to the locality, the rain falls in different months, and the amount varies from 20 inches to 300 during the year. But there is the result, this astonishing wealth of species, surely nowhere equalled in any other part of the world.

"In one respect this great variety of species may be looked on as an advantage, in another as a disadvantage. Among so many hundreds—nay thousands of trees and shrubs and herbs, there might be a large number capable of producing useful products—timber or fruits, gums, oils, or medicines. The field of work is wide— the results to be obtained both useful and interesting. Who will devote himself to the study? And it must be remembered that there is no finality about the work. We may examine one species of tree or plant and decide that it has no properties which will ever be of any use to man, and the timber, the fruit and the resin may be regarded in the present state of our knowledge as worthless. Let us therefore destroy the plant wherever found, to make way for the betters. But next year some chemical discovery may bring to light the fact that this very despised plant has certain properties possessed by no others, such for instance as the peculiar property of dulling the taste of sweet things, possessed by the pretty little creeper *Gymnema sylvestre*. One of the commonest trees in our low country forests is the Charei or Chera, *Holigarna ferruginea*. From its stem, from its leaves and from its fruit issues a blistering juice, of which nothing is known at present except that when it touches the skin of certain persons, the results are swelling and much pain. The immediate conclusion to be arrived at is that such a tree should be exterminated wherever found, for its timber is soft and worthless and is not suitable even for fuel, but who can say that within a dozen years we shall not be asked to collect the acrid juice of this tree as a valuable medical agent? In this way the great variety of our Flora is interesting because it opens up such a wide field for study, and because it foreshadows the great possibilities and the great discoveries yet to be made.

"But from another point of view the variety is a disadvantage. In his report on the Forests of Ceylon written some 20 years ago, Mr. Vincent expressed the opinion that not more than 2 per cent of the species of trees to be found in Ceylon were of any commercial value, and judged by the standard of our present knowledge, the proportion of useful trees in Travancore is very small. There is an unlimited demand for certain timbers, but for others, hardly inferior to the favoured ones, and much appreciated in other parts of India, there is no demand. Who will be so enterprising as to experiment with the despised woods? Many times have we offered them for sale, and praised their good

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qualities, but in vain. The ordinary timber merchant will buy the 20 kinds which he knows readily. All the rest are 'Palmaram', useless species to him and only to be consumed as fuel.

"It has often been said that the trees and plants of India have no flowers and that such flowers as they have are without scent, and that except for the mango and the pine-apples there is no fruit worth eating. This by comparison with Europe. But the comparison is hardly fair. The truth is that the wild products of the one continent are as good as those of the other. Our cultivated plants and fruits are indeed vastly inferior to those of Europe, and the reason is not far to seek. They have not been selected and improved in the way that they have been improved in Europe, because the class of market gardeners and florists, and that of wealthy landowners interested in scientific agriculture does not exist in India, but the material from which to evolve the better product is not wanting.

"It is in the spring time that in Europe the earth puts on her garment of beautiful flowers. Our spring time is in September. It is then that the grassy uplands are covered with balsams, with white and pink orchids and yellow stone-crop. Most of the herbaceous plants blossom then, the pleasantest time of the year when the rains have poured their water on the soil, and the air is cool with soft breezes. So far as the wild flowers go, I do not think that Travancore is far behind other countries. We have no primroses or violets with their sweet scent but we have many beautiful orchids and others such as lilies, and amaryllis all awaiting the art of the horticulturist to improve them almost out of recognition.

"As regards fruits, we have the wild Jack and Mango which bear insipid or acid fruit in the wild state. The difference between the wild and the cultivated forms shows what can be done by cultivation. One of our commonest trees in the forests is the Longan—*Nephelium longana*—which in China produces a fruit of great excellence. It is largely exported from that country. The wild fruit is the size of the top of the thumb, round and wrinkled. Its appearance would not lead one to suppose that it could ever be improved into a fruit for the dessert table. The hillmen recognise many other fruits as fit for food even in their wild state. Some of them are not bad eating, and are at least much better than the wild mango. Perhaps the best of these is the fruit of *Clausena willdenovii*—the 'Potti' of the Hillmen, of which Beddome said, it is 'very delicious, as large as a large cherry, succulent as a grape, and somewhat of the flavour of black currant'. The fruit is not unlike a white grape but instead of growing in bunches, 6 or 8 fruits grow along a common stalk. This and many other wild fruits are well worthy of improvement and cultivation but this Clausena in particular. It does not like being moved from the climate and surroundings in which it is generally found.

"The vegetation and Flora of Travancore are of exceptional interest first, because they are the relic and development of flora which was at one time uniform over a large part of India, secondly, because of the extraordinary variety of species occurring within a small area, and thirdly because many of these species have been taken as types of plants with which others from all parts of the world have been compared."

This chapter * is treated under the following heads :—

* The information for this chapter is based on Mr. Bourdillon's exhaustive "Report on the Forests of Travancore" and his "Notes on some of the commoner trees of the Travancore forests", Drury's "Useful plants of India", and Balfour's "Timber trees of India". The draft as originally prepared, from which this one is condensed, has been kindly corrected by Mr. Bourdillon himself.

(1) Valuable timber trees
(2) Trees yielding gums, resins, and dyes
(3) Avenue trees
(4) Cycads and palms
(5) Bamboos and reeds
(6) Fibrous plants
(7) Medicinal plants
(8) Flowering and Ornamental plants

Valuable timber trees. There are nearly 650 indigenous trees in the forests of Travancore. This number includes many species occurring in North India and others peculiar to Ceylon. The uses only of a very few trees are known in Travancore. Others are considered useless and are popularly known as *Palmarangal*. In other parts of India these trees are highly valued. As the trees which are now considered valuable are getting rarer, the latter trees will in future be looked upon by the people as valuable and will be utilized.

1. Teak, Tèkku — *Tectona grandis*.

This is rightly called "the monarch of the woods" as it is the most highly-priced timber under favourable circumstances and is perhaps the most useful of all the timber trees of India. It generally grows to a height of 80 to 100 feet to the first branch with a girth of 22 feet. In Travancore the tree seldom attains a height of more than 50 feet to the fork and a girth of 10 feet. It thrives best with a rainfall of from 120 to 150 inches and in a temperature ranging from 60° to 90° and attains its maturity in from 80 to 100 years and is sometimes found 400 years old. It grows in open forest, wants much room and light and never occurs in heavy moist forest from sea-level up to 8,000 feet elevation. The teak tree is usually found with such trees as *Dalbergia latifolia*, *Pterocarpus marsupium*, *Terminalia paniculata*, *Anogeissus latifolia*, *Schleichera trijuga*, *Gmelina arborea*, *Sterospermum xylocarpum*, *Careya arborea*, *Phyllanthus emblica* and others. It grows best at an elevation of 1,000—2,000 feet. The Idiyara valley has long been celebrated for the quality and size of its teak. Fifty or sixty years must pass after plantation before the tree can yield serviceable timber. The wood is brown in colour and when fresh sawn has the fragrance of rosewood—hard yet light, easily worked, strong and durable though porous. Its strength and durability are well known; for house-building and furniture it is the best of woods.

The Malabar teak is generally esteemed the best. For ship-building purposes, it is superior to every other sort of wood, being

light, strong and durable whether in or out of water and hence it is extensively used for that purpose. A cubic foot of seasoned wood weighs about 40 lbs., that of unseasoned 55 lbs. or more. Burma teak is much lighter and kole teak is heavier. A commercially valuable oil is extracted from the teak wood.

Kole teak is teak occurring in hard and unsuitable soil and hence growing not more than 3 feet in girth. Most of the teak in the low country is kole teak and its wood is close-grained and heavier than the ordinary teak.

2. Malabar Blackwood (Rosewood), Eattie—*Dalbergia latifolia*.

There are two species which yield blackwood, found in Travancore, viz., *D. latifolia* and *D. sissoides*. It attains an enormous size in Malabar and is often crooked. It is one of the most valuable trees of the Travancore forests. It is heavy and close-grained admitting of fine polish and is much used for furniture but seldom for building. The wood is white externally; in the centre of the trunk and the large branches it is purple or purplish black, often mottled or with light coloured veins running in various directions. The tree grows to a height of 60 to 80 feet and requires a temperature slightly cooler than that in which teak thrives, with a rainfall averaging from 50 to 150 inches. In strength it excels teak, but is very scarce and of slow growth, and less adapted for plantation than the teak. It does not seem to prefer any particular soil. It grows in the Travancore hills at an elevation of 0-3,600 feet and prefers a rather higher elevation than teak. One cubic foot of seasoned wood weighs 52 lbs; unseasoned 60-66 lbs.

3. Ebony, Karungali — *Diospyros assimilis*.

This is a large tree 60 or 90 feet in height and 6 or 8 feet in girth growing in the Travancore forest at an elevation of 0-2,000 feet. It requires a considerable rainfall, but still it is very sparingly distributed. The heart-wood is black, hard and heavy, and is most valuable. In strength it excels teak. It is not much used as a building material for the simple reason that wood of this kind, more than 6 inches square, is very seldom obtained. When young the wood is white, but as the tree advances in age the black portion increases until at last in the later stages of its growth the black heart is of considerable size. But there is always a large quantity of sap-wood even in old trees. It is used chiefly for ornamental work, furniture, inlaying, mathematical instuments, rulers &c.

The tree is of very slow growth. More than 100 years should elapse

before an ebony tree attains a diameter of 1 foot. It is not suited for plantations. There are nearly 20 other kinds of Diospyros, but none of them have blackwood except *D. ebenum* which is extremely rare. One cubic foot of seasoned wood weighs 81 lbs; unseasoned 90-100 lbs.

4. Sandalwood—*Santalum album.*

This small tree (height never more than 20 feet) grows in the Travancore hills at an elevation of 3,000 feet, and is celebrated for its highly scented and valuable timber. It is very sparingly distributed in Travancore, being found only in the Anchanad valley. Three varieties of sandalwood are known in commerce, the white, the yellow, and the red—the two former coming under *Santalum album* now under notice. The timber is eminently fitted for carving and other ornamental work such as small boxes, walking sticks, pen-holders and other fine articles. From this wood is produced the paste Chandanam which is used by Hindus for their caste marks. A valuable oil is distilled from the wood, 1 pound of the wood yielding about 2 drams of oil. The fragrance increases as the tree advances in age.

This also is a tree of slow growth, reaching its full development in 60 to 100 years, by which time the tree will have a diameter of one foot of heart-wood. It is well adapted for plantations if suitable land is selected, i. e., land with good soil and elevation not less than 1,000 feet and a light rainfall of 20 to 50 inches.

5. Anjili, Ayani—*Artocarpus hirsuta.*

This lofty and handsome tree (height 100-150 feet, girth 16 feet) grows in the Travancore forests at an elevation of 0-3,000 feet. It yields the valuable wood so well known on this coast for house-building, furniture, frame works, boats etc. It grows very rapidly on yellow loam with a rainfall exceeding 60 inches, reaching its maturity in 25 to 40 years. Its wood is bright yellow turning to brown with age, very straight-grained and free from knots and takes a fine polish. The bark yields a brown dye and the fruit is edible. The tree is well suited for plantations. Weight of seasoned wood 42 lbs. a cubic foot; unseasoned 48 lbs.

6. Thambagam—*Hopea parviflora.*

This lofty tree (height 100 feet, girth 15 feet) thrives best in heavy forest at an elevation of from 300 to 3,000 feet. It is also found to some extent along the banks of rivers in the low country. The wood is close-grained, heavy and yellow becoming darker with age. It is used for bridges and buildings of all sorts and occasionally for boats. It stands

exposure when sawn into scantlings but cracks if sawn into thin planks. It is not attacked by white ants.

This tree grows nearly as fast as Anjili but is difficult to raise from seed. It is well suited for plantations.

7. Venga—*Pterocarpus marsupium.*

This is a large and very beautiful tree, especially when in flower at the beginning of the rains (height 80 to 90 feet, girth 10 feet). It yields one of the most abundant and useful timbers, the Venga wood of South India. It is widely diffused and is found in large numbers in the forests of Travancore. It grows best on stiff soil at an elevation of 0-3,000 feet and is found in company with Eattie, Thembavu and other trees. It is found in abundance where teak is scarce. It is a fast grower and attains maturity in about 60 to 80 years and grows to double that age, but is not suited for plantation as it is not gregarious. The timber is as strong as teak, heavier, and less liable to split after long exposure. The colour of the wood is dirty yellow darkening with exposure. It is never used for house-building in Travancore, as, when wet or unseasoned, it imparts a yellow stain and gives out to wet lime a dark rusty brown colour. It is specially useful for fine furniture and resembles fine Mahogany but must be well seasoned to avoid the yellow stain. Seasoned wood weighs 56 lbs. a cubic foot; unseasoned 65-70 lbs.

This tree yields a resinous substance which is exported in large quantities. This is the gum Kino of commerce used largely for dyeing and calico-printing.

8. Thembavu—*Terminalia tomentosa.*

This is another huge tree (height 80 to 120 feet, girth 12 feet) growing in open grass forest at an elevation of 0-3,000 feet in company with blackwood, teak and other trees. Its growth is fairly fast; it reaches maturity in 80-100 years and lives for more than 200 years. The wood is dark brown, hard and heavy, and is much used for house-building. In matured trees, the wood is exceedingly heavy, of the same weight as water and is not easily worked. It is a disappointing timber. Its strength and durability are uncertain or it would be used even more largely than it is. The weight of seasoned wood is 60 lbs. a cubic foot, and that of unseasoned 75-80 lbs.

The ashes of the burned bark produce a kind of chunam which contains much potash. The bark is used in tanning and the leaves for

manuring the paddy fields. The leaves form the food of the Tusser silk-worm. A dyeing substance is obtained from the bark of this tree which is used for brown colouring.

9. White Cedar, Vellai Agil—*Dysoxylum malabaricum.*

This lofty tree (height 120 feet, girth 16 feet) is found only on the West Coast of India from Canara to Cape Comorin and there, it is abundant and well distributed. It grows in moist forest at an elevation of 0-3,000 feet and attains its greatest size at an elevation of 1,400 feet. The wood is pale yellow with a smooth silky vein, sweet-scented and easily worked and is used for oil casks. It does not stand exposure. Seasoned wood weighs 42 lbs. a cubic foot; unseasoned 52 lbs.

The cedar is a tree of moderate growth, 500 years being the limit of its life; it grows more rapidly in its younger stages.

10. Red Cedar, Madagiri Vembu— *Cedrela toona.*

This large and valuable tree (height 60 feet) is abundant in Travancore. It grows at an elevation of 0-4,000 feet and is common on the Peermade hills. This is well suited for plantations and grows well with Anjili. The wood, coarse, red and sweet-scented, is used for furniture of all kinds, house-building and carving and is called the "Mahogany of India" which it resembles closely, though lighter and not so close in the grain. It admits of fine polish. It is used also for tea boxes, shingles and cigar boxes.

11. Ventekku— *Lagerstræmia lanceolata.*

This is a large tree with a straight stem, (height 120 feet, girth 12 feet), with a smooth, very pale bark scaling off in thin flakes not much thicker than paper and found only on the West Coast from Bombay to Cape Comorin. It grows to its largest size in the forests of the north at a low elevation of 200 to 300 feet; it is never found in the dense moist forests. It lives for more than 200 years but grows very slowly and is not therefore suited for plantations. The wood is light brown, straight-fibred and elastic but splits easily. It is not strong and does not stand exposure to the weather.

12. Jack, Chakka or Pilavu—*Artocarpus integrifolia.*

This valuable fruit and timber tree is much planted and grows largely all over Travancore. It grows best in rich red soil with a rainfall of not less than 50 inches. It grows rapidly when young, but after it has attained a diameter of 2 feet its growth is slow. It lives for more than 200 years. It is much cultivated in the low lands for fruits and along the

roads for shade. It attains a height of about 80-100 feet with thick spreading branches. The fruit is very large weighing from 30 to 40 lbs. The green fruit is used in curries. The tree bears fruit in about 7 years, the fruits appearing in all parts even at the very root. Hence the proverb:— "വേണ്ടാത്തെങ്കിൽ ചക്ക വേരിലും കാഞ്ഞും."

The wood is excellent and is highly valued; it is yellow when cut, afterwards changing into dull red or mahogany colour. It admits of fine polish. It is used both for building purposes and for furniture of various kinds, such as chairs, tables &c., musical instruments and ornamental work. Of late years jack wood has been superseded by blackwood in the matter of furniture making. The weight of seasoned wood is 42 lbs. a cubic foot; unseasoned 50 lbs.

There are several varieties of the Jack tree, but what is called Varikka or the honey jack is the sweetest and best. The fruits yield a good red dye.

13. Irul— *Kodaxylia dolabriformis.*

This tree is not found in South Travancore, but is common in North Travancore. It is a large tree growing to a height of 80-100 feet with a girth of 9 feet. It is always found in company with teak and requires a rainfall of not less than 100 inches. The wood is dark red, hard, heavy, durable and close-grained but not easily worked. It is used for boats, sleepers, posts, carts, house-building etc. It lasts a long time under water and is hence used in the construction of bridges, but in small scantling it is inclined to split and warp if exposed. It is however not much valued in Travancore. The weight of seasoned wood is 58 lbs. a cubic foot; unseasoned 70 lbs.

14. Mayila— *Vitex altissima.*

This is a large tree with a height of 80 feet and a girth of 12 feet, widely distributed throughout Travancore at all elevations between sea-level and 3,000 feet. It is a moderately fast grower. It increases in diameter 1 inch in 5 years and lives to be nearly 300 years old. The wood is hard, durable and flexible, with a coarse grain, is light brown in colour and does not split nor warp. It is highly esteemed in other parts of India for buildings, carts &c., but here in Travancore the people prefer other trees for such purposes. The unseasoned wood weighs 63 lbs. a cubic foot, and seasoned wood 53 lbs.

The Vernacular name covers two other varieties viz., *Vitex pubescens* and *V. leucoxylon.*

15. Manjakadambu—*Adina cordifolia.*

This lofty tree (height 100 feet, girth 9-16 feet) is found only in the open moist forests between sea-level and 3,000 feet elevation; it is particularly abundant and reaches a very large size in the forests near Konniyur and in North Travancore. The wood is light yellow seasoning to nut brown, close-grained, smooth and light, and admits of a fine polish but does not stand exposure to water. It is used for building, furniture, boxes, turnings &c., in other parts of India, but in Travancore it is not much used. Weight of seasoned wood 42 lbs. a cubic foot; unseasoned 50 lbs.

16. Ceylon Oak, Puvan—*Schleichera trijuga.*

This is a large handsome tree of slow growth (height 100 feet, girth 15 feet). It lives to a great age of nearly 300 years but is not suited for plantation as its growth is too slow and its value too small. It is found in Travancore with Irul, Maruthu &c., on the deciduous forests 0-2,000 feet. Its wood is strong and durable, seasons and polishes well and is used for carts, sugar and oil mills, and a variety of other useful purposes. Weight 67 lbs. a cubic foot.

17. Manimaruthu—*Lagerstræmia flos-regina.*

This is a medium-sized tree of very ornamental appearance on account of its handsome pink flowers, found along the banks of streams and in the open forests. It lives to be nearly 200 years old. Its wood is pale red, tough and very durable under water but it decays under ground and is seldom used in Travancore. Seasoned wood weighs 38 lbs. and unseasoned 48 lbs. a cubic foot. Silkworms feed on the leaves of this tree.

18. Mango, Mavu—*Mangifera indica.*

This useful tree is found wild in our moist forests at all elevations up to 2,000 feet. In the low country it is much planted for its fruit. It is not a very rapid grower and lives for a century and a half. The wild fruit is hardly edible but the low country fruit is very wholesome and when unripe is much used in curries, preserves &c. Its flowering time is January, February and March and the fruits ripen from May to July. There are several varieties found in Travancore. The wood, dull grey and porous, is very serviceable for planks when not exposed to wet and hence much used for house purposes. It can also be used for canoes as it bears the action of salt water well. Seasoned wood weighs 42 lbs. a cubic foot and unseasoned 55 lbs. The leaves form an excellent food for silkworms.

19. Malampunna—*Calophyllum tomentosum.*

This is a handsome tree of very large size reaching a height of 120

feet or more and a girth of 10 feet, found all through Travancore in the dense evergreen forests from 300 feet elevation to 400 feet. It requires a rainfall of not less than 100 inches and thrives on very poor soil where no other tree will succeed. The wood is reddish, loose-grained, long-fibred and elastic. In the coffee and tea plantations it is used for reapers, packing cases, rough planking and furniture; its chief use however is for spars of vessels, its great length, lightness, straightness and elasticity making it most suitable for this purpose; a single spar sometimes realises 1,000 Rs., but the demand is uncertain and unequal. The Pinnakai oil so largely used for burning lamps is made from the seeds of the Alexandrine Laurel, *Calophyllum inophyllum*, a small tree abundantly planted in the low country.

20 Cheeni—*Tetrameles nudiflora.*

This is a very lofty tree (height 120 feet) with grey shining bark and small flowers, widely distributed in Travancore. It requires a very heavy rainfall, grows very fast and lives for more than 200 years. Its wood, dirty white, exceedingly light, soft and even-grained, takes a good polish and paint and is used for canoes, boats and catamarans, carved toys &c., but it is neither strong nor durable and white ants eat it. This tree is not suited for plantations on account of its low value.

21. Pathiri—*Stereospermum chelonoides.*

This is another large and handsome tree (height 100 feet, girth 8 feet) with very beautiful pinkish flowers and occurs in Travancore from sea-level up to 3,000 feet both in the dense moist forests of the hills and in the open forests and in grass land, associated with teak and other trees. It is much planted on account of its ornamental appearance. Its wood, orange or reddish brown, is close and even-grained, elastic, durable and easily worked, gives a smooth surface and is used for house-building and for furniture and makes excellent fuel. This is a moderately fast growing tree and lives for more than a century. Seasoned wood weighs 48 lbs. a cubic foot; unseasoned 58 lbs.

22. Cotton Tree, Ilavu—*Bombax malabaricum.*

This large and stately tree (height 150 feet or more, girth 18 or 20 feet) with very large and showy flowers occurs in Travancore from sea-level up to 3,000 feet attaining its greatest height and girth in moist forests at the foot of the hills. Its wood is whitish, coarse-grained and brittle, but stands the action of water well and is hence used for floating rafts and packing boxes. Cotton or the wool of the pods is used for stuffing pillows, cushions &c. This is a fast-growing tree and lives for

more than 200 years. Silkworms feed on the leaves of this tree and the large honey bee makes its nest chiefly in this tree.

23. Karuntagara or Vaga—*Albizzia procera.*

This is a moderate-sized, fast-growing tree (height 60 feet, girth 6 feet), occurring in moist situations as on river banks. It flourishes best in open situations and is not found south of Trivandrum. The sap-wood is yellowish white and not durable while the heart-wood is brown, straight and even-grained, seasons well, works freely, and admits of fine polish and is hence good for furniture, boxes, agricultural implements etc. Weight averages 46 lbs. a cubic foot.

These are the most valuable timber trees of Travancore. Among the other useful trees employed in the low country and having some market value may be mentioned the following:—

1. Malakanjiram—*Anogeissus latifolia.*

This tree is common in the drier districts of South Travancore and on the Peermade hills near Kambam and in the deciduous forests near Konniyur. The wood is dark-coloured and strong and is used for bandy poles and agricultural implements. A valuable gum is obtained from its stem which is used in cloth-printing and its leaves are used for tanning.

2 Ironwood, Nangu—*Mesua ferrea.*

This tree is abundant in the evergreen forests from 0-6,000 feet. Its wood is very heavy, hard and durable; but for its great weight it would be more commonly used for building. It gives out great heat when burnt and makes first rate charcoal.

3. Nedunar—*Polyalthia fragrans.* This is a straight tree abundant in the forests of North Travancore. The wood is light and very elastic and is very well adapted for masts and yards.

4 Shurali—*Hardwickia binata.* A very large tree yielding timber of an excellent quality for beams and a variety of uses, found only on the Western Ghauts from South Canara to Cape Comorin. The wood is brown and exudes a sticky oil resembling Copaiba balsam for which it may be substituted.

5. Indian Copal, Payin—*Vateria indica.* This beautiful tree which is so much planted in gardens and along avenues for the fragrance of its flowers and which is very abundant in the moist forests, is sometimes cut for boats. It is better known for its gum called white dammer, an excellent varnish resembling copal.

6. Malavaram—*Pterospermum rubiginosum* and *P. heyneanum.* These are felled for building and boats; the former especially is said to be very good wood and is an exceedingly handsome tree.

7. Kalasam—*Odina wodier.* This is a small-sized tree with a light reddish wood, very useful for furniture and house-building.

8. Kollamavu—*Machilus macrantha.* A moderate-sized tree of light wood growing in the moist forests, much used for boats.

9. Arayanjili—*Antiaris toxicaria.* An immense tree of the dense moist forests with light wood, not strong or durable, used for boats, tea boxes &c. Its inner bark is composed of very strong tenacious fibres and seems excellently fitted for cordage and matting.

10. Aval—*Holoptelea integrifolia.* Another tree of immense size common in the moist forests of the north. The wood is light and fairly durable if smoked; it is sawn into planks or fashioned into boats.

11. Venkotta—*Lophopetalum wightianum.* A lofty tree found in the evergreen forests and on river banks 0-3000 feet. Wood is light, white, useful and durable if smoked.

12. Mukkampala—*Alstonia scholaris.* A large and handsome tree common in the deciduous forests 0-3000 feet with a milky juice; wood white, and very light but not durable, used for rough planking.

13. Palagapayani—*Oroxylum indicum.* A tree of moderate size, occasionally cut into boats.

14. Maruthu or Pumaruthu—*Terminalia paniculata.* A large tree and one of the commonest of the deciduous forests. Wood is strong and durable but not much appreciated in Travancore, used for buildings to a small extent.

15. Kanakaitha. Two botanical names come under this, viz., *Miliusa velutina* and *Bocagea dalzelli.* These are very elastic woods which may be used for carriage shafts, spear handles and such purposes. The former is found in the deciduous forests, while the latter occurs only in the moist forests.

16. Kar Anjili—*Dipterocarpus bourdilloni.* A large tree resembling Anjili, generally felled for boats; grows in the moist forests of North Travancore.

17. Mulluvenga—*Bridelia retusa.* Wood hard and heavy, used only to a limited extent in Travancore, though much valued in other countries.

18. Pambarakumbil—*Trewia nudiflora*. A moderate-sized tree, possessing light wood used for carving; the image put up in Roman Catholic churches is commonly made of this timber.

These are the only trees yielding timber commercially valuable; many other trees there are, indigenous to the country, used for rough house-building, for posts or for the construction of jungle wood-roofs but they have no commercial value and are used only by the poor or for temporary buildings.

The following is a list of trees exclusively used by the planters living at elevations between 1500 and 4000 feet:—

1. Kattu Iluppa or Pala, of which there are two species viz., *Dichopsis elliptica* and *Chrysophyllum roxburghii*. The latter has very poor timber, while the former yields a reddish brown timber with straight grain, easily worked when young, but hardening with age, and used for shingles. A sticky milky juice exudes from both of them, which is commercially valuable.

2. Puthankalli—*Poeciloneuron indicum*. A large tree occurring in the moist forests up to 2,000 feet yielding a hard, heavy and durable reddish wood used for building.

3. Karuva—*Cinnamomum zeylanicum*. A large tree common in the Peermade plateau; wood dull white resembling mango wood, used for rough planking and building.

4. Kalpayin—*Dipterocarpus turbinatus*. This is another very large tree common in the evergreen forests 0-3,000 feet. It yields soft resinous wood used for reapers, but which decays rapidly with exposure.

5. Shenchandanam—*Gluta travancorica*. A very large forest tree, confined to the extreme south of the Peninsula and ascending the hills to an elevation of 4,000 feet. It yields a beautiful red wood suitable for furniture but not strong.

6. Kattu Puvan—*Nephelium longana*. Wood, hard, yellowish red; suitable for buildings if cut in large scantlings but liable to crack if sawn thin.

7. Wynaad Shingle-tree, Malakonnai—*Acrocarpus fraxinifolius*. Found only in places where the climate is dry; wood pink and splits easily; used for shingles as well as for buildings and furniture.

8. Vellakasavu—*Hemicyclia Venusta*. A small tree common in the evergreen forests growing at an elevation of 2,000 to 4,000 feet, with a white, hard and heavy wood used for turning and posts. *H. elata* is another tree of the same species possessing a like wood.

Trees yielding gums, resins and dyes. First comes the beautiful Venga tree, *Pterocarpus marsupium*, already described, which yields the dragon's blood or gum kino of commerce. The gum is collected by incisions in the bark. Of dammer there are two varieties, the white dammer or Vella Kundrikam, the product of *Vateria indica* or the Payin tree, and the black dammer, the product of *Canarium strictum or Thellimaram*, a lofty tree very abundant in our dense moist forests from 0-5,000 feet. The gum exudes from all parts of the tree and is semi-transparent in small pieces, but black in masses and tastes like fennel. It is collected and used for bottling and varnishes. A solid oil is also obtained from the seeds of *Vateria indica*, known as vegetable tallow, of which candles are made, which diffuse an agreeable fragrance and give a clear light with little smoke. The oil is used also as a local application in chronic rheumatism.

The lofty *Ailantus malabarica*, common in the evergreen forests of North Travancore, yields a fragrant resinous juice known as Muttipal which is burnt as incense and used also for medicinal purposes. Reference has already been made to the Shurali or *Hardwickia binata* yielding a gum said to be as useful as copaiba. *Butea superba* as well as its allied species *B. frondosa* or the Palasa tree yield a kind of East Indian kino flowing from fissures in the bark, which becomes opaque and dark-coloured after a time. This gum which dissolves in hot water imparting to it a fine red colour contains a large proportion of tannin which might render it useful in the arts and in tanning leather especially for thick hides. The fruit of the Panichimaram, *Diospyros embryopteris*, contains a large proportion of tannin and a gum used for fishing lines &c.

The Kattucheru or *Holigarna arnottiana* is one of the trees yielding the well-known black lacquer varnish. The juice of the fruit is used by painters and also for fixing indelible colours figured on linen cloths. The small and thorny Karuvelam tree, *Acacia arabica*, yields a valuable transparent gum which is used as a substitute for gum Arabic, which itself is the product of *A. vera*. The bark of this tree is used for tanning leather and also for medicinal purposes. The Pattathamara, *Macaranga indica* a very common tree in Travancore, produces a gum of a light crimson colour used for taking impressions of leaves, coins, medallions &c. The stem of the Vilatti or wood-apple, *Feronia elephantum*, yields a transparent gummy substance which is used for mixing with painter's colours, in

dyeing and also in ink and varnish. The gum called in Tamil Velan pishin, resembles the true gum Arabic and is also used for medicinal purposes. The Vembu, *Melia azadirachta*, the Iluppa, *Bassia longifolia*, the Bilva, *Ægele marmelos*, and the Cashewnut, *Anacardium occidentale*, are some of the other common trees yielding useful gums.

The Gamboge tree, *Garcinia pictoria*, abundant in the moist forests yields a very bright orange pigment which is excellent and equal to the best gamboge. Two other trees of the same species also are said to yield good pigments, viz., *G. morella* and *G. travancorica*. The Kamila dye is the product of Ponnagam, *Mallotus philippinensis*, a middle-sized tree found in the secondary and open forests from 0-5,000 feet. Kamila is the powder rubbed off the capsules and is also found though in smaller quantities on the leaves and stalks of the plant. It is of a rich red colour, used all over India especially for silk to which it imparts a fine yellow colour. Two species of myrabolans are gathered from the Kadukai or *Terminalia chebula* and the Tani or *T. belerica*, the former especially being in good demand. They are very astringent and are used for tanning, also for making ink; with alum they make a good yellow dye. The Manjanatti or *Morinda tinctoria*, a very common tree, frequently met with in gardens as well as in the forests, yields a yellow timber which takes a polish equal to jack wood, the interior wood of the old trees yielding a dye. The Noonamaram or *Morinda umbellata*, a common climbing plant, yields a dye of permanent yellow from its root; with the addition of sappan wood a red dye also can be prepared from the same. It is said that the colours dyed with this as well as the other species of the Indian mulberry plant are for the most part exceedingly brilliant and the colouring matter far more permanent than many other red colours and that with improved management the dye would probably rival that of madder. The Manjadi or *Adenanthera pavonina* also yields a red dye. And lastly we have the Sappan wood, *Cæsalpina sappan*, a small tree whose wood called the red wood of commerce is extensively used in dyeing and is exported for that purpose. It grows freely without any care and is of the first quality in Malabar. It yields a first class dye much used on the other coast.

Avenue trees. Foremost among the avenue trees comes the Banyan or Alamaram, *Ficus bengalensis*, an immense tree with branches spreading over a large area. It is remarkable for the singular property of letting a gummy kind of rootlet fall from its branches. These on reaching the ground soon form a natural support to the larger branches of the tree, and several of these extending and increasing from year to year forming a vast assemblage of pillar-like stems, cover a considerable area round the

original trunk. This tree is wild throughout India, and is much planted for avenues everywhere. It is of rapid growth and grows best from large cuttings 6 or 7 feet long planted in the ground. In Travancore it is found both in the moist and deciduous forests from sea-level to 4,000 feet. The wood is light, coarse-grained, brittle and not durable, but lasts under water and is hence used for wells, water conduits &c. The root 'drops' are tough and elastic and are used for tent poles, cart yokes &c. Bird-lime is made of the milky juice which abounds in every part of the tree. The leaves are used as plates and the fruit is occasionally eaten. Birds are very fond of it.

The Arasu or *Ficus religiosa* is found wild in our subalpine forests but is not abundant. It is however very widely planted everywhere near temples and along avenues. It does not ascend the hills to any elevation. It is a sacred tree and is much respected by the Hindus who are very unwilling to cut it down at any time. The wood is white, light and perishable. It is used for fuel, charcoal and packing cases. Elephants eat its leaves and branches and the silkworms feed on its leaves. Stick-lac is produced from it and the glutinous juice which exudes from the stem is made into bird-lime. Eight other varieties of the Ficus species are found in Travancore, viz., *Ficus tomentosa*, *F. altissima* or Kal-atthi, *F. benjamina*, *F. tsiela*, *F. infectoria*, *F. asperrima* or Theragam, *F. hispida* or Erumanaku and *F. glomerata*, or Atthi, of which the last is the most important. This is found throughout Travancore in the secondary and open forests 0-3,000 feet. It grows rapidly and gives a light pleasant shade. It is much planted in coffee estates. The wood is white, light and not durable except under water; it is used for well rings. Bird-lime is made from the milky juice and the leaves are largely used as fodder for elephant and cattle.

The Naval or *Eugenia jambolana* is a very large tree found in the evergreen forests and much planted for avenues. The wood is reddish or dark brown, close-grained, but not straight; it is hard, and heavy but difficult to work and is therefore unsuitable for any use. The fruit is eatable, and the leaves and bark are used in native medicine.

The Poo-arasu or *Thespesia populnea* is another tree planted for roadside avenues, being remarkable for its easy and rapid growth from cuttings and yielding a good shade. It yields when ripe a very strong, hard and durable timber with a colour like mahogany, but its use is limited on account of the difficulty of getting it in large size.

The other trees planted for avenues are the Casuarina, the Tamarind, the Jack, the Mango, the Margosa, the Alexandrine laurel, the Payin and

the Cashew-nut trees. Of these the jack, mango and payin have already been noticed under the valuable timber trees. The casuarina does not grow in the Travancore forests except when planted, as its introduction into Southern India itself from Chittagong, its native province, is only of recent date. It may however be of interest to state that the timber of casuarina which grows well from seeds and is a very rapid grower is without exception the strongest wood known for bearing cross strains and very valuable for fuel.

The Tamarind or Puli, *Tamarindus indica*, is planted largely for its fruit; it also runs wild in the dry forests from 0-2,000 feet. This is a graceful avenue tree of slow growth but attaining great size. The timber which is hard, heavy and durable is converted to many useful purposes in building, for mills and the teeth of wheels etc., and makes excellent fuel. The pulp of the pods is used both in food and in medicine. The natives have a prejudice against sleeping under the tree as its shade is considered unhealthy, and the tree haunted.

The Margosa or Vembu, *Melia azadirachta*, is a small and beautiful tree much planted in the low country for ornament and shade. Its uses are referred to a little later under medicinal plants.

The Alexandrine Laurel or Punna, *Calophyllum inophyllum*, is another beautiful tree common on the banks of rivers and "not less esteemed for its ornamental appearance than for the delicious fragrance of its flowers".

The Cashew-nut or Parangimavu, *Anacardium occidentale*, originally belonging to the West Indies is now common all over India. As the vernacular name implies, this seems to have been introduced by the Portuguese and has now run wild in the maritime forests all over Western India. Two kinds of oil can be prepared from the hard fruit borne at the end of the fleshy peduncle, viz., (1) a sweet nourishing table-oil from the kernels, pronounced equal to almond oil and superior to olive oil, and (2) a brown blistering oil from the rind (cardol). But this is scarcely done, the kernels being used only as a table-fruit. The wood is of no value but is largely used as fuel.

Cycads and Palms. The most important of the indigenous cycads is the Eentha or *Cycas circinalis*, a small tree very abundant in the deciduous forests 0-3,000 feet. It produces a good abundance of spherical fruit containing a kernel. The hillmen and the low country people in some parts collect these fruits and convert the kernels into an insipid flour which is baked into cakes. The fruit forms the staple food of some of the hill-tribes for several months together.

Exclusive of the Cocoanut and Areca palms, whose cultivation forms such a striking feature of the garden lands of Travancore, 6 other varieties of palms are known, of which 4 are wild. They are:—the Palmyra or *Borassus flabelliformis*, the Talipot or *Corypha umbraculifera*, the Bastard Sago or *Caryota urens*, the *Bentinckia condapana*, the *Pinanga dichronii*, and the *Arenga wightii*.

The palmyra is much planted in the drier districts of South Travancore. The fruit is not much used and the tree is valued mainly for the juice which is either drunk as toddy, distilled into arrack or made into jaggery. The leaves are used for several purposes like those of the cocoanut palm and the wood is valuable for rafters. The mighty talipot is doubtfully indigenous and is found all through our forests. Its large broad fronds are used for thatching and also for writing on with an iron style. The dried leaf is very strong and is commonly used for umbrellas. A kind of flour or sago is prepared from the pith of the trunk. As observed by Mr. Bruce Foote, late of the Geological Survey of India,

> "The most striking feature in the flora of South Travancore is the immense forest of fan palms (*Borassus flabelliformis*) which covers a great part of the country. The fan palms, or palmyras, attain here to much greater height than they generally do elsewhere. Trees measuring from 90 to 100 feet in height are not uncommon in places, and with their stems greatly covered by white or silvery grey lichens, they present a much finer appearance than the comparatively stunted specimens one is accustomed to see in the Carnatic or on the Mysore and Deccan plateaus. Whether these Travancore trees owe any part of their greatly superior height to superior age, as compared with the palms in the great Palmyra forest in South Tinnevelly, I could not make out; but the white colour of their stems, added to their great height certainly gives them a much more hoary and venerable appearance."

The Bastard Sago, *Caryota urens*, common in the evergreen forests 0-3,000 feet, is a large tree yielding toddy. Sago is prepared from the stem. The tree is valued for the good quantity of sap it yields and also for its fibre. In times of scarcity these trees which are planted about the low country, are felled, and the pith is mixed with water and the resulting fluid is strained, and a flour is prepared from it.

Bamboos and Reeds. The Bamboo is the most gigantic of the grasses and consists of several species all useful to man in a variety of ways. Seven species are known in Travancore, of which the most useful is the ubiquitous bamboo, *Bambusa arundinacea* commonly called Mungil or Mulah. The uses &c., of this and the other species of bamboos in general are thus described by Drury:—

"These gigantic arborescent grasses which cover the sides and tops of the mountains throughout the continent of India form one of the peculiar as well as the most striking features of Oriental scenery. Few objects present a more attractive sight in the wild forest of this country than a clump of these beautiful plants with their tall bending stems and delicate light-green foliage. With the exception of the Cocoa and some other palms perhaps, the Bamboo is the most useful and economical of all the vegetable products of the East. In no other plant is strength and lightness combined to that degree which renders this so important an article in building houses, lifting weights, forming rafts and a thousand other uses which might here be enumerated. It attains a considerable height,—some 70-80 feet—and has been known to spring up 30 inches in 6 days. At the age of 15* years, the bamboo is said to bear fruit, a whitish seed-like rice, and then to die. These seeds are eaten by the poorer classes.

"The purpose to which different species of bamboo are applied are so numerous that it would be difficult to point out an object in which strength and elasticity are requisite, and for which lightness is no objection to which the stems are not adapted in the countries where they grow. The young shoots of some species are cut when tender and eaten like asparagus. The full-grown stems, while green, form elegant cases, exhaling a perpetual moisture, and capable of transporting fresh flowers for hundreds of miles. When ripe and hard they are converted into bows, arrows, and quivers, lance-shafts, masts of vessels, bed-posts, walking-sticks, the poles of palanquins, to floors and supporters of rustic bridges, and a variety of similar purposes. In a growing state, the spiny kinds are formed into stockades, which are impenetrable to any but regular infantry, aided by artillery. By notching their sides, the Malays make wonderfully light scaling ladders, which can be conveyed with facility where heavier machines could not be transported. Bruised and crushed in water, the leaves and stems form Chinese paper, the finer qualities of which are only improved by a mixture of raw cotton and by more careful pounding. The leaves of a small species are the material used by the Chinese for the lining of their tea-chests. Cut into lengths and the partitions knocked out, they form durable water-pipes, or, by a little contrivance are made into excellent cases for holding rolls of papers. Slit into strips, they afford a most durable material for weaving into mats, baskets, window-blinds and even the sails of boats. Finally, the larger and thicker truncheons are exquisitely carved by the Chinese into beautiful ornaments. No plant in Bengal is applied to such a variety of useful purposes as the bamboo. Of it are made implements for weaving, the post and the frames of the roofs of huts, scaffoldings for buildings, portable stages for native processions, raised floors for granaries, stakes for nets in rivers, rafts, masts, yards, oars, spars, and in boat-decks. It is used for building bridges across creeks, for fences, as a lever for raising water for irrigation, and as flag-poles. Several agricultural instruments are made of it, as are also hackeries or carts, doolies or litters and biers, the shafts of javelins or spears, bows and arrows clubs and fishing-rods. A joint of bamboo serves as a holder for pens, small instruments and tools. It is used as a case in which things of little bulk are sent to a distance; the eggs of silkworms were brought into a bamboo-cane from China to Constantinople in the time of Justinian. A joint of bamboo answers the purpose of a bottle, and a section of it is a measure for solids and liquids in bazaars. A piece of it is used as a blow-pipe and as a tube in a distilling apparatus. A small bit of it split at one end, serves as tongs to take up burning charcoal, and a thin slip of it is sharp enough to be used as knife in shelling betel-nuts &c. Its surface is so hard, that it answers the purpose of a whet-stone upon which the ryots sharpen their bill-hooks and sickles."

* According to Mr. Bourdillon, 50.

2. Male Bamboo or Kalmulah — *Dendrocalamus strictus.* This species of bamboo (culms up to 3 inches in diameter and 30 feet high) has great strength and solidity and is very straight; hence it is better suited for a variety of uses than the common bamboo. The natives make great use of it for spears, shafts &c. It is clearly a distinct species, growing in a drier situation than other bamboos. In Travancore its habitat is the Anchanad valley 3,000-4,000 feet.

3. Arambu — *Oxytenanthera bourdilloni.* A species of thornless bamboo growing on rocky cliffs found only at elevations between 2,000 and 3,000 feet. It attains a diameter of about 4 inches and a height of 40 feet. The hillmen use this for making combs and other household implements.

4. *Oxytenanthera thwaitesii.* Found in the evergreen forests 3,000-6,000 feet; reeds not exceeding 1 inch in diameter and 10 feet high.

5. Tha Eetta or Eeral reed — *Ochlandra travancorica.* This forms the undergrowth in many parts of the Travancore forests and is used by the hillmen for temporary huts, the reeds themselves being employed for frame work and the leaves serving as thatch. The reeds are also used for fencing, basket-making, mats &c., and an excellent paper is made out of the fibre.

6. *Teinostachyum wightii.* Another reed found on the hills and evergreen forests 3,000-4,000 feet; reeds not exceeding 1 inch in diameter and 10 feet high.

7. Amma — *Ochlandra rheedii.* Found on the banks of rivers in the low country; reeds up to 3/4 inch in diameter and 10 feet high, used for basket-making.

There are also many other kinds of reeds not yet identified. Of grasses the most important is the lemon grass, *Andropogon schœnanthus*, from which the famous lemon grass oil is extracted.

Fibrous plants. The Vakkanar, a very strong and durable fibre exclusively used for the dragging of timber by elephants, is made of the bark of *Sterculia villosa*, a small tree of rapid growth with straight trunk and smooth bark. All the layers of this tree can be stripped off from the bottom to the top with great facility and fine pliable ropes are formed from the inner layers while the outer ones yield coarser ropes. The fibre is unusually strong as the strands not only run lengthwise but are formed into a net-work by other strands crossing them

diagonally. *Sterculia guttata* is another tree of the same species yielding a useful fibre which is generally used for making coarse bags.

The Arayanjili, *Antiaris toxicaria*, yields, as we have already noticed, strong fibres which are excellently fitted for matting, sacking and cordage. The Kaivanar so largely used by the Chalpans of Trivandrum, and the low-caste dhobies of Central and North Travancore for making coarse cloths, gunny bags and sacking is obtained from the bark of Valampiri or *Helicteres isora* which occurs as an undershrub in most of the lower and outer forests of Travancore. The fibres are strong and white-coloured and are well adapted for ropes and cordage. A fortnight's soaking of the fresh stems in running water yields a fibre of very good colour with a pearly lustre. Strong fibres are also made from the bark of Pulimanji or *Hibiscus cannabinus* and its allied species *H. tiliaceus* (Nirparuthi), of Cherutali or *Antidesma bunias* and Nagavalli or *Bauhinia scandens* and from the roots of *Butea superba* and its allied one *Butea frondosa*. A species of Crotalaria resembling *Crotalaria juncea* or sunn-hemp is largely grown in Shencottah and the northern districts of Ampalapuzha, Shertallay, Vaikam, Alangad, Kunnatnad and Parur, especially in Vaikam. Here the plant as well as its fibre are called Wuckoo, the latter being largely employed in the manufacture of fishing net and tackle. Some specimens of strong canvas made of this fibre were sent to the Madras Exhibition of 1851, which have been much approved of by competent judges from the compactness and strength of the manufacture. The Erukkalai plant, *Calotropis gigantea*, a plant growing wild in Travancore, generally on hot stretches of bare sand as well as in dry, rocky and exposed situations, yields useful fibres which are soft, white, silky and very tenacious. But the comparative shortness of the staple and the difficulty of extracting the fibres probably explain the sparing use made of them in the arts and manufactures. The fibre possesses many of the properties of the European flax and can be spun into the finest thread for sewing and weaving cloth. The white silk-like material of the pods has been successfully tried to mix with silk.

Among other common plants of Travancore yielding useful fibres may be mentioned, the Indian hemp largely grown for Ganja, Inja, Chiyakka, Jack and Anjili, Rattans, Ilavu, Mul Ilavu, Murunga, some species of Banyan, Nedunar, Poonga, Venga and Pooarasu. Of the plants yielding useful leaf-fibres the commonest are the plantains, of which there are several species. A regular industry has grown up on the plantain fibre, an account of which is given in the Chapter on Arts and Industries. Next come the Aloes, of which the Mexican

aloe or Anakkattazha and the green aloe of St. Helena have become naturalised in the country. The pine-apple which is now regularly cultivated in some of the districts, especially in the South, yields an excellent fibre which from its silky lustre and great strength has been suggested as a fair substitute for flax.

The fibre of the palms requires special mention. The cocoanut, the palmyra, the talipot, the bastard sago and the wild dates, all yield good fibres which are "characterised by extreme tenacity, a certain degree of elasticity, firmness and gloss," and are specially adapted for the manufacture of brushes, cordage, ropes and cables. The *Kittul* fibre of commerce is obtained from the fronds of *Caryota urens* which is much valued for its sago and toddy as well. Coir, the produce of the cocoanut palm, is not a true fibre but only a seed-hair like cotton and other vegetable flosses.

Medicinal trees and plants. The number of medicinal plants seems to be legion. The native doctors use a very large variety of plants and shrubs for medicinal purposes. A short notice of only a few of them is attempted here.

We will start with those trees that are poisonous as well as medicinal. Of these, the Yettimaram or Kanjiram, *Strychnos nux-vomica*, comes first. It is a tree of middle size common throughout Travancore. The seeds are most valued both in native and European medicine, and the well-known poison Strychnine is prepared from the kernel of the fruit. The pulp of the fruit is harmless and eaten by birds, monkeys and cattle. It is believed that the seeds of the fruit if taken for two years one or two every day have the effect of rendering innoxious bites of poisonous cobras. The Tettankotta or *Strychnos potatorum* is harmless and is used for several medicinal purposes. The seeds of this tree have the singular property of clearing muddy water, if it is poured into a vessel of which the sides have been rubbed with bruised or sliced seeds. They are devoid of all poisonous properties and are used as a remedy in diabetes and gonorrhea.

The Odallam, *Cerbera odollam*, a small tree growing largely on the banks of canals and backwaters, yields a very poisonous fruit somewhat resembling a mango. The Vellai-oomatha, *Datura alba*, and the Kari-oomatha, *Datura fastuosa*, are both very common weeds famous for the intoxicating and narcotic properties of their fruits. Their medicinal and poisonous properties are well known. Of the two the former is said not be quite so virulently poisonous as the latter. Both are used as anodyne and antispasmodic. Among other poisonous plants mention may be made

of *Sapium insigne*, a small tree growing on the upper hills, from which exudes a very poisonous and acrid juice, and the Chera or *Holigarna ferruginea*, a lofty tree found both on the slopes of the hills up to 3,000 feet and in the low country. This latter yields a sap which on exposure to air becomes dark like tar and when it falls on the body raises large blisters. The root of Mettonni or *Gloriosa superba*, a very handsome climbing plant, "one of the most ornamental plants any country can boast of," is used medicinally by the natives and is commonly believed to be very poisonous. It is applied in paste to the hands and feet of women in difficult parturition; mixed with honey it is given in gonorrhea. It is not poisonous in twelve-grain doses; on the contrary it is alterative, tonic and antiperiodic.

The following are some of the commoner medicinal plants arranged in the alphabetical order of their botanical names:—

Vettila Kasturi—*Abelmoschus moschatus*. A very common plant in Travancore, whose seeds have been given with the best effect in counteracting bites of venomous reptiles, being applied internally and externally.

Peruntutti—*Abutilon indicum*. The leaves of this shrub in decoction are used by European and native physicians as an emollient fomentation and an infusion of the roots is given as a cooling drink in fevers. The root is also used in leprosy and the seeds are reckoned laxative.

Kuppameni—*Acalypha indica*. The root of this small plant bruised in hot water is employed as cathartic, and the leaves as a laxative in decoction; mixed with salt the latter are applied externally in scabies. A decoction of the plant mixed with oil is a specific against gout and mixed with chunam is applied externally in cutaneous diseases.

Nayuri—*Achyranthes aspera*. The seeds are given in hydrophobia and in cases of snake-bites, as well as in ophthalmia and cutaneous diseases. The flowering spikes rubbed with a little sugar are made into pills and given internally in cases of dog-bites, while the leaves taken fresh and rubbed to a pulp are considered a good remedy for scorpion-bites. The root is used as a sort of tooth-brush in some parts of India.

Vasamboo—*Acorus calamus*. An aromatic bitter principle exists in the rhizomes of this plant, on account of which they are regarded as useful additions to tonic and purgative medicines, being much given to children in cases of dyspepsia, especially when attended with looseness of bowels. It is also beneficially employed in chronic catarrh, asthmatic complaints and intermittent fevers.

Adatoda—*Adhatoda vasica*. The flowers, leaves and root are all considered antispasmodic and are given in cases of asthma and intermittent fever. The leaves given in conjunction with those of Tooduvala and Kandankatiri are employed internally in decoction as anthelmintic.

Bilva—*Ægle marmelos*. The root, bark, leaves and the fruit are all medicinally used. The half-ripe fruit, especially newly gathered, is a very good remedy for chronic diarrhœa and dysentery. The root bark is a remedy in hypochondriasis, melancholia and palpitation of the heart and the leaves in decoction are used in asthma.

Chittaratta—*Alpina galanga*. The tubers which are faintly aromatic, pungent and somewhat bitter are the larger galangal of the shops and are used as a substitute for ginger. They are given in infusion in fevers, rheumatism and catarrhal affections.

Lemon grass—*Andropogon schœnanthus*. An infusion of the fragrant leaves which are bitter and aromatic is given to children as an excellent stomachic. It is also diaphoretic. The oil prepared from it is a most valuable remedy in rheumatism applied externally.

Vilamichum—*Andropogon muricatum*. An infusion of the roots is given medicinally as a gentle stimulant and a grateful drink in feverish cases. The roots reduced to powder are given in bilious affections, and mixed with milk and applied externally as cooling applications to the skin when irritated. They are delightfully fragrant and aromatic and contain a volatile oil used in perfumery. The root in infusion is also used in cases of gout and rheumatism.

Karuntumba—*Anisomeles malabarica*. The juice of the leaves of this shrub is given to children in colic and indigestion and fevers arising from teething; it is also employed in stomachic complaints, dysentery and intermittent fevers.

Samudrachedi—*Argyreia speciosa*. The leaves are used in the preparation of emollient poultices and also in cutaneous complaints being applied externally to the parts affected.

Perumarundoo—*Aristolochia indica*. The root which is nauseously bitter is said to possess emmenagogue and antarthritic virtues. It is said to be a valuable antidote to snake-bites, being applied both internally and externally. Mixed with honey the root is given in leprosy and the leaves internally in fever.

Nirmulli—*Asteracantha longifolia*. This plant is commonly met with by the side of paddy fields and other damp situations. The roots

are considered tonic and diuretic; administered in decoction, they are also employed in dropsical affections and gravel.

Kattu Atthi—*Bauhinia tomentosa.* The dried leaves and young flowers are administered in dysenteric affections and a decoction of the bark of the root is given in cases of liver and phlegmatic complaints and also as a vermifuge. The bruised bark is also occasionally applied to tumours and wounds.

Alpam—*Bragantia wallichii.* This is peculiar to the Malabar Coast. The whole plant mixed with oil and reduced to an ointment is said to be very efficacious in the treatment of inveterate ulcers. Bartolomeo refers to this plant as "the only Malabar plant which I can with certainty call an antidote to poison". The root is powdered and administered in warm water to those who are poisoned. The familiar Malayalam proverb is "Alpam akathu visham porathu" i. e., as soon as the Alpam root enters the body, poison leaves it.

Erukkalai—*Calotropis gigantea.* The acrid milky juice flowing from every part of this shrub is used by the natives for medicinal purposes in many different ways, besides preparations of the plant itself in epilepsy, paralysis, bites of poisonous animals, as a vermifuge &c. The root, bark and juice are used as powerful alteratives and purgatives. The plant as we have seen already is also valuable for the fine strong fibres with which it abounds.

Modakattan—*Cardiospermum halicacabum.* The root of the plant is diaphoretic and diuretic and is given in decoction as an aperient; the leaves are administered in pulmonic complaints and mixed with castor oil are internally employed in rheumatism and lumbago, and the whole plant boiled in oil is rubbed over the body in bilious affections. The leaves mixed with jaggery and boiled in oil are a good specific in sore eyes.

Seema Agathi—*Cassia alata.* The juice of the leaves mixed with lime-juice is a useful remedy for ringworm; the fresh leaves simply bruised and rubbed on the parts affected sometimes remove the eruption. The plant is also considered a cure in all poisonous bites, besides cutaneous affections.

Karuva or Kattukavangam—*Cinnamomum zeylanicum.* This small tree is very common in the jungles on the western coast. The seeds bruised or mixed with honey or sugar are given to children in dysentery and coughs and combined with other ingredients in fevers.

Elumichai—*Citrus medica.* Lime-juice is much used in medicine

by native practitioners, possessing all the virtues attributed to that of the English lemon. It is considered to possess virtues in checking bilious vomiting and to be refrigerent, astringent, stomachic and tonic; diluted with water and sweetened it forms a refreshing drink. The dried rind of the fruit also is used as a vegetable drug.

Sankhapushpam—*Clitorea ternatea.* The seeds of this common creeper are a useful purgative. The root is used in croup; it is also given as a laxative to children and is diuretic.

Nervalam—*Croton tiglium.* The seeds of this small plant yield the well-known Croton oil. They are of the size of a sloe and are considered one of the most drastic purgatives known. The oil is chiefly employed in incipient apoplexy, visceral obstruction and occasionally in dropsy. The seeds mixed with honey and water are often applied to obstruct buboes. The expressed oil of the seeds is a good remedy externally applied in rheumatic and indolent tumours.

Mavilangam or Nirmathalam—*Crataeva religiosa.* This small tree is abundant on river banks from 0-5,000 feet. The bark, leaf and root are all used medicinally. The leaves are slightly aromatic and bitter and are considered stomachic. The root is supposed to possess alterative properties. The juice of the bark is given in convulsions and flatulency and boiled in oil is externally applied in rheumatism.

Kuvamanjal—*Curcuma angustifolia.* An excellent kind of arrow-root is prepared from the tubers of this species, especially in Travancore, where the plant grows in great abundance, and this is a favourite article of diet. The flour powdered and boiled in milk is an excellent diet for sick people or children.

Wild Turmeric, Kasturimanjal—*Curcuma aromatica.* This is an ornamental and beautiful plant abounding in our forests. The root is used as a perfume and also medicinally both when fresh and dried. It possesses aromatic and tonic properties and is less heating than ginger.

Veliparuthi—*Dennia extensa.* This twining plant abounds in milky juice. In medicine the natives use the whole in infusion in pulmonary affections; if given in large doses it will cause nausea and vomiting. The juice of the leaves mixed with chunam is applied externally in rheumatic swellings of the limbs.

Karusalankanni—*Eclipta erecta.* The whole plant is alterative, tonic, purgative and diuretic. In paste with gingelly oil it is a good remedy

for elephantiasis, applied externally. It has a peculiarly bitter taste and strong smell. The root has purgative and emetic properties assigned to it, and is also used in case of liver, spleen and dropsy.

Mullumurunga—*Erythrina indica.* The leaves and bark of this prickly tree are used in cases of fevers. The leaves pulverised and boiled with ripe cocoanut are also applied to venereal buboes and pains in the joints, and mixed with jaggery are applied externally to the stomach in grips and colic.

Devadaram—*Erythroxylon monogynum.* The young leaves and tender shoots of this small tree are reckoned refrigerent. Bruised and mixed with gingelly oil they are applied as a liniment to the head. The bark is occasionally administered in infusion as a tonic.

Kammatti—*Excœcaria camettia.* This shrub grows abundantly along our backwaters and canals. It abounds in an acrid milky juice which is poisonous and blinding and is known as the "Tiger's milk tree." The juice is applied with good effect to inveterate ulcers. The leaves also are used for the purpose in decoction.

Karunochi—*Gendarussa vulgaris.* The leaves and tender stalks of this shrub are prescribed in certain cases of chronic rheumatism. The leaves in infusion are given internally in fevers, and a bath in which these leaves are saturated is very efficacious in the same complaint. The juice of the leaves is administered in coughs to children and the same mixed in oil as an embrocation in glandular swellings of the neck and the throat; mixed with mustard seed it is also a good emetic.

Choratti—*Gomphia angustifolia.* The root and leaves which are bitter are given as tonics in these parts. A decoction of the leaves is given in heart-burn and also applied in ulcers. The leaves, flowers and fruits boiled in water are administered as a wash in gingiva and for strengthening the gums. The root boiled in milk and mixed with cummin seeds is said to allay vomiting and the root and bark pulverised and mixed with oil are made into an ointment for scabies and other cutaneous affections.

Kazhanchi—*Guilandina bonduc.* The kernels of the nuts are very bitter and said to be powerfully tonic. They are given in cases of intermittent fevers mixed with spices in the form of powder. Pounded and mixed with castor oil they are applied externally in hydrocele.

Narunindi or Nannari—*Hemidesmus indicus.* This is the

country Sarsaparilla very common in Travancore. The root is used largely for the thrush in children, a drachm every morning and evening of the powder fried in butter. Dried and reduced to powder and mixed with honey, it is reckoned a good specific in rheumatic pains, boils &c., and in decoction with onions and cocoanut oil is internally recommended in hæmorrhoids, and simply bruised and mixed with water in diarrhœa. This has been employed as a chief and efficacious substitute for Sarsaparilla in cachectic diseases, increasing the appetite and improving the health. The milky juice of the fresh plant boiled in oil is applied externally in rheumatism and an infusion of the whole plant is given in fevers. Carivilandi or *Smilax ovalifolia* also possess all the virtues of the true sarsaparilla.

Kodagapala—*Holarrhena antidysenterica.* This is a common but handsome flowering shrub in the Malabar Coast. A medicine is prepared from the long pods, which is efficacious in cases of dysentery. The plant has astringent and tonic properties in its bark and is a remedy in fevers.

Modirakanni—*Hygonia mystax.* This is a handsome shrub with beautiful golden yellow flowers. The bruised roots are used in reducing inflammatory tumours, as a febrifuge and anthelmintic, especially for children, and also as a remedy in the case of snake-bites.

Maravetti—*Hydnocarpus wightiana.* The fruit if eaten occasions giddiness. An oil is extracted from the seeds given in cutaneous diseases and ophthalmia, causing an excessive flow of tears.

Vallavai—*Hydrocotyle asiatica.* The leaves of this wildly distributed herb are roasted and given in infusion to children in bowel complaints and fevers. They are also applied to parts that have suffered from blows and bruises as anti-inflammatory. The plant is also said to be an excellent specific for leprosy.

Orelatamara—*Ionidium suffruticosum.* The fruit in infusion is diuretic, and is a remedy in gonorrhœa and affections of the urinary organs. The leaves and tender stalks are demulcent and are used in decoction and electuary: also employed mixed with oil as a cooling liniment for the head.

Indian Jalap, Shevatai—*Ipomœa turpethum.* The fresh bark of the root is employed as a purgative mixed up with milk. Being free from any nauseous taste or smell, the root possesses a decided superiority over jalap for which it might well be substituted.

Kattumalhika—*Jasminum angustifolium*. The bitter root of this twining shrub ground small and mixed with lime-juice and Vasamboo root is considered a good remedy in ringworm. The leaves of its allied species, Jirakamulla or *J. sambac* if boiled in oil exude a balsam which is used for anointing the head in eye-complaints. It is said to strengthen the vision. An oil is also expressed from the roots used medicinally.

Kattamanakku—*Jatropha curcas*. The seeds of this shrub are purgative occasionally exciting vomiting. A fixed oil is prepared from the seeds useful in cutaneous diseases and chronic rheumatism applied externally, also for burning in lamps. The leaves warmed and rubbed with castor oil are applied to inflammations when suppuration is wished for, and the juice of the plant is used for hæmorrhoids. The oil is a very much more powerful purgative than castor oil but very uncertain in its action. The Chittamanakku or ordinary castor oil plant belongs to a different species, *Ricinus communis*, whose oil is used largely as a mild laxative and for burning lamps.

Vembu or Neem tree—*Melia azadirachta*. This is a beautiful tree whose leaves, bark, seeds and oil are all medicinally used by the natives. The bark which has a remarkably bitter taste is considered a most useful tonic in intermittent fevers and chronic rheumatism, administered either in decoction or powder. The oil which is of a deep yellow colour and much used for burning lamps, is a useful remedy in leprosy and is moreover anthelmintic and stimulant, being used externally in bad ulcers and as a liniment in headaches and rheumatic affections.

Champaka—*Michelia champaca*. The bark of the root is red, bitter and very acid and when pulverised is reckoned emmenegogue; the flowers beaten up with oil are applied to fetid discharges from the nostrils, and all parts of the tree are said to the powerfully stimulant.

Thottavadi—*Mimosa pudica*. This is the common sensitive plant. Mixed with gingelly it is given as a drink in gonorrhœa.

Karuveppila—*Murraya koenigii*. This is the curry-leaf tree whose leaves are used for flavouring curries. The leaves are further used in dysentery and to stop nausea; the root is laxative and both bark and roots are stimulants and are used externally as remedies in eruption and in infusion to check vomiting in cholera.

Wild Nutmeg, Jatikkai—*Myristica laurifolia*. This is a large tree common in the evergreen forests. The mace of this kind of nutmeg has not the same virtues as that of the common one. Mixed with honey it is

administered in coughs and pectoral affections but generally in combination with other ingredients.

Sweet Basil, Vellatulasi—*Ocimum basilicum*. The whole plant is aromatic and fragrant. The seeds are cooling and mucilaginous and are said to be very nourishing and demulcent. An infusion is given as a remedy in gonorrhœa, catarrh, dysentery and chronic diarrhœa, and the juice of the leaves is squeezed in the ear in ear-ache. It is said the seeds are a favourite medicine with Hindu women for relieving the after-pains of parturition.

Tulasi—*Ocimum sanctum*. The juice of this plant is given in catarrhal affections in children and mixed with lime-juice is an excellent remedy in cutaneous affections, ringworms &c. The root is given in decoction in fevers.

Nelli—*Phyllanthus emblica*. The seeds are given internally as a cooling remedy in bilious affections and nausea, and in infusion it makes a good drink in fevers. They are are also used in diabetes. The bark of the tree is used for dysentery and diarrhœa, and mixed with honey it is applied to aphthous inflamations of the mouth. The fruit is pickled or preserved in sugar. The young branches of the tree are put into wells to impart a pleasant flavour to the water, especially if it be impure from the accumulation of vegetable matter or other causes.

Kilanelli—*Phyllanthus niruri*. The root, leaves and young shoots are all used medicinally, the two first in powder or decoction in jaundice or bilious complaints and the last in infusion in dysentery. The juice of the stem mixed with oil is employed in ophthalmia.

Pevetti—*Physalis somnifera*. The root of this shrub is said to have deobstruent and diuretic properties. The leaves moistened with warm castor oil are externally employed in cases of carbuncle. They are very bitter and are given in infusion in fevers. The root and leaves are powerfully narcotic; the latter is applied to inflamed tumours, while the former in obstinate ulcers and rheumatic swellings of the joints mixed with dry ginger.

Black Pepper, Nallamilagu—*Piper nigrum*. This is indigenous to the forests of Malabar and Travancore. For centuries past pepper has been an article of export to the European countries and even to-day a considerable quantity is annually exported from Travancore. The cultivation of this very common vine is described elsewhere. The berries medicinally used are given as stimulant and stomachic, and when toasted have been

employed successfully in stopping vomiting in cases of cholera. The root is used as a tonic, stimulant and cordial. A liniment is also prepared which is used in chronic rheumatism. The watery infusion is used a gargle in relaxation of the uvula. As a seasoner of food, it is well known for its excellent stomachic qualities. Pepper in over-doses acts as a poison by over-exerting the inflammation of the stomach and its acting powerfully on the nervous system. It is also successfully used in vertigo, and paralytic and arthritic disorders.

Kodiveli—*Plumbago zeylanica.* The fresh bark bruised is made into a paste, mixed with rice conjee and applied to buboes. It acts as a vesicatory. It is believed that the root reduced to powder and administered during pregnancy will cause abortion.

Pomegranate, Mathalam—*Punica granatum.* All the parts of this tree are used medicinally. The rind of the fruit and flowers which are powerfully astringent are employed successfully as gargles, in diarrhœa and dysentery; the pulp is sub-acid, quenching thirst and gently laxative, while the bark is a remedy for tape-worm given in decoction.

Nagumâlli—*Rhinacanthus communis.* The fresh root and leaves of this shrub bruised and mixed with lime-juice are considered a useful remedy in ringworm and other cutaneous affections. Milk boiled in the root is reckoned aphrodisiacal and the roots are used as a cure for bites of poisonous snakes.

Karinghota—*Samadera indica.* This tree grows abundantly in Travancore and Cochin. The bark has febrifugal properties and is used by the natives for this purpose. An oil extracted from the kernels of the fruit is extensively used in rheumatism.

Sandalwood—*Santalum album.* Sandal reduced to powder is supposed to possess sedative and cooling properties and is hence prescribed in fever and gonorrhœa. Mixed with butter it is applied in headaches. Internally it is given in fevers and bilious affections and externally in prickly heat and cutaneous eruptions. It yields by distillation a pale-yellow volatile oil, which is stated to be a successful remedy in gonorrhœa.

Belamodagam—*Scævola kœnigii.* The leaves of this common shrub made into a poultice are powerfully emollient in tumours. Boiled in water a drink is prepared from them and administered internally to excite the flow of urine and in lochial obstructions.

Ealettadi-maravara—*Scindapsus pertusus.* The pericarp of this singular looking plant common in the jungles between Quilon and Courtallam is used in leprosy and scabies generally combined with other ingredients and in infusion for cough and rheumatism. Anattippili, *Scindapsus officinalis*, another plant of the same species, is reputed to have stimulant, diaphoretic and anthelmintic virtues.

Senkottai—*Semecarpus anacardium.* The acrid juice of the shells is given in small doses in leprous and scrofulous affection. An oil is prepared from the kernels useful in rheumatism and sprains; undiluted it acts as a blister.

Agathi—*Sesbania grandiflora.* The bark is powerfully bitter and is used as a tonic. The tender leaves, legumes, and flowers are all eaten by the natives in their curries. An infusion of the leaves is given in cases of catarrh.

Kandankathri—*Solanum jacquini.* There are two varieties of this prickly creeper. The fruit is bitter and sub-acid and considered as an expectorant by the natives and given by them in coughs and consumptive complaints; also in decoction in humoral asthma. They are said to be good for the digestion.

Tooduvala—*Solanum trilobatum.* This is another creeper of the same species, much used in native medicine. The roots and leaves are given in decoction or powder in consumptive complaints, while the berries and flowers are given in decoction for coughs. Cheruchunda or *Solanum indicum* is also used largely in medicine.

Tanikai—*Terminalia belerica.* The kernel of the nut mixed with honey is given in certain cases of ophthalmia. The juice of the bark and root is given in decoction with rice and milk in colic. The fruit is astringent in taste, and is tonic and attenuent; it is also used in dropsy, diarrhœa, piles and leprosy, as well as for coughs. In large doses it becomes a narcotic poison.

Indian Almond, Vadankotta—*Terminalia catappa.* The kernel of the nuts of this tree has the taste of an almond and may be used for the same purposes but does not contain so much oil. The juice of the leaves with infusion of rice is given for bile, headache and colic pains. An ointment is made from the young leaves and milk of the nut, which is applied medicinally in scabies, leprosy and similar cutaneous affections.

Kadukai—*Terminalia chebula.* The gall-nuts when rubbed with

an equal portion of catechu are used in aphthous complaints and considered a valuable remedy. The unripe dried fruits are recommended as purgative by the natives; mixed with honey the fruit is given in infusion in dropsy and diabetes, and hæmorrhoidal affections and externally in cases of sore eyes &c.

Sirukanjori—*Tragina cannabina*. The root of this stinging plant is considered diaphoretic and is prescribed in decoction as an alterative; also in infusion in ardent fevers.

Nerunji—*Tribulus lanuginosus*. The leaves and root are said to possess diuretic properties, and are prescribed in decoction, while the seeds powdered are given in infusion to increase the urinary discharge, also in dropsy and gonorrhœa. The herb is said to be astringent and vermifuge and the seeds cordial.

Peppodal—*Trichosanthes cucumerina*. The seeds are reputed good in disorders of the stomach and the tender shoots and dried capsules are very bitter and aperient and are reckoned among the laxative medicines. In decoction with sugar they are given to assist digestion. The juice of the leaves is emetic and that of the root very purgative, while the stalk in decoction is expectorant.

Narumpanel—*Uvaria narum*. This climbing shrub seems peculiar to Travancore. A sweet-scented greenish oil is obtained from the roots by distillation, which as well as the root itself is used in various diseases. The roots which are fragrant and aromatic are also used in fevers and hepatic as well as cutaneous diseases.

Chembaravalli—*Vitis indica*. The juice of this plant mixed with oil is applied to affections of the eyes. The root beaten up and mixed with oil and cocoanut milk is said to be a cure for carbuncles, pustules and boils, and the juice of the root mixed with sugar is cathartic.

Ginger, Inji—*Zingiber officinale*. The ginger plant is extensively cultivated all over Travancore and its method of cultivation is described elsewhere. The ginger from Malabar is reckoned superior to any other. Ginger from its stimulant and carminative properties is used in toothaches, gout, rheumatism of the jaw and relaxed uvula with good effect and the essence of ginger is said to promote digestion. It is said to act powerfully on the mucous membrane though its effects are not always so decided on the remoter organs as on those into which it comes into immediate contact. Beneficial results have been arrived at when it

has been administered in pulmonary and catarrhal affections. Headaches have also been frequently relieved by the application of ginger poultices to the forehead. The native doctors recommend it in a variety of ways, externally in paralysis and rheumatism, and internally with other ingredients in intermittent fevers.

Jujube, Elantha—*Zizyphus jujuba*. The fruit of this small tree is sweet and palatable, and the seeds are given internally with other ingredients to allay irritation in the throat, coughs &c., Mixed with buttermilk the seeds are also given in bilious affections, and mixed with oil externally in rheumatism. The bark of root powdered and mixed with oil is applied to ulcers. A drink prepared from the leaves boiled in milk is given in virulent gonorrhœa; the leaves boiled and applied to the navel in the form of a plaster take away dysuria and strangury, and the juice of the root mixed with castor oil seeds is used as a purgative in bad stomachic complaints.

Flowering and Ornamental plants.

Allamanda cathartica. This showy plant was introduced into India from Guiana in 1803. It has become quite naturalised and is one of the handsomest ornaments of gardens. If allowed to climb up large trees, the effect is very striking and beautiful owing to the clusters of bright yellow flowers it is covered with.

Samstravadi—*Barringtonia acutangula*. This as well as its allied species, *B. racemosa*, are both handsome trees with long pendulous racemes of scarlet flowers, commonly to be met with along the banks of our backwaters.

Mandarai. There are two varieties. The Velutha mandarai, *Bauhinia acuminata*, is a favourite shrub in gardens, the large white fragrant flowers having a pretty appearance; the Chuvanna mandarai, *Bauhinia variegata*, is a small handsome and ornamental tree in gardens having beautiful purple flowers.

Porasu, or Palasa—*Butea frondosa*. This is a middle-sized tree which when in flower has a very striking appearance from its bright scarlet corollas. The natives are fond of offering the flowers in their temples and the women by intertwining the rich scarlet blossoms in their hair assume a very attractive and pleasing appearance.

Saralkonnai—*Cassia fistula*. This is easily recognised by its beautiful and fragrant long pendulous racemes of yellow flowers and is used

largely in medicine. The flowers form a favourite offering to the God Siva.

Chirutekku—*Clerodendron serratum*. This is a very ornamental shrub cultivated in Travancore. Its flowers are pale blue with lower lip indigo-coloured.

Sankhapushpam—*Clitorea ternatea*. This a very common creeper with pretty blue or white flowers. It is very ornamental for trellis work but by its quick spreading it is apt to become a little troublesome in gardens.

Kasturimanjal—*Curcuma aromatica*. An ornamental and beautiful plant, abounding in the Travancore forests with flowers, largish, pale-rose coloured with a yellow tinge along the middle of the lip.

Murunga—*Erythrina indica*. A small tree with scarlet flowers much used in these parts for the support of the betel vines and serving as an excellent hedge plant from its being armed with numerous prickles.

Gloriosa superba. This splendid creeper with flowers yellow and crimson-mixed is commonly met with in the Travancore forests. It is considered one of the most ornamental plants any country can boast of.

Chemparuthi—*Hibiscus rosa-sinensis*. This shrub is generally cultivated in gardens and grows to a height of 12-15 feet. Throughout the year may be seen its large flowers, single or double, crimson, yellow or white.

Adakodien—*Holostemma rheedii*. The flowers of this creeper found largely in the Covalam jungles near Trivandrum are remarkably pretty and would answer well for trellis work in gardens.

Thetti—*Ixora coccinea*. The Ixoras are all very ornamental plants with white, cream or orange-coloured flowers. The shurbs grow to a height of 4 or 5 feet and flower all through the year. The name ixora is derived from the Hindu deity Iswara to whom the beautiful scarlet flowers are offered in temples.

Kattumallika—*Jasminum angustifolium*. The flowers of this twining shrub are large, white with a faint tinge of red, star-shaped and fragrant.

Kattujirakamulla—*Jasminum pirulam*. This is a fine-looking plant and very desirable in gardens from its white fragrant flowers which open in succession. Jirakamulla or *Jasminum sambac* is another plant of the same species commonly cultivated in gardens for its fragrant flowers.

Manimarathu—*Lagerstræmia flos-reginæ*. This, as already referred to, is without exception one of the most showy trees of the Indian forests when in blossom. It is now commonly cultivated in gardens on this coast where the moist damp climate is most suitable for its growth and the full development of its rich rose-coloured blossoms. In the forests near the banks of rivers it grows to an enormous size, some having purple flowers and forming a most beautiful and striking appearance.

Nedumchetti—*Memecylon amplexicaule*. A handsome flowering shrub common in our forests. In April and May it is covered with numerous very small bluish purple flowers. *M. tinctorium*, another shrub of the same species, is also common and highly ornamental in gardens when in flower, the stem being crowded with beautiful sessile purple florets.

Champaka—*Michelia champaca*. This tree is celebrated for the exquisite perfume of its flowers and is highly venerated by the Hindus being dedicated to Vishnu. The natives adorn their heads with them, the rich orange colour of the flowers contrasting strongly with their dark black hair. Its medicinal properties have already been referred to.

Indian Cork tree—*Millingtonia hortensis*. This tree with numerous, large, pure white and fragrant flowers is very handsome and ornamental and well adapted for avenues and plantations.

Vellila or Vellimadantai—*Mussænda frondosa*. A common shrub having gold-coloured flowers all through the year. The white calycine leaf contrasting with the golden coloured flower gives this shrub a conspicuous appearance.

Lotus, Tamara—*Nelumbium speciosum*. The large white or rose-coloured flowers of the lotus common in tanks throughout India are held specially sacred among the Hindus.

Sweet-scented Oleander, Arali—*Nerium odorum*. There are two or three varieties of this shrub common on the banks of rivers and channels with deep red, white, rose-coloured, single and double flowers.

Parijatakam or Pavazhamalli—*Nyctanthes arbor-tristis*. The bright red flowers of this small tree give it a very lively and attractive appearance, especially in the evenings and nights when a very delicious fragrance is given out.

Alli—*Nymphæ rubra*. This beautiful flower is common in ditches and tanks but neither so common nor so grand as the Tamara.

Kaitha, Tazhai—*Pandanus odoratissimus*. This large and singular-looking shrub is very common along the banks of our canals and back-waters where they are planted to bind the soil. The flowers are very fragrant but are seldom visible; the large red fruit much like a pine-apple is very attractive. There is a special variety of this in Central Travancore, known by the name of Kuramadie.

Venga—*Pterocarpus marsupium*. This has been already referred to as being a large and very beautiful tree especially when in flower, with flowers small, sweet-scented and bright yellow.

Nandiyavatta—*Tabernæmontana coronaria*. There is a variety with double flowers which are fragrant at night. It is more common in gardens than the single one.

Among the other indigenous flowers may be mentioned, the Javanti (*Vicoa auriculata?*), the common rose found only in gardens, the Andimallika, a small violet flower blossoming in the evening, and the Kolundu, a shrub whose leaves are very fragrant.

Concluding remarks.—The foregoing account of our forests might produce an impression on the general reader of the abundance of forest wealth in Travancore. This however is a chimera, whatever might have been their condition in bygone times, when Travancore forests are said to have been indented upon for the building of the British Navy, and Travancore Teak entered largely in the construction of ships that fought the battle of the Nile and gave victory to Nelson at Trafalgar. Such is not the case at any rate now. In the first place, there is no part of Travancore known as the 'Impenetrable forest' marked in Ward and Conner's maps, except in the sense of undergrowth and 'Inja-padappu' (thicket of *Acacia intsia*) growing luxuriantly to the detriment of the jungle-wallah's easy movements. In the second place, Travancore-grown teak has been found not enough to satisfy local Merchants or P. W. wants. Burma teak has been imported more than once. And there is besides a perennial complaint from the people that they cannot get fairly good teak, nor in sufficient quantities, for their own house-building purposes. Considered in any light, it may be safely stated that the 'untold wealth' of the Travancore forests is a thing of the past; it cannot apply to present-day conditions. If a sustained policy of care and economy is vigilantly followed for the next 100 years or so, the Travancore forests may be resuscitated with real advantage to the State and prosperity to the agricultural ryots. The work of devastation has been unfortunately carried out with such activity, especially in the sixties and seventies of the last century. But there is no

doubt that a vast field for private enterprise exists in the Travancore jungles and Travancore minerals. It requires knowledge, perseverance, capital and combined effort to utilize them. Mr. T. Ponnambalam Pillay* M. R. A. S. has collected some valuable data on this subject while he acted as Conservator of our Forests, 3 years ago. He believes that there are 1,000 species of trees in Travancore against 1,200 for all India and 160 in Europe. Out of this, the Forest Department of the State respects only 4 Royal and 20 Reserved trees. There is a piece of forest known as the Yerur Reserve. It has an area of 100 square miles, each square mile containing timber of the 24 species to the value of 1 lac of rupees. Thus for 100 square miles the value of this timber is 100 lacs. The extent of the total reserved area in Travancore is about 2,350 square miles. Of this, some tracts such as Kulattupuzha, Ranni, Konni and Malayattur are superior to Yerur, while there are others inferior to it. To add to these, there are unreserved forests in which are to be found the superior species already referred to, besides the Royal trees found in private property. Thus following the calculation, the amount of the value of the timber from those trees can be put down at 2,500 lacs of Rupees or 25 years' revenue of the State. Only a few species of trees are made use of by the people in Travancore. This is due either to ignorance of the quality of the other species, or to sentiment on the part of the consumers. The timber called Irul or Irupul or Iron-wood (Xylia dolabriformis) is largely used in Burma and Ceylon for building purposes. Though it is a very hardy wood it is not in requisition in Travancore. For a long time Thambagam or Kongu (Hopea parviflora) was not used in Travancore, and it is only some time since its virtues were known to the house-building public. It is therefore possible to introduce into the market those species that are now not known. Again there are certain trees which are not close-grained and of a perishable nature. Scientists have found out a method by means of which certain chemical substances are injected into the trees to render the timber durable, and to secure immunity from the attacks of insects. Thus the wealth of the Forests can be increased. It has been seen that the value of the 24 species of timber in the forests came to 25 years' revenue of the State, and the value of the remaining ones can safely be put down to an equal amount. In speaking of timber, fire-wood has not been included. This article of daily want is obtained from the country and not imported from outside Travancore. Every individual of the State consumes at the rate of a chuckram (six and three-fourth pies) worth of fuel every day. Omitting one-fourth of the population who live on the sea-board towns

*In a lecture delivered under the auspices of the Public Lecture Committee, Trivandrum, in 1902.

and villages and use cocoanut shells for fire-wood, and omitting another one-fourth of the population who are able to get their fuel from their private compounds, and a third one-fourth of the population who gather dried leaves and twigs on the road side and other places and use them and cow-dung cakes in the place of fire-wood, there remains but one-fourth of the whole population of the State who get their fire-wood from the forest and the value of the quantity used by them comes to Rs. 25,000 daily. The value of the large quantities that are exported as well as those used for the several mills and factories, and for the manufacture of sugar, lemon-grass oil, and charcoal may be put down at Rs. 5,000. Thus the cost of the total quantity of fire-wood used in a day may be put down at Rs. 30,000. To this an equal amount which rots away in the forests may well be added without exaggeration. The amount of Rs. 60,000 is the value of the fire-wood at the place of consumption or outside the forests. Its value at the forests themselves may be put down at one-third of that value. Thus the amount consumed in a year is 73 lacs of Rupees worth of fire-wood which is the lowest figure possible. The capital amount that will be required to produce the 73 lacs must be another 2,500 lacs of Rupees. Notwithstanding the fact that a large quantity of fuel is available in the country the public demand is not met. There is not a single private depot in all Travancore, excepting at the mills where the rates are exorbitant. People go in for cocoanut shells because they cannot get fire-wood. These are not only costly but also not suited for cooking, owing to the violent way in which they burn. At the present moment it may not pay to bring in all the fire-wood that rots away in the forests. But certainly there is a large quantity that could be brought with advantage in order to create a trade in it. In Madras there are fuel-depots in every street. Though the proprietors do not take the commodity from long distances, still they manage to get about 10 per cent profit. In Trivandrum and other populous centres south of Quilon, excepting in small bazaars, we cannot get fire-wood unless we take advantage of the carts that perambulate the streets in the mornings. This industry has not yet been touched; undoubtedly there is plenty of money in it. The sap-wood of all coloured trees and the entire volume of all colourless trees, provided there is cellulose substance in them, can be made use of for making wood-pulp, which plays an important part in the manufacture of paper. The cellulose substance found in them should be separated from the rest. This is done by putting together small pieces of fresh cut wood and grinding them in a mill where water must constantly be poured in. By constant repetition of this process the fibrous substance will be retained and ground down. The same substance is also obtained by boiling the fresh

cut pieces already referred to, and separating the cementing substances from the fibres. By either process one-fourth of the original weight can be obtained as pulp. It is largely in demand in all manufacturing countries, and the quantity that is annually imported into Great Britain and Ireland is alone worth four millions of pounds sterling. Young shoots of bamboos, portions of matured bamboos and the surplus quantity of those that are not wanted for domestic purposes, several kinds of reeds, the wild sugar-cane and the refuse of the sugar-cane mills are considered to be good paper materials. Teak, Sandalwood, Lemon-grass and Cherupunna can give oils of commercial value and will form a basis of remunerative industry. Tar, gums, resins, tannic acid and dye are also obtainable from ordinary trees if people will come forward and take up the matter. The abundance of fibre-material in Travancore is already known. It can be increased still more. The well-known senna-leaves are found largely in South Travancore. It is as good as the Tinnevelly senna which is in great demand in the European markets. Gum kino is not only useful for dyeing, but it is also a very valuable medicinal product. The value of 1 lb of it when sent back from England with English labels on is about Rs. 17, but if it is locally prepared it will not exceed Rs. 6. It is believed that the Travancore forests contain wealth to the extent of 100 years' revenue of the State, or 1,000 millions sterling and thus afford an inexhaustible field for private industry.

CHAPTER IV.

Fauna.

(Contributed by Harold S. Ferguson Esq. F. L. S., F. Z. S.)

"The early progenitors of man must have been once covered with hair, both sexes having beards; their ears were probably pointed, and capable of movement; and their bodies were provided with a tail, having the proper muscles. Their limbs and bodies were also acted on by many muscles which now only occasionally reappear, but are normally present in the Quadrumana ... These early ancestors of man, thus seen in the dim recesses of time must have been as simply, or even still more simply organised than the lancelet or amphioxus."

Darwin.

(*Prefatory Note.*—To my old friend and brother-officer, Mr. H. S. Ferguson F. L. S., F. Z. S., I am beholden for this chapter on the Fauna of Travancore—a subject upon which he is an authority having spent nearly the whole of his life in the country, first as a Planter for several years on the Travancore Hills, then as the Guardian of the Princes, then as Commandant of one of the battalions in the Travancore army (Nayar Brigade), and lastly as the Director of the Government Museum and the Public Gardens at Trivandrum. He is a good shikari and has always been a diligent student of Natural History, both of which qualifications entitle him to be reckoned as an authority on the subject. He has delivered several lectures on kindred subjects in pursuance of the scheme of Public Lectures instituted by the Travancore Government, and these lectures have generally drawn large audiences from among the educated classes of the Trivandrum Public. The value of the contribution has been enhanced by the fact that he himself kindly offered to write the chapter unsolicited by me—an offer with which I readily fell in as I could not think of a more competent authority.

He drafted this chapter about two years ago, but finally corrected it just as he was leaving Trivandrum on furlough in March 1904. As his contribution to the Natural History section of the State, he has discovered several species of reptiles and insects new to science; his observations upon cetaceans have been received with interest, and his study of the growth of tadpoles the result of which he has embodied in Notes which he has made known to the scientific world, all point him out to be a naturalist of no mean order.

The chapter is inserted here just as he left it. Not being a specialist myself on the subject, I have not taken the liberty to correct, abridge or modify it in any way.

(V. N.)

General. Travancore is a narrow strip of land more or less angular in shape with a maximum breadth of 75 miles and a length of 174 miles. It is bounded on the west by the sea and on the east by the watershed of the hills which run from Cape Comorin to the extreme north, ending in the Kannan Devan hills or High Range, which is connected with the Anamalays on the north and the Pulneys on the east. The annual rainfall varies in different parts but is abundant everywhere except in the extreme south. The average temperature in the low country is 85° and at 2,100 feet elevation it is ten degrees less. The dry season which lasts from the middle of January to the middle of April is well marked. As is usually the case where there are dense forests and a heavy rainfall, cases of melanism are not uncommon and seasonal variation in colour constantly occurs. All countries are characterised by the different kinds of animals that inhabit them and they can be grouped into regions, subregions &c., in accordance with the way in which these animals are distributed. In this respect Travancore belongs to the great Indo-Malay, or Oriental Region, which includes the whole of India, Ceylon, Assam, Burma, Formosa, Hainan, Cochin China, Malacca, Sumatra, Java, Borneo, the Philippine Islands and part of China. It is divided into three subregions, Cisgangetic, Transgangetic and Malayan. The first of these comprises "India proper from the base of the Himalayas to Cape Comorin and from the Arabian Sea and eastern boundary of the Panjab tract to the Bay of Bengal and the hills forming the eastern limit of the Gangetic alluvium with the addition of the island of Ceylon", and in this Travancore is included. It has, however, affinities in its hill fauna with that of the Himalayas and the south-western hill-group in Ceylon, but they are not sufficient, says Mr. Blanford, "to enable the S. Indian and Ceylonese areas to be classed with the Himalayan forest area in a separate subdivision or subregion". It has also affinities with the Malayan subregion as is shown by the occurrence of such genera as *Loris* and *Tragulus* among Mammals, *Draco* among Reptiles, and *Ixalus* among Amphibians. Travancore itself may be divided into four divisions:—(1) The forest-clad hill range up to and including the Cardamom Hills with an average height of 4,500 feet. (2) The Kannan Devan Hills or High Range more open in character and with an average height of 6,500 feet. (3) The low country from the north as far as Nagercoil. (4) The low country south of Nagercoil. Here the rainfall is only 25 inches and the palmyra takes the place of the cocoanut palm. The fauna resembles that of the east coast and here only in Travancore are found among Mammals the S. Indian Hedgehog (*Erinaceus micropus*), among Birds the smaller white Scavenger-vulture (*Neophron*

gingianus), the grey Partridge (*Francolinus pondicerianus*) and some others, and among Reptiles, *Gongylophis conicus* and *Eryx johnii*.

Mammals. There are no Mammals peculiar to Travancore, but the Toque Monkey (*Macacus pileatus*), the Ceylonese Palm-civet (*Paradoxurus aureus*) and the Ceylon brown Mungoose (*Herpestes fulvescens*), formerly believed to be confined to Ceylon, are found in Travancore, and lately two Dolphins, *Tursiops fergusoni* and *Sotalia fergusoni*, have been taken off the coast.

There are four species of Monkeys, two of which, the grey, or Bonnet monkey (*Macacus sinicus*) and the Toque monkey (*M. pileatus*), are found only in the low country and do not ascend the hills to any height. The other two species are (*Macacus silenus*) the Lion-tailed monkey, and (*Semnopithecus johnii*) the Nilgiri Langur, which are only to be found on the hills at elevations over 2,000 feet. The former may be met with in small herds but often goes about solitary. The latter is always found in small troops. The loud booming note of the male is a familiar sound in the hills. They are very gentle and easily tamed and are clean in their habits in captivity. Coolies on the tea estates are very fond of the flesh of these animals and are always anxious to get them as medicine. The Malabar Langur (*Semnopithecus hypoleucus*), a grey monkey with a black face, is found in the Cochin hills and in the the Kambam valley on the eastern slopes of the Cardamom Hills; but I do not think it has been actually recorded from Travancore. Of the Lemuroids there is only one representative the Slender Loris (*L. gracilis*) found in the lowland forests; according to Jerdon it is "rare on the Malabar Coast", but so far as Travancore is concerned this does not hold good as it is decidedly common. Some years ago I saw two specimens of a larger species and the Kanis about Ponmudi say they know of two kinds. To describe their respective sizes they point to their wrists and then to their thighs. I have failed to obtain a specimen, however, and have no record of the ones I saw.

The Carnivora are well represented in Travancore. To begin with, there are six Cats varying in size from the Tiger to the little Rusty-spotted Cat (*Felis rubiginosa*). Tigers are not uncommon on the hills, but in the south where there is an abundance of forest and very little grass, they are not easy to get. The next in size, the Leopard (*F. pardus*), is very common and many skins are brought in by villagers yearly for the Government reward. The black variety is common and is usually bolder and fiercer than the ordinary one. The Fishing Cat (*F. viverrina*) is a fine cat, coloured as its name implies, like the civets, grey with black

spots and lines. It is usually found about the neighbourhood of the backwaters. I cannot agree with Blyth that it is "a particularly tamable species". Those we have had in captivity in the Public Gardens have invariably been very shy, sulky and fierce. The Jungle Cat (*F. chaus*) is the commonest of all and is found in the low-country; in and about villages, it breeds freely with domestic cats. The Leopard Cat (*F. bengalensis*) used to be common some years ago about Kottayam but is now confined to the hills. This beautiful little cat is about the size of a domestic cat and is marked with black spots on a fulvous ground colour. It is commonest now in the High Range. The smallest of the six cats is the Rusty-spotted Cat (*F. rubiginosa*) which is found in the low country but is not common. The young of the Jungle Cat are very like the young of this species and it is difficult to distinguish them till they grow up. There are two Civets one of which (*Viverra civettina*) is very much larger than the other. Both are kept in captivity for the sake of the "musk" secreted by a gland near the tail.

Three Toddy Cats are found, one of which, *Paradoxurus jerdoni*, is confined to the hills at elevations over 3,000 feet. They are all nocturnal and feed on fruits though they are not above taking a meat diet when they can get it. The common Toddy Cat (*P. niger*) is a perfect pest as it invariably finds its way into houses and takes up its abode between the roof and ceiling where its movements and its smell make it a most undesirable visitor. The third species (*P. aureus*) I have only found in Trivandrum.

The Mungoose family are represented by four species of which the stripe-necked (*Herpestes vitticollis*) is the largest. It is found only in the forests and has very strong claws which enable it to dig out any prey that it has run to ground. *H. fuscus* is confined to the hills, but the common mungoose *H. mungo* and *H. fulvescens* are found in the low country.

Fifty years ago Hyænas were common in the neighbourhood of Trivandrum. Col. Drury in his *Life and Sport in Southern India* says "my shikari brought in this morning two Hyænas he had killed about seven miles from this". But now there are hardly any to be found. Jackals are plentiful and in the hills packs of wild dogs (*Cyon dukhunensis*) hunt and clear the district they happen to be in of every kind of game. When living on the hills I often heard them in full cry and on one occasion, attracted by the sound, three of us ran in the direction and arrived in time to find them pulling down a Barking Deer (*Cervulus muntjac*). We

drove them off and took the deer ourselves. On the other hand I have also seen them running mute. My own belief is that this is their usual habit but they give tongue when their quarry is in view. I am the more convinced of this as the sounds we heard were not continuous nor of long duration.

The Indian Marten (*Mustela flavigula, var Gwatkinsi*) is found on the hills, rarely in the south but more commonly in Peermade and the Cardamom Hills. They are nocturnal and sometimes give trouble by breaking into fowl-houses. In the backwaters both the common Otter (*Lutra vulgaris*) and the Smooth Indian Otter (*L. macrodus*) are to be met with. The last of the carnivora is the Sloth-bear or Indian Bear (*Melursus ursinus*). This is found on the hills at all elevations and is more dreaded by the hillmen than any other animal as it will attack at once if suddenly disturbed.

The next great group of Mammals is the Insectivores. About their habits there is little to be said. They are all nocturnal. The only Hedgehog found in Travancore is the South Indian (*Erinaceus micropus*) and it is only found in the extreme south about Nagercoil. Of the Shrews the so called "Musk rat" (*Crocidura murina*) is the best known and there are one or two other species of this genus recorded from the hills, but I have not come across specimens and have failed to obtain them from the hillmen.

The bats are well represented from the great dull coloured fruit-eating Flying-fox (*Pteropus medius*), conspicuous everywhere by its habit of associating in large colonies, to the little richly coloured Painted Bat (*Cerivoula picta*), hardly larger than a good-sized butterfly, that hides itself in the recesses of a plantain tree. The Fruit-eating Bats play an important part in the dispersion of seeds as they usually carry off the fruits to some distance and drop the seed when they have fed on the pulp. Insectivorous Bats enter houses very frequently at night and feed on the insects that are attracted by the light. So far, I have identified about fourteen species; but there are many more, I am sure, to be found on the hills.

Of the Rodents, our next group which includes the Squirrels, Rats, and Mice, Porcupines, Hare &c., the Porcupine (*Hystrix leucura*) is the largest. It is found only in the hills and is very destructive to garden produce. The Black-naped Hare (*Lepus nigricollis*) is common in the low country and on the hills. There are two kinds of Flying-squirrel both found only on the hills, the larger (*Pteromys oral*) is not uncommon

but the smaller (*Sciuropterus fuscicapillus*) is somewhat rare. The large black and red Squirrel (*Sciurus indicus*) is only found on the hills from 500 feet elevation upwards; its loud cry may be often heard in the forest. There are three small striped squirrels of which the Palm-squirrel (*S. palmarum*) is a familiar visitor to human habitations where its loud persistent chirrup when alarmed or exited renders it often most unwelcome. The other two kinds, (*S. tristriatus*) and (*S. sublineatus*), are found only on the hills, the latter only at elevations of over 2,000 feet. There is, however, one exceptional locality in the low country, seven miles from Trivandrum, where I have obtained specimens. Here there are remains of the old forest which once covered the whole of the country but is now confined to the hills. Of the Rat tribe the Malabar Spiny Mouse (*Platacanthomys lasiurus*) is the most interesting. It is found only on the hills where it lives in hollows made in old forest trees. It is something like a dormouse. The Antelope-rat (*Gerbillus indicus*) may often be seen at dark crossing the roads; it makes its burrows in open places such as the Parade grounds and the Public Gardens in Trivandrum. Of the remaining species, some six in all, the Bandicoot-rat (*Nesocia bandicota*) is the largest and the common Indian Field-mouse (*Mus-buduga*), an elegant little beast, the smallest. The common rat is ubiquitous and frequents human habitations most persistently; it is a splendid climber and runs up a punkah rope with the greatest ease.

From the small Rodents to the lordly Elephant is a great step, but this animal is the first member of the next order we have to consider viz., the Ungulates. Elephants are protected in Travancore and their ivory is a royalty of the Government so that they are fairly numerous in the hills. Mr. T. F. Bourdillon in his *Report on the Forests of Travancore* writes as follows:—

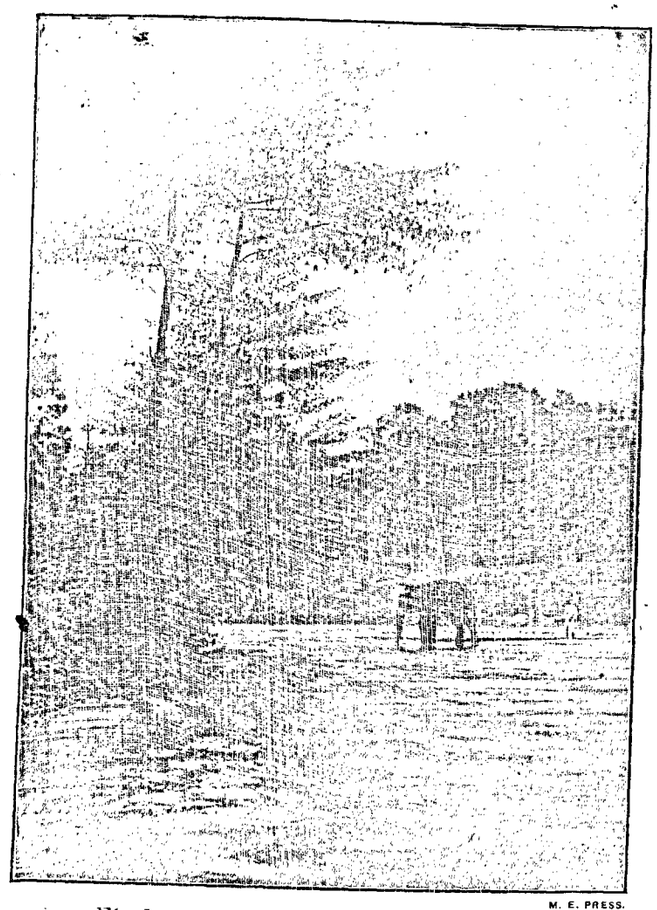
"These animals are wild in the forests, and are in some places particularly abundant. They do not always remain in the same spot, but move about over large areas, their movements being regulated by the quantity and condition of the food available, and by the state of the weather. Over the greater part of Travancore they descend from the hills as soon as the water begins to fail there, that is to say about January, and they are then to be found in the thickest and coolest parts of the lower forests in the vicinity of some river. As soon as the showers begin to fall in April, their instinct tells them that they can again obtain water on the hills, and that fresh grass has sprung up where the dry herbage was so lately burnt, and they immediately commence an upward movement to the higher ground. There they remain till about September when some, but not all of them, descend to the lower slopes of the hills and even to the low country, to see what they can get from the fields of hill-paddy then beginning to ripen, and they often destroy large quantities of grain. In November these migrants again ascend the hills and join their companions. Advantage is taken by us of the annual descent from the hills in the hot weather to catch these animals in

pits, but in November no attempt is made to capture them as the pits are then full of water. The question has often been debated whether the number of elephants in the country is increasing or decreasing. I believe that most people would say that elephants are more numerous than formerly, but I am inclined to think that this impression is formed from the increased damage done to cultivation of all sorts. If we recollect that cultivation is yearly extending, we can well understand that elephants are much more troublesome now than formerly, without there being any increase in their numbers; and if we could take a census of them we should probably find that their numbers are about stationary. I once attempted to estimate how many there are in the State; and I came to the conclusion that there must be from 1,000 to 1,500, the greater number of them being found in North Travancore, especially the Cardamom Hills. Sometimes elephants die in large numbers, as in the year 1866, when a murrain attacked them in the forests near Malayathur, and 50 pairs of tusks were brought to the Forest Officers at that place and Thodupuzha in April and May of that year. Such epidemics would doubtless occur more frequently if the number of elephants increased unduly and the supply of food fell short and their rarity is a sign that the animals are not troubled for want of food though their migrations show that it is not always to be obtained in the same place."

The Gaur, the so called "Bison" of Europeans (*Bos gaurus*), is the finest representative of the existing bovines. They go about in herds of which one old bull is the acknowledged leader and master. When age tells upon him he may be driven out after severe fight by a younger and a stronger one and he then abandons the herd and wanders about solitary. It is these solitary bulls that generally afford the finest trophies to the sportsman.

There are no wild Sheep in Travancore and the Goats are represented by a solitary species, the Nilgiri Wild Goat (*Hemitragus hylocrius*) miscalled by Europeans the Ibex. They are to be found in herds on the hills in suitable localities where there are grassy slopes and precipitous rocks. The bucks leave the herd from December to April when the does breed and go about with their kids. No Antelopes are found in Travancore but the Deer are represented by four species, the Sambur (*Cervus unicolor*), found at all elevations where there is a forest; the Spotted Deer (*Cervus axis*) that go about in herds and frequent open forests and bamboo jungle at the foot of the hills; the Rib-faced or Barking-Deer (*Cervulus muntjac*), usually found solitary, or in pairs at all elevations on the hills in thick forest; and the tiny little Mouse-deer (*Tragulus meminna*) that stands only about a foot high, and is also to be found only on the hills, where it leads a solitary and retired life except in the breeding season when the male and female keep together.

The Indian Wild Boar is the last of the Ungulates. Herds or "Sounders" of these animals are to be met with at the foot of the hills and about the cultivated patches where they do much damage to the crops. The young



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Elephant at bath in the Karamanai River.

Photo by J. B. D'Cruz.

are striped and spotted. Of the Cetaceans that frequent the coast no, much is known. The little Indian Porpoise (*Neophocæna phocænoides*) the False Killer (*Pseudorca crassidens*), the Common Dolphin (*Delphinus delphis*), *Tursiops catalania*, *Tursiops fergusoni* and *Sotalia fergusoni* are the only ones so far identified. The Indian Pangolin (*Manis pentadactyla*) is the only representative of the order Edentata. It feeds almost entirely on white ants which it seeks at night; during the day it lies up in a burrow scooped out under ground. There is a Game Preservation Regulation which is in force in the hill districts of Central and North Travancore. The close season for all Big Game is from 31st May to 1st October.

Birds. The birds cannot be treated of at such length as the mammals, as there are about 330 species found in Travancore. Of these, two only are peculiar to it while the third is only found elsewhere on the Pulneys. They were first brought to notice by Mr. Bourdillon and two are named after him, Bourdillon's Babbler (*Rhopocichla bourdilloni*) Bourdillon's Black-bird (*Merula bourdilloni*). This extends to the Pulneys and Blanford's Laughing-thrush (*Trochalopteron meridionale*) which is only found in the extreme south above 4,000 feet on the tops of the hills in forest. As it is not possible with the limited space at my disposal to enumerate all the birds, it will perhaps be the best way to point out those that are characteristic of the different divisions into which, as I have said, Travancore may be separated. To take the low country first. Two species of crows, the Indian House-crow (*Corvus splendens*) and the Jungle-crow (*Corvus macrorhynchus*) are ubiquitous, while the Drongo or King-crow (*Dicrurus ater* is the next most conspicuous bird with the exception perhaps of the common House-sparrow which is found wherever there are human habitations. Flocks of Rose-ringed green Paroquets (*Palæornis torquatus*) may be seen feeding on fruit trees or rapidly flying in search of food and uttering shrill cries as they fly. Perched on the telegraph wires or seated on the ground, a little green bird with a long bill and tail, the outer feathers of which are elongated and pointed, may be constantly met with moving from its perch in short flights after its insect prey. This is the common Bee-eater (*Merops viridis*). A relation of it, the white-breasted Kingfisher (*Haleyon smyrnensis*) is a much more gorgeously-clad bird; its white breast, chestnut brown head and blue black make it evident to the eye, while its high pitched tremulous cry forces itself on the ear. It frequents gardens and feeds on insects mainly, while a smaller edition of it *Alcedo ispida*, the common Kingfisher, is found on the banks of every tank or stream looking for fish to which its diet is limited. Another common Kingfisher is the Indian Pied (*Ceryle varia*), a black and white bird which

may be seen hovering over water and shooting down with a direct plunge when it descries a fish. Towards dusk another relation, the Common Indian Nightjar (*Caprimulgus asiaticus*) may be heard. It is known as the "ice bird" as its cry resembles the sound of a pebble skimming along the ice. Another bird that forces itself on the ear is the Tailor-bird (*Orthotomus sutorius*), it is a tiny plain greenish brown bird, white below, with a remarkably loud voice which it constantly exercises in crying "pretty, pretty, pretty," or as some described it "towhee, towhee, towhee". The prettiest of all our garden birds are the Honey Suckers or "Sun-birds," tiny little creatures shining with glorious metallic colours. Nothing can be more charming than to watch a flock of the commonest kind, *Arachnechthra zeylonica*, skirmishing through a bush in flower, never still, at one time spreading their tails like fans, anon fluttering their wings up and down and keeping up a constant chatter. There are two other kinds, *A. lotenia* and *A. asiatica*, but these are not so conspicuous. The smallest and brightest of all, *A. minima*, is abundant at the foot of the hills and may be found at all elevations. Every one has heard of the "Seven sisters". This name is given to various kinds of babblers in different parts of India which have a strong family likeness and go about in small flocks of about half a dozen. They are mostly earthy brown and they vary in the colour of the throat. Our commonest species is the Southern Indian Babbler (*Crateropus striatus*), but there are two other kinds found, *C. griseus* and *C. canorus*, the latter chiefly at the foot of the hills. Another well-known bird is the Madras red-vented Bulbul (*Molpastes hæmorrhous*), a plain brown bird with a black head, white upper tail coverts and crimson lower ones. It is often kept as a pet by natives. A bright-coloured bird with a good deal of yellow and white about it may often be seen about the trees and bushes hunting for insects; this is the common Tora (*Ægithina tiphia*). The female is green and white. Its presence may always be known by its peculiar note which sounds like a prolonged plaintive indrawn whistle on D sharp falling to a short note on F sharp.

There are three Shrikes that may be seen not uncommonly, two of which go about in flocks. One, the common Wood-shrike (*Tephrodornis pondicerianus*), a plain ashy-brown bird with a broad white eyebrow has a tuneful whistle well described by Mr. Aitken as "Be thee cheery". The other, the small Minivet, has a finer dress of black orange and scarlet but this is only sported by the males, the females and young having it more subdued. The third, the Large Cuckoo Shrike, is a grey bird considerably bigger than the others. Conspicuous by their colour are the Orioles commonly known as "Mango birds", fine yellow fellows with some black

about them. The Black-naped Oriole (*Oriolus indicus*), which is only a winter visitor, has it on the nape, while the other the Black-headed Oriole wears it on the head. They have a rich flute-like whistle. No one can fail to notice the common Myna (*Acridotheres tristis*), a plain brown bird with a black head and breast shading off into vinous brown often seen walking after cattle and as its name implies hunting for grasshoppers, its favourite food. It is a splendid mimic and in captivity can be taught to talk and it readily picks up the notes of other birds. Another Myna, the Jungle Myna very like it in colouration and habits, is also common. It is a smaller bird than the Common Myna and may be distinguished from it by its size and the absence of the bare skin round the eyes. A white bird with a black crested head and two very long white tail feathers may often be seen flitting in undulating flight from tree to tree. This is the Indian Paradise Flycatcher (*Terpsiphone paradisi*), commonly known as the "Cotton thief", as he looks as if he were making off with a load of that staple. His wife, the "Fire thief", has an almost equally long tail, only it is red; hence her nickname. The young males take after their mother at first and only get to the white stage in the fourth year. Another common bird is the Fantail Flycatcher; it is dark brown with white forehead and eyebrows, it has a quaint song that reminds one of the opening of a valse tune. One of the few birds that has a really pretty song is the Magpie-robin (*Copsychus saularis*), a familiar bird in its white and black livery, to be met with in the neighbourhood of human habitations. Its sweet notes are the first one hears just as the dawn is beginning to break. Another sweet songster is the Large Pied Wagtail also clad in black and white. The Indian Skylark too (*Alauda gulgula*), may often be heard both in the low country and on the hills in open ground. Another Lark, the Madras Bush-lark (*Mirafra affinis*), is common. It has a habit of sitting on some exposed spot such as the roof of a house, whence it rises in a short soaring flight while it utters a shrill trilling note. Both it and the Indian Pipit (*Anthus rufulus*) frequent grass land and are to be found in crowds on the rice fields after the crop is cut and the ground has dried. Most people can recognise a Woodpecker when they see it and there are at least three species that are found in the low country, but it is not easy to describe them in a few words. The Yellow-fronted Pied Woodpecker (*Liopicus mahrattensis*) may be recognised by its bright yellowish brown head. The Malabar Rufous Woodpecker (*Micropternus gularis*) is a uniform dull rufous. The third is well called the Golden-backed Woodpecker (*Brachypternus aurantius*), its loud screaming call, which it utters as it flies, is a familiar sound. So too is the call of the "Copper smith",

the Crimson-breasted Barbet (*Xantholæma hæmatocephala*). It is a green thick-set bird with a yellow throat bordered below by a crimson band and with a crimson forehead; it has a strong coarse beak. A near relation, the small Green Barbet (*Thereiceryx viridis*), is also common and to be heard frequently. Two not uncommon birds, the Hoopoe (*Upupa indica*) and the Indian Roller (*Coracias indica*), are conspicuous by their plumage. The latter is very like an English Jay. The former is a brown bird with a long bill and a large fawn-coloured crest, all the feathers of which are tipped with black. Another bird that intrudes upon one's notice by its persistent cry is the common Hawk-cuckoo (*Hierococcyx varius*). It is a grey bird very like a Shikra, hence its English name; but familiarly it is known as the "Brain-fever bird" for, as the hot weather approaches, its voice may be heard first running up a scale and at the end shrieking, time after time, what sounds to one's heated imagination like the words "brain fever," again and again repeated. It is heard by night as often as by day which makes it all the more disturbing. Of the birds of prey there are not a few that frequent the plains; many being, however, only winter visitors may be safely left out of account. The most familiar of our residents are of course the Brahminy and the Common Kite; these are too well known to need description. The Crested Hawk Eagle (*Spizætus cirrhatus*) is a fine bird, for the most part brown, the feathers having darker centres; it has a long crest black tipped with white. It is most destructive in the poultry yard as it takes up a station on a tree hard by and seizes its opportunity to dart down and carry off whatever it can; this it will do day after day unless it is driven off. The Shikra is also a common bird, while at night the Little Spotted Owlets (*Athene brama*) and (*Scops bakkamœna*) may often be heard.

Of the Pigeons the only one common in the plains is the Indian Blue Rock (*Columba intermedia*) which may often be met with in the dry paddy fields after the crops are cut.

Turing now to the marsh and water birds, we find them pretty well represented as the backwaters along the coast afford them shelter and food. In or about every tank where there are bushes, a dark slaty grey bird with a white breast may be seen for a second, feeding in the open, but not longer, as it skulks off rapidly into cover with its perky little tail uplifted. This is the white-breasted Water-hen (*Amaurornis phœnicurus*). The Water-cock (*Gallicrex cinerea*) is not its husband but has a wife of his own. They are larger birds clad alike, in winter in dark brown with paler edges to the feathers; in summer, however, the male dresses more or less in black with some white below. They are common

in standing paddy. On every weed-covered tank the elegant Jacanas, both the bronze-winged (*Metopidius indicus*) and the Pheasant-tailed (*Hydrophasianus chirurgus*), are to be seen like Agag treading delicately over the water leaves. The latter in its breeding plumage is a lovely sight. Two Lapwings, the Red-wattled (*Sarcogrammus indicus*) and the Yellow-wattled (*Sarciophorus malabaricus*), may be frequently heard and seen. The former prefers the neighbourhood of water and when flushed goes off remonstrating "why did you do it". The other prefers dry plains, where it circles about uttering much the same cry but with one note less. Its cry may be heard for some time after dark. These are residents and the Little Ringed Plover (*Ægialitis dubia*) may almost be reckoned so, as there are few months in which individuals may not be met with. It frequents the shores and paddy fields. Other winter visitors are the Sandpipers commonly called "Snippets", the most numerous of which are the Common Sandpiper (*Totanus hypoleucus*) and the Wood Sandpiper (*T. glareola*). Both the Common and Fantail snipe afford sport to the gunner in winter while the beatiful Painted Snipe (*Rostratula capensis*) is a permanent resident. Seated on the posts that mark the channel in the backwaters, numbers of Terns are to be seen in winter, they are the Smaller-crested (*Sterna media*), and on the seashore the common Tern (*Sterna fluviatilis*) is fairly numerous. In the paddy fields the Pond Heron (*Ardeola grayi*) is always abundant and so are the Little Green Heron (*Butorides javanica*) and the Chestnut Bittern (*Ardetta Cinnamomea*). So far as I have been able to ascertain, the Duck are represented by four species of Teal, the Whistling, the Cotton, the Common and the Blue-winged, while the Spotted-billed Duck is occasionally met with. The Little Grebe (*Podiceps albipennis*) completes the list of water birds to be found commonly in the plains.

Bird life is most abundant at the foot of the hills. Here the "Seven sisters" are represented by the Jungle Babbler (*Crateropus canorus*) which has the same colouring and habits as the others of its class. The Bulbuls are represented by Jerdon's Chloropsis, a green bird with a black chin and a blue moustache, a cheerful little fellow frequenting trees and not to be easily distinguished as its colour harmonises so well with the foliage. The Southern Red-whiskered Bulbul (*Otocompsa fuscicaudata*) is even more abundant and might perhaps be considered to have a prescriptive right to the epithet 'cheerful', I have used in describing the Choloropsis, for to Jerdon he was always "Jocosa". If you see a plain brown bird with a snow white throat and breast and with a perky black crest bending forward over its beak you will know it at once. Another

bright coloured bird is the Yellow-browed Bulbul (*Iole icterica*). It is mostly yellow with brown wings. It is common up to 2,000 feet. Flocks of Malabar Wood-shrikes are to be met with up to 3,000 feet, grey birds with a black band through the eye. They keep up a harsh chattering as they search the trees for insect food. The Black-backed Pied Shrike (*Hemipus picatus*) is also fairly common and easily recognisable, some of the most familiar sounds are the notes of the Southern Grackle (*Eulabes religiosa*). It is a black bird, and its yellow beak, yellow legs and yellow wattles on the back of the head render it unmistakable. It has a powerful voice and a variety of notes, some harsh and some pleasing; towards sunset it makes itself particularly heard. Most of the Fly-catchers are winter visitors and are to be found at high elevations, but the little Brown Flycatcher (*Alseonax latirostris*) is an exception. It is resident and is found from the foot of the hills to about 2,000 feet. It takes up its perch on a branch and sits motionless until it makes a dash after some passing insect when it returns to its perch again.

Flocks of little Munias, small finch-like birds of three kinds, the White-backed (*Uroloncha striata*), the Spotted (*U. punctulata*) and the Black-headed (*Munia malacca*) may be seen feeding on the ground or clinging to the lantana bushes in which they love to perch.

Two small Woodpeckers, the Ceylon Pigmy Woodpecker (*Iyngipicus gymnophthalmus*)and the Heart-spotted (*Hemicercus canente*), are fairly common. The latter is easily recognised in the first place by its peculiar cry something like that of the Kestril and secondly by its black plumage with heart-shaped black spots on the buff coverts of the wing. The former is a small bird brown with white streaks on the plumage about 5 inches long of which one and a half are tail. The Western Blossom-headed Paroquet (*Palæornis cyanocephalus*) is here conspicuous going about in flocks and the Little Indian Grey Tit (*Parus atriceps*) may be seen at almost all elevations. It has a black head with white cheeks and grey back. As one ascends the hills the Southern Tree-pie (*Dendrocitta leucogastra*) is commonly seen. It is a beautiful bird with a black head, a snow-white breast, chestnut-bay back and a tail 12 inches long of grey and black. They go about in parties of three or four and are somewhat noisy. Another bird that is often heard is the Southern Scimitar Babbler (*Pomatorhinus horsfieldii*). Its peculiar rolling chuckle tells one it is there, but the thick underwood it affects renders it difficult to discover. The peculiar inconsequent whistle of the Malabar Whistling Thrush (*Myiophoneus horsfieldii*) is to be heard near every stream in the forests. "The Drunken Plough Boy" is the name it has obtained by

its musical efforts. It is a fine bird to look at, black with a considerable amount of blue about it. From the foot of the hills to about 2,000 feet, another bird, the Racket-tailed Drongo (*Dissemurus paradiseus*), makes itself continuously heard and its rich metallic notes are characteristic of the forest. It is a glossy black bird with a fine crest, the lateral tail feathers are greatly elongated, bare for a certain distance and webbed at the end; hence its English name. In the tops of the trees flocks of the fairy Blue Bird (*Irena puella*), one of the most beautiful of all our birds, are a feature of the jungle life to about 2,000 feet. At a distance they seem plain enough, but if you get a closer view the metallic blue of the back and crown of the male contrasting with the black of the other parts shows a scheme of colouring that cannot be surpassed.

Creeping among the leaves the Little White-eyed Tit (*Zosterops palpebrosa*) is a common sight. Its green plumage and the conspicuous ring of white round the eye render it easy to recognise. In the winter two Rock-thrushes are to be commonly met with, the Blue-headed (*Petrophila cinclorhyncha*)and the Western Blue (*Petrophila cyanus*), the former in forest in the neighbourhood of cultivation, the latter generally in open clearings or in grass land where there are rocks. The males are handsome birds; when in their winter plumage the former has a blue head, black back, red upper tail coverts and a blue spot in front of the shoulder. The latter is bright blue with dark brown wings and tail, the female is dull blue throughout with buffy white under plumage each feather of which has a black edge. The female of the Blue-headed Rock-thrush is quite unlike her husband being brown above and white below, thickly barred with dark brown.

On every path the elegant little Grey Wagtail (*Motacilla melanope*) may be seen tripping along. It is our earliest visitor and stays the latest.

Three Woodpeckers frequent the higher elevations, the common Golden-backed three-toed (*Tiga javanensis*), Tickell's Golden-backed (*Chrysocolaptes guttacristatus*), and the Malabar Great Black Woodpecker (*Thriponax hodgsoni*). The first of these is common everywhere, the second in the neighbourhood of streams, while the third is the commonest in open jungle. The peculiarities noted in their names are sufficient to discriminate them. The presence of a pair of the great Horn-bill (*Dichoceros bicornis*) is manifested for some distance. Their hoarse croaking roar may be heard for miles and the beating of their wings as they fly across a valley attracts one's attention at once. They are not

abundant nor so common as their relation, the Jungle Grey Horn-bill (*Lophoceros griscus*). These also make their presence known by their peculiar cry which is like the laugh of our old friend Mr. Punch, but they frequent heavy forest and are not so often seen.

The "whish" of the brown-necked Spine-tail (*Chætura indica*) is a familiar sound as it rushes by at more than double the rate of the fastest express. They are more often heard than seen, but at times they play, and the rate of flight is then moderate. The Indian Edible-nest Swiftlet (*Collocalia unicolor*) is the other swift that is most common in the hills. A very beautiful bird that frequents heavy forests over 2,000 feet is the Malabar Trogon. It has a broad black head set on a thick neck, a yellowish brown back and a long black tail with chestnut centre feathers. The breast is black bordered by a white band and below this again it is pale crimson. The female has the head, neck and upper breast brown, no white band and the under parts are brownish buff.

Another beautiful bird is the velvet-fronted Blue Nuthatch. At elevations of about 2,000 feet and upwards, it may be seen creeping about the trunks of trees. As its name describes, it is blue with a dark velvety-black band on the forehead.

At about this elevation or perhaps a little higher and up to the extreme summits, the Southern Indian Black-Bulbul (*Hypsipetes gamesa*) is very common; it is a dark grey bird with a black head and an orange-red beak. Its cheerful notes are a sure sign that you are a long way above the sea-level.

Flocks of the Blue-winged Parequet (*Palæornis columboides*) take the place of the Blossom-headed as one ascends the hills, and the little Indian Loriquet inconspicuous by its small size and green colouring is to be met with.

The note of the Brown Hawk-owl (*Ninox scutulata*) is frequently heard at night while by the day the scream of the Crested Serpent-eagle (*Spilornis cheela*) as it soars aloft, is equally common. The Black Eagle (*Ictinætus malayensis*) may be seen quartering the tops of the trees in search of small birds' eggs and young at all seasons while the Kestril and the Indian Hobby are winter visitants.

The whistle of the Grey-fronted Green Pigeon (*Osmotreron affinis*) is not uncommonly heard and also the booming note of Jerdon's Imperial Pigeon (*Ducula cuprea*), while the Bronze-winged Dove (*Chalcophaps indica*) may be seen in heavy jungles feeding on the ground. The Grey

Jungle-fowl (*Gallus sonnerati*) may be met with on jungle paths either early in the morning or after sunset.

On the High Range the Palni Laughing-thrush (*Trochalopterum fairbanki*) takes the place of *T. meridionale*. Here too may be found the Nilgiri Babbler (*Alcippe phæocephala*), a plain brown bird with ashy brown forehead and crown that was called by Jerdon the "Neilgherry Quaker Thrush," no doubt on account of the want of brilliancy in its plumage. In the grass lands the Red-headed Fantail Warbler (*Cisticola erythrocephala*) is fairly common.

The three Flycatchers that are most abundant at high elevations are the Nilgiri Blue Flycatcher (*Stoporola albicaudata*), an indigo blue bird with a lighter blue forehead and eyebrow, the Grey-headed Flycatcher (*Culicicapa ceylonensis*) and the Black and Orange Flycatcher (*Ochromela nigrirufa*), whose English names sufficiently describe them for purposes of identification. About Peermade and the High Range are found numbers of the Southern Pied Bush-chat (*Pratincola atrata*). They are always in pairs, the male is black with white upper tail coverts and a white patch on the wing, the female is grey with reddish upper tail coverts and black tail. Other birds peculiar to the High Range are the common Rose Finch (*Carpodacus erythrinus*) which come there in flocks as winter visitants, the White Wagtail (*Motacilla alba*) is also to be found there only in winter, and the Nilgiri Pipit is a permanent resident in the grass lands. Here too is often seen the Malabar Crested Lark (*Galerita malabarica*) also a permanent resident, and the great Alpine Swift (*Cypselus melba*) congregates in numbers and hawks for insects through the smoke of the grass fires. The commonest Quail is the Painted Bush-quail (*Microperdix erythrorhyncha*), and of other game birds the Wood-cock and the Wood-snipe are sometimes met with in winter.

To return to the low country: the birds peculiar to the extreme south of Travancore are the White-throated Munia (*Uroloncha malabarica*) which is common there, though to my surprise I have not met with it elsewhere, the smaller White Scavenger Vulture (*Neophron ginginianus*), the Little Brown Dove (*Turtur cambayensis*), the Indian Ring Dove (*Turtur risorius*), the Grey Partridge (*Francolinus pondicerianus*), and the Brown-headed Gull (*Larus brunneicephalus*).

The Palm Swift (*Tachornis batassiensis*) though not confined to the south is far more abundant there, and the little Scaly-bellied Green Woodpecker (*Gecinus striolatus*) I have only obtained near Cape Comorin.

Reptiles. All the backwaters and most of the larger rivers of Travancore are infested with crocodiles and in North Travancore small ones may be found even in the tanks, the water of which is used for various purposes; the people take no notice of them until they get fairly large (over 4 feet or so) when they either destroy them or force them to move away. By far the commonest kind is *Crocodilus palustris*. In the south they do not generally exceed 8 feet in length but in North Travancore specimens are said to be found up to 20 feet. At the mouths of the rivers in North Travancore *Crocodilus porosus* is found. There is one specimen in the Museum taken at Tannirmukham and there was a skull presented by General Cullen of which he gives the following account :—

> "The animal was killed several years ago in the backwaters between Alleppey and Cochin at a place called Tannirmukham. It had killed several natives and on the last occasion seized a woman far advanced in pregnancy as she was washing. She died of the injuries she received, and the husband and others vowing vengeance against the brute, at last caught and killed it. They brought it with another one and left it before me at Cochin. It was about 10 feet long. I have records of alligators up the river at Cochin near Verapoly of 18 to 22 feet in length."

The sea yields four kinds of turtles, (*Chelone imbricata*) the one that produces the tortoise-shell of commerce, *Chelone mydas*, *Thalassochelys caretta* and the great Leathery Turtle, *Dermochelys coriacea*. In the rivers the fresh-water turtles, *Trionyx cartilagineus* and *Pelochelys cantori*, may be found.

In the tanks, the Ceylon Pond-tortoise, *Emyda vittata* and *Nicoria trijuga*, are common, while on the hills in the extreme south, the land-tortoise (*Testudo elegans*) may be met with and *Testudo platynota* throughout the range. Among the lizards, the Flying-lizard (*Draco dussumieri*) is the most remarkable as it has a lateral wing-like membrane supported by the last five or six ribs which enables it to glide through the air from one tree to another in downward flight. It is found at the foot of the hills most commonly. In houses numbers of the House Gecko (*Hemidactylus leschenaulti*) are always to be seen stalking insects on the walls at night. The lizard that has been victimised with the name of "Blood-sucker" is *Calotes versicolor*. It is very common in the low country while its relation, *C. ophiomachus*, is equally common in the hills. On the sides of the roads in forest on the hills, a fat-bodied lizard, olive brown above, with a a series of rhomboidal spots along the middle of the back, *Sitana ponticeriana*, is common at low elevations. While on the High Range *Salea anamallayana* is abundant. Into houses *Mabuia carinata*, a brown lizard with a lighter band on each side, often finds its way. It is essentially a Ground-lizard and never climbs. The most formidable of the lizard tribe is the monitor called by Europeans "Guana" found in the neighbourhood of water both in the low country and in the hills. It has a powerful jaw and can kill rats as well as any terrier and then swallow them whole with the greatest ease. Lastly we have the well-known Chameleon (*C. calcaratus*) which is not uncommon about the low country.

Only two lizards are peculiar to Travancore, *Ristella travancorica* and *Lygosoma subcaruleum*.

Snakes are fairly common in Travancore and there are about 67 species represented. When one is met with, the first question that is asked is, "Is it a poisonous one", to this most of the people at once reply in the affirmative and, needless to say, they are generally wrong. There are only three poisonous snakes that are found in the low country and they are easily recognisable:—(1) The Cobra (*Naia tripudians*) whose hood at once proclaims it (2) The Russel's Viper (*Vipera russellii*) whose thick body, broad head covered with little scales, and the chain pattern down the centre of its back easily identify it (3) The "Krait" (*Bungarus cæruleus*), this is bluish black above with narrow transverse white streaks or spots, a scheme of colouring which is adopted by a harmless snake (*Lycodon aulicus*) that is often found about houses and is mistaken for the Krait: the Krait, however, can be easily discriminated by its blunt head and by the fact that the scales running down the centre of the back are enlarged and hexagonal. No other poisonous snakes than these are likely to be seen in the low country. On the hills and at their foot the Hamadryad (*Naia bungarus*) is found. Here again the hood betrays it. Two species of Callophis, *C. nigrescens* and *C. bibronii*, may be met with occasionally but so rarely as not to need description, and there are three Tree-vipers (*Ancistrodon hypnale*). *Trimeresurus anamallensis*, and *T. macrolepis* which are easily recognised by their broad flat heads and by the pit just in front of the eye. The bite of these last, though painful, in effect is not fatal to man. There are several species of Sea-snakes, all of which are poisonous. They are entirely marine and may be distinguished by their compressed oar-like tails. The only harmless snake that lives entirely in water is *Chersydrus granulatus* which is found at the mouths of the rivers and along the coast, its tail is not compressed like that of sea-snakes. Among the harmless snakes there is a family of burrowing ones, the Uropeltidæ that have truncated tails. They feed on earth worms and may be met with on the roads on the hills after rain. The people call them "double-headed snakes". Of these, two species, *Rhinophis travancoricus* and *Rhinophis fergusonianus*,

the latter taken by Mr. Sealy on the High Range, are peculiar to Travancore. Rat Snakes (*Zamenis mucosus*) are common about the paddy fields and most tanks contain specimens of *Tropidonotus piscator*. The commonest Tree-snake is the green one (*Dryophis mycterizans*), while *Dipsas trigonata* is sometimes found in bushes near houses. Snakes of this genus are sometimes mistaken for poisonous ones as their heads are somewhat flattened and triangular, but their long thin bodies and the presence of shields on the head distinguish them from vipers with which alone they are confounded. One species, *Dipsas dightoni*, is peculiar to Travancore having been taken by Mr. Dighton in Peermade. The largest snake found in Travancore is the Python (*P. molurus*). I have seen a specimen 18 feet long and one now in the Public Gardens is 15 feet. It is harmless, but the next largest the Hamadryad is deadly. The largest specimen I have seen is 13½ feet long. It is said to make unprovoked attacks on people but though I have met many specimens they have always gone off as hard as possible and I have not heard of any one in Travancore being molested by this snake.

Batrachians, which include Frogs, Toads and Cæcilians are naturally abundant in Travancore as there is plenty of water. There are 34 species of which three, *Rana aurantiaca*, *Ixalus travancoricus* and *Bufo fergusonii* are peculiar to Travancore. The croaking of the frogs and toads in the paddy fields as the rains set in is a familiar sound at night. In the low country the largest and commonest frog is *Rana tigrina*, a great cannibal, of which large specimens may be caught in any tank by using a small one as bait. The commonest toad is *Bufo melanostictus*. Small specimens of this are very partial to taking up their abode under the edge of the matting in any room and here they sit and croak happily till the lights are put out when they sally forth to feed. Two kinds of "Chunam frog", *Rhacophorus malabaricus* and *R. maculatus*, also come into houses and seat themselves on pictures or in between the venetians or on any other convenient perch and thence make prodigious leaps, the discs on their dilated toes enabling them to stick even to a perpendicular surface. On the hills, *Bufo parietalis* is found in abundance and five species of the genus *Ixalus* may be met with. The Cæcilians are not so abundant. They are worm-like burrowing Batrachians and are usually found in damp situations. There are three kinds found in Travancore, *Ichthyophis glutinosus*, *Uraeotyphlus oxyurus*, and *Gegenophis carnosus*.

Fish. Several species of sharks are found along the coast. Of the family *Carcharidæ* some of which grow to a considerable size and are dangerous, the most curious looking is the Hammer-headed shark (*Zygæna blochii*), which has the front portion of the head laterally elongated from which it derives its name. The great Basking-shark (*Rhinodon typicus*) is sometimes found; one 27 feet and 1 inch in length was washed ashore at Puntura (Trivandrum) in 1900. It is quite harmless. Another innocuous form is *Stegostoma tigrinum* which grows to 15 feet in length but feeds mostly on molluscs and crustaceans. Two kinds of Saw-fish, *Pristis cuspidatus* and *Pristis perotteti*, frequent the coast, the beaks of which are sometimes 5 feet long. In most of the rivers, Mahseer (*Barbustor*) are to be found. Shoals of Flying-fish (*Exocœtus micropterus*) are not uncommonly to be seen winging their way over the waters. The great Sword-fish (*Histiophorus gladius*) may occasionally be seen sunning itself on the surface with its great blue dorsal fin fully extended. It is a dangerous animal and cases of injury inflicted by it on unfortunate fishermen have been treated in the hospital at Trivandrum. In one of these, about nine inches of the sword were taken from the fleshy part of the shoulder of one man who while sitting on his catamaran had been wantonly attacked. Another species, *H. brevirostris*, is also found, one specimen in the Museum is 10½ feet long. A curious fish is *Echeneis*, which has the first dorsal fin modified into an adhesive disc by means of which it clings to the bodies of sharks and so profits by the superior powers of locomotion of its host in finding food. Goby fish of the genus *Periothalmus*, though only able to breathe by gills, are fond of the land and may be seen climbing about the rocks; when pursued they use their tails and ventral fins to leap out of harm's way. The fishermen call them Sea-toads. They are very wary and hard to catch. The Sea-horse (*Hippocampus guttulatus*) is often found about Cape Comorin and there are many others of strange shape and varied colour. Of the former, *Ostracion turritus* having a solid coat of armour composed of angular bony plates is a quaint example. So are the fish of the genus *Tetrodon*, sometimes called Sea-porcupines, which are covered with small spines. They are able to inflate their bodies with air and float on the water upside down, hence they are called Globe-fish. *Holocanthus annularis*, a fish with a body vertically broad, coloured sienna, with a blue ring on the shoulder and six or seven curved blue bands upon the sides, and a yellow caudal fin, is an example of the latter, and so are *Chætodon vagabundus*, *Psettus argenteus* and *Heniochus macrolepidotus*. There are many that are edible, of which perhaps the best are the Seer-fish of the genus *Cybium*, Red Mullets of the family *Mullidæ*, Grey Mullets of the family *Mugilidæ*, Pomfret of the family *Stromateidæ* (*Strombillidæ?*) and Whiting (*Sillago sihama*).

So far I have described the animals comprising the subkingdom of

the vertebrates or as they are now called the Chordata. Formerly all the remaining animals were lumped into one subkingdom and called Invertebrates, but a fuller knowledge has shown that they must be split up into eight subkingdoms, each of which is equivalent to the subkingdom of the Chordata. They are:—(1) *Arthropoda* (Insects, Spiders and Crustaceans), (2) *Echinodermata* (Star-fish and Sea-urchins), (3) *Mollusca* (Cuttle-fish, Oysters &c.), (4) *Molluscoida* (Lamp-shells and Corallines), (5) *Vermes* (Worms, Leeches &c.), (6) *Cœlenterata* (Jelly-fish, Sea-anemones and Corals), (7) *Porifera* (sponges) and (8) *Protozoa* (Single-celled animals). Of these I can only speak of the Arthropods, and of them only imperfectly. The remaining seven subkingdoms have not as yet been worked at all in the Museum.

The Arthropods are divided into seven classes:— 1. Insects, 2. Centipedes, 3. Millipedes, 4. Scorpions, Spiders, Ticks &c., 5. Kingcrabs, 6. Crustaceans, and 7. Prototracheata. There are no representatives of clsses 5 and 7 in Travancore. The remaining classes will be taken in the order given.

Insects are divided into nine Orders:— 1. *Hymenoptera* (Ants, Bees Wasps), 2. *Diptera* (Flies), 3. *Lepidoptera* (Butterflies and Moths), 4. *Coleoptera* (Beetles), 5. *Neuroptera* (Dragon-flies, White-ants &c), 6. *Orthoptera* (Grasshoppers, Crickets, Mantises), 7. *Rhyncota* (Bugs), 8. *Thysanoptera* (Thrips) and 9. *Thysanura* (Spring-tails and Bristle-tails).

Hymenoptera. The Order Hymenoptera which includes ants, bees, wasps, sawflies and Ichneumon-flies has, with the exception of the last two, been lately worked out for India. It contains some of the most familiar insects, and the habits of some of them are of particular interest. Those of the Fossors have been very well described by M. Fabre.

The young of this tribe are meat-eaters and have to be nourished on the flesh of other insects, the mother therefore lays up a store of these in readiness for the young one as soon as it emerges from the egg, but two things are necessary; first, that the stored-up insects should not decompose, and secondly, that they should not have the power of injuring the tender grub which is the first form of the perfect insect. There must be life but life only of the interior organs combined with absolute immobility of the limbs. This is marvellously insured by the instinctive power the Fossors have of stinging their prey at certain spots which are the seat of the nerve centres which control the movements of the limbs and so paralysing them. One of the largest of the Fossors is *Scolia indica*. It is a large dark

hairy insect with thick legs. Its colour is black throughout, with the exception of some ferruginous red bands on the abdomen, the wings are fuscous brown with beautiful purple reflections. Its young lives on the flesh of the larvæ of beetles that undergo their metamorphosis beneath the ground. The Scolia burrows until it finds such a larva, stings it and renders it incapable of movement, lays an egg on it and leaves the egg to mature amid this supply of food. The family *Pompilidæ* may be at once recognised by their long hind legs. They have great powers of running rapidly over the surface of the ground and while so doing their wings are constantly quivering and their antennæ vibrating. Most of them dig holes in the ground and lay up a store of spiders for the benefit of their young.

Macromeris violacea is a good example of the family; it is black with beautiful purple and blue reflections, the wings dark brown with brilliant purple effulgence changing in different lights. Others of the genus *Salius* i. e., *S. flavus* and *S. consanguineus* are common.

The family *Sphegidæ* are rather a mixed lot of varying form. *Liris aurata* is a beautiful insect black with more or less red legs, with silvery bands on the abdomen and with a golden gloss on the face. It is common about Trivandrum; it makes its nest-hole in the ground and stores it with young crickets. One often finds the back of a book or the folds of a paper filled with clay cells containing spiders. This is the work of *Trypoxylon pilicatum* or *T. intrudens*, both are small black insects with very long bodies and transparent wings. "A slender waist, a slim shape, an abdomen much compressed at the upper part, and seemingly attached to the body by a mere thread, a black robe with a red scarf on its under parts", is the very apt description M. Fabre gives of the genus *Ammophila*, three species of which are common about Trivandrum. They make vertical tunnels in the ground and store them with caterpillars.

In a corner of the glass pane of a window or on the side of a table or chair one often sees what looks like a splash of mud with rays of mud branching from it. This is the nest of *Sceliphron madraspatanum*, a black insect with a long slender yellow waist and yellow and black legs; if the nest is opened it will be found to be made up of four or five cells filled with spiders. There are three more species of this genus common in Trivandrum. The genus *Sphex* contains some beautiful species, they all make burrows in the ground and store their nests with various species of Orthopterous insects (crickets, grasshoppers &c.). There are seven species common about Trivandrum, of which *Sphex lobatus* is the most striking as it is a brilliant blue green with transparent wings.

Ampulex compressa is another very beautiful insect. It is brilliant metallic blue with some deep red on the legs with transparent wings slightly clouded. It stores cockroaches. *Bembex* is the last genus of the Sphegidæ I need mention. They are stout black insects with yellow bands on the abdomen, their prey consists of flies of different kinds. They make their burrows in sandy banks and use their legs like a dog in digging them. Unlike the other Fossors, they do not supply a store of food and close the burrow once for all, but return day by day and feed the young larva until it refuses to take more and settles down into the pupa stage towards its final transformation. The next tribe, the *Diploptera*, are distinguished by having a fold in the wings when in repose; it includes the *Eumenidæ*, solitary wasps, and the true or social wasps. Among the former are several familiar insects of the genus *Eumenes*, *E. petiolata*, *E. conica*, *E. flavopicta*, all large conspicuous wasps with elongated waists. The thorax has usually some yellow about it and the abdomen also. They come into houses about August and September and build clay cells which they store with caterpillars. Another very common wasp is *Rhynchium brunneum*, a stout insect brownish red with black bands on the abdomen. It comes into houses and builds a clay nest which it stores with caterpillars, or makes use of any hollow such as the mouth of an old gun barrel or the hole for a window bolt. Among the social wasps are some of the genus Ischnogaster. They are brown and yellow with a very long waist. They build cells of papery stuff more or less hexagonal in shape connected by a pedicel but without any exterior envelope. Others again of the genus Icaria build from 5 to 43 cells attached by a stout pedicel to twigs. *Icaria ferruginea* is the commonest species. The great papery nests of *Vespa cincta* are often to be seen under the eaves of houses or in a bush. The insect is black with a broad yellow band on the abdomen. They form vast communities and are very dangerous if disturbed.

The next tribe includes the bees. The most conspicuous of these are the Carpenter-bees, *Xylocopa latipes* and *Xylocopa bryorum*. The former is a large robust hairy insect black all over with dark wings that shine with brilliant coppery or purple reflections. The latter is yellow in front and has a black abdomen and more or less dark wings with a purple effulgence. As their name implies, they bore holes in wood in which they make their nests. *Megachile lanata*, one of the leaf-cutting bees, a black insect with a good deal of fulvous red hair about it and with narrow transverse white bands on the abdomen, often comes into houses and makes use of any hollow space it finds, or the back of a book for its nests which it forms of clay partitions.

Anthophora zonata is another familiar insect rufous in front with a black abdomen on which there are narrow bands of metallic blue hairs and wings more or less transparent. They form burrows and live in colonies. Then there are the true honey-bees of which there are three kinds, *Apis indica*, *dorsata*, and *florea*, and lastly the dammar-bees of the genus *Melipona* that make their nests in hollows of trees mostly of more or less resinous wax.

Ants, which form another tribe of the Hymenoptera, are numerous, there being over sixty species in Travancore. They live in large communities consisting of a queen, a perfect female, of imperfect females which may include workers of two kinds and soldiers, and of young, the latter comprising all these forms and also perfect males. At certain seasons, generally after the first showers in April or May, the perfect males and females, which are winged, emerge from the nest and rise into the air for their nuptial flight; they couple and the males die while the females cast their wings and are ready to lay eggs. They are divided into five sub-families. The first of these, the *Camponotidæ*, have no true sting but are able to produce an acid poison and to eject it to some distance. The best known of all is the "red ant", *Œcophylla smaragdina*. This forms shelters in the leaves of trees or bushes by fastening the edges together by a silky substance. The mature ants are unable to produce this but the larvæ can, as they spin a silken cocoon for themselves in which to pupate: when therefore it becomes necessary to form a new shelter, or to mend a damaged one, some of the mature workers hold the edges of the leaves close, while others carry a larva each in their jaws, apply the mouth of the larva to the edge of the leaf and the sticky secretion from it fastens the leaves together. The larva are not damaged by this operation but are carefully laid by when done with. A small yellow ant, *Plagiolepis longipes*, which has, as its name implies, very long legs, is very common in houses. Companies of them may be seen dragging any dead insect up a wall to its nest. *Prenolepis longicornis* is an equally familiar ant but is black; it has no settled home and does not frequent houses so regularly as the last. The large black ant that forms vast nests under ground is *Camponotus compressus*. They are regular cattle keepers as they keep herds of caterpillars of certain of the family of the Lycænid butterflies which includes the Blues and Coppers. These have two erectile tentacula near the end of the body and close to them is an opening from which exudes a sweet liquor that the ants very much appreciate. When an ant wishes to milk the caterpillar it gently strokes it with its antennæ and a drop of liquid exudes which the ant licks up. The ants regularly attend the caterpillars

and when they are about to pupate conduct them to a safe place in which to undergo transformation, and do not allow them to stray too far. They also attend and herd plant-lice or aphides. There are five species of the genus found in Travancore. The nests of ants differ very much, but those formed by a genus of ants called *Polyrachis* are peculiar in that they consist of a single cavity which is lined with a silky substance. They are built on leaves usually. There are four species known from Travancore. The next family of the *Dolichoderides* is a small one, of which the most familiar member is a small ant, *Tapinoma melanocephalum*, with a black head that contrasts with the semi-transparent abdomen. It has no sting, nor power of ejecting fluid to a distance, but it secretes a very strongly malodorous fluid from the anal glands which it uses for defence. Among the next subfamily are some of the most elaborate nest builders, *Cremastogaster rogenhoferi* builds a more or less round brown papery nest of vegetable fibre, often eighteen inches long and almost as broad, round a branch which it uses as a central support. These nests may be seen commonly on the hills. The ants have a curious habit of turning their abdomens over their backs. There are some species of ants that make roads for themselves and the result of their labours may be seen in partial tracks and tunnels running across the paths. Of these the commonest is *Solenopsis geminata*, a reddish yellow ant. *Holcomyrmex criniceps*, a brown ant, also has this habit, both of them store grass seeds in their nest but ants of the genus *Phidole* are the best known harvesters: round the entrance to their nests may be seen the husks of the seeds they have stored below and to prevent rain penetrating to their galleries they make embankments round the nest which effectually protect them. There are four species in Travancore of which *P. rhombinoda* is the commonest. To this family also belongs a very small reddish-yellow ant, *Monomorium destructor*, that is commonly to be met with in houses.

The next family, the *Ponerinæ*, are hunting ants and are flesh eaters. They have a curious way of carrying their prey underneath their bodies between the forelegs. There are several genera represented in Travancore of which the best known is *Lobopelta*; long lines of *Lobopelta chinensis* may be seen going, usually in single file, on foraging expeditions about four in the evening. They hunt by night and by eight in the morning they retire underground. They have a very fairly powerful sting which they use freely if disturbed. There are also *L. dentilobis*, *L. dalyi* and *L. ocellifera* which behave in the same way.

The last family is the *Dorylides*; they lead a nomadic social life notwithstanding the fact that the eyesight of the workers is very imperfect.

It includes the genera *Dorylus* and *Œnictus*; of the latter there are four species in Travancore. They are small ants and march three or four abreast with great regularity carrying their prey as does Lobopelta.

Diptera. This Order which includes Mosquitoes, Gnats, Flies and Fleas has not had the attention paid to it that it deserves. Since however the connection between malaria and mosquitoes has been established, considerable study has been bestowed on the particular family the *Culicidæ*, which includes the various species of those insects. In Travancore there are at least 4 species of the genus *Anopheles*, the members of which are the intermediate hosts of the Sporozoa which give rise to malarial fever. These four species are *Anopheles fuliginosus*, *A. jamesii*, *A. sinnensis* and *A. rossii*. There are many other species of mosquitoes. Among them, *Toxorynchites immisericors* is conspicuous by its size and is known as the Elephant Mosquito. Of the genus *Culex* there are five species. The family *Tipulidæ* contains the Daddy-longlegs or Crane-flies. There are several species in Trivandrum, one of which is conspicuous by its long legs being banded alternately black and white. The *Tabanidæ* or Horse-flies are numerous, one species known as the Elephant Fly is most troublesome on the hills at considerable elevations in the dry weather. They can easily bite through thin cloths and can draw blood. The use of a folded newspaper is absolutely necessary when seated on a cane-bottomed chair. Another species of the genus *Pangonia* has a stiff proboscis, more than half an inch long, which is a formidable weapon of offence. The Robber Flies constituting the family *Asilidæ* are common. The largest is more than an inch long having a black body with narrow grey bands, the wings are smoky. It preys on other insects but fortunately it does not suck the blood of vertebrates. Another very curious member of this family is *Laphria xylocopiformis*, a large hairy insect very like one of the carpenter-bees; hence its name. The flies that one sees commonly hovering over flowers belong to the family *Syrphidæ* or Hover-flies, their food is chiefly pollen. The family *Muscidæ* contains the House-flies, Blue-bottles &c., which are so common about our dwellings. They lay their eggs on dung or any kind of soft damp filth and the larvæ feed on this. The so-called flying-tick which infects dogs is really a fly of the family *Hippoboscidæ*. Lastly we have the *Pulicidæ* or Fleas which though wingless constitute the suborder *Aphaniptera* of the order Diptera.

Lepidoptera. SERIES I. RHOPALOCERA. This order includes the

Butterflies and Moths. There are about two hundred and thirty species of the former and at least ten times the number of the latter to be met with in Travancore. So far as ornament is concerned, they are the highest of the insect world. Insect angels, they have been well termed by Wendell Holmes. In the larval form they are worm-like and are called Caterpillars and in this stage some are often very destructive to crops as they are nearly all vegetable feeders. They pass a considerable portion of their lives in the pupal state. Many of the butterflies differ according to the season; there being wet and dry season forms, the former being always darker than the latter. The pupa of butterflies is also called chrysalis from the fact that some of them are partially or entirely of a golden hue; this is found chiefly in the family *Nymphalidæ*, a good example of which is *Euplœa core* a plain brown butterfly whose pupa is like a pear drop of burnished gold. There are six families, specimens of all of which are to be found in Travancore though one of them, *Lemoniidæ* has only two species representing it. The family of the *Nymphalidæ* includes the greatest number and is divided into six subfamilies.

The Euplœinæ are characterised by their slow flapping flight and their fearless behaviour, this is probably due to the fact that they possess acid juices which render them unpalatable to birds and lizards with the exception of *Limnas chrysippus* and *Salatura genutia*, which are bright ferruginous with black markings, the others are sombrely clad. The *Euplœas* are mostly brown with some white spots. The most remarkable member of the subfamily is *Hestia malabarica* which is to be met with in the hills in dense forest. Whoever has seen a number of these floating aimlessly about in a forest grove like animated pieces of spotted tissue paper is not likely to forget the scene.

The *Satyrinæ* are all very soberly clad and have the underside of their hind wings marbled or mottled in such a way as to render them almost invisible when settled. They have a way too of dropping the front wings between the lower ones which adds to the difficulty of seeing them. They never take long flights but may be seen on the sides of shady roads and in the forest, and many of them frequent grass lands. There are twenty one species in Travancore of which two are peculiar to it, *Ypthima ypthimoides*, a meadow brown found only in the hills at considerable elevations and *Parantirrhœa marshalli*, a dark brown insect with a pale violet band on the forewing which is most commonly to be seen in Eetta jungle (*Beesha travancorica*) from May to October on the Peermade hills.

The caterpillar of *Melanitis ismene* is said in other parts of India to do damage to the rice plants, but in Travancore there is such an abundance of vegetation that it is not driven to rely on them for food. Seasonal dimorphism is well marked in this subfamily so much so that the wet and dry season forms of one butterfly have received different names, for example, *Melanitis leda* and *Melanitis ismene*, *Orsotriæna mandata* and *Orsotriæna mandosa*; *Calysisme mineus* and *Calysisme visala*. The next subfamily *Elymniinæ* has only one representative, *Elymnias caudata*, which is very like *Salatura genutia* and is therefore said to "mimic" it. The *morphinæ* have two, both of which are very rare, the *Acræinæ* and *Telchinia violæ*, which is very common both in the low country and on the hills. It is red with a narrow black border to the forewing and a broader one on the hind on which are some yellow spots. The next subfamily *Nymphalinæ* are eminently sunshine-loving. They are mostly brightly coloured and have a strong flight, but the habits of some are not so nice as their colouration, for the mango butterflies of the genus *Euthalia* are fond of rotten fruit and those of the genus *Charaxes* may be attracted by carrion and *Charaxes fabius* sometimes gets drunk on toddy. There are forty-seven species in Travancore; of which the largest are *Cynthia saloma* and *Parthenos virens*. *Cyrestes thyodamas*, one of the Porcelains, is perhaps the most curiously coloured. The leaf butterflies of the genus *Kallima*, of which there are two species, *K. philarchus* and *K. wardi*, are so called from the fact that the underside of the wings so exactly represents a leaf with the mid-rib marked that it is most difficult to discover the insect when it alights which it does very suddenly. They are only found in forest on the hills and are far from common. *Pyrameis cardui*, the Painted Lady, is probably the most widely distributed of all butterflies as it is found everywhere except in the Arctic regions and South America.

The Family *Lemoniidæ*, as I have said before, is only represented by two forms, *Lybithea myrra* common on the High Range and *Abisara prunosa* common on the hills at the sides of roads in jungle.

The Family *Lycænidæ*, which includes the Blues, Coppers and Hairstreaks, is represented by nearly sixty species. The males and females are often very differently coloured on the upper side but are marked alike below. Some of them are very small, covering not much more than half an inch with the wings expanded. Those of the genus *Centaurus*, of which there are three species, are the largest, being nearly two inches in expanse. They are brilliant metallic blue above, and are unmistakable. *Lampides elpis*, a light blue insect, is about the commonest of all the family. Some of them have very long tails, for example, *Cheritra*

jaffra which is common at 2,000 feet on the hills, and *Bindahara sugriva* fairly common in the low country. The caterpillars of the family are very peculiar being usually short, broad in the middle and naked. As pointed out when describing the Hymenoptera, some of them yield a fluid of which ants are fond, hence they are domesticated and tended by the ants. The tastes of some are peculiar as they feed not, as is usual, on vegetable substance but devour aphides and scale insects. The caterpillars of the genera *Lampides*, *Virachola* and *Deudorix*, feed on the interior of fruits of different kinds. *Lampides elpis*, for example, bores into cardamoms. *Deudorix epijarbus* feasts on the pomegranate, but the most curious of all is the caterpillar of *Virachola isocrates* which feeds on the guava, pomegranate and some other fruits. The mature female insect, which is dull purple with a patch of yellow in the forewing, deposits her eggs in the calyx of the flower; the caterpillar when hatched bores into the young fruit, where it remains throughout its transformation. By the time it is ready to change to a pupa it has so damaged the fruit that further growth is stopped and the fruit dies, there is therefore the danger that the fruit should drop and destroy the larva. This however is prevented by the extraordinary instinct of the caterpillar which leads it to emerge from the fruit just before pupating. It then spins a strong web over the base of the fruit and stem which effectually prevents the falling of the fruit even though it should separate from the stem and so it returns to its abiding place in the centre of the fruit and pupates in safety.

The *Pieridæ* which form the next family include the Whites, Brimstones, Clouded-yellows and Orange-tips. White yellow and red are the predominant colours. There are about twenty-five species in Travancore. *Terias hecabe*, a small yellow insect, is about the most abundant in the hills and the low country. But the large yellowish white butterflies of the genus *Catopsilia* of which there are three species are almost equally common. At times great migrations of these take place and hundreds of them may be seen flying in one particular direction.

The *Papilionidæ* are known as the swallow-tails and include the largest and most conspicuous of all the order. The great *Ornithoptera minos*, nine inches in expanse, a black butterfly with yellow on the hind wings, is fairly common in the low country and on the hills. *Iliades polymnestor* (black with lavender spots on the hind wings) is also fairly abundant, as is too *Menelaides hector*, black with red spots on the hind wings. On the hills, *Charus helenus*, black with a cream spot on each hind wing, is most conspicuous, while *Achillides tamilana*, black having

a large metallic spot on each of the hind wings of blue with green reflections, is perhaps the most beautiful. The larvæ of some, especially of *Orpheides erithonius* do considerable damage to orange trees by feeding on the leaves. They rest fully exposed on the upper side of the leaves, but are so coloured that they resemble birds' droppings. *Pattiysa naira* is a rare butterfly peculiar to Travancore. The members of the last family, the *Hesperiidæ*, are called skippers from their peculiar jerky flight. They are a very distinct family and closely allied to the moths. There are about forty species in Travancore. The largest is *Gangara thyrsis* which is common in the low country, its caterpillar which is covered with white fluff is destructive to palms as it feeds on their leaves cutting and rolling up a leaf to form its habitation. The caterpillar of *Matapa aria* behaves in the same way towards the leaves of the bamboo, while that of *Chapra mathias* is said to do damage to the rice plant.

SERIES II. HETEROCERA MOTHS.—The old divisions of the moths into five subsections is now more or less abandoned and no larger division than that of families is recognised. There are thirty four of these: it will not therefore be possible to mention them all, a few examples of the most prominent are all that can be cited.

The family of the *Saturniidæ* or Emperor-moths contains the largest individual of all, *Attacus atlas* which is twelve inches in expanse; one noticeable feature in this family is the presence of transparent spaces on the forewings. This is found in several other species. *Actias selene*, a large greenish white moth with long tails, is another beautiful example of the family; it is fairly common both in the hills and plains. The most useful member is *Antheræa paphia*, the Tussur-silk moth, which is to be found about Trivandrum; *Læpa katinka* in the Hills and *Cricula trifenestrata* on the plains also spin cocoons of silk. The family *Eupterotidæ* is represented by three rather common insects, *Eupterote mollifera*, *Nisagra simplex* and *Sangatissa subcurvifera*. The scheme of colouring is the same in all brown or drab with curved black lines on the forewings. Their larvæ are hairy and the hairs produce great irritation if the caterpillar is handled. The family of the *Sphingidæ* or Hawk-moths is perhaps the most easily recognisable. They have long stout bodies elongated narrow pointed forewings and small hind ones. They fly usually by day or in the evening. The best known is *Acherontia lachesis*, the Death's-head moth, so called from the marking on the thorax being like a skull. When handled the moth can produce a fairly loud squeak. One of the most beautiful is *Calymnia panopus*. *Daphnis nerii*, the Oleander Hawk-moth, is the most wide spread being found all over Europe, S. Africa and

India. The Humming-bird Hawk-moths of the genus *Macroglossa* have a very long proboscis and the tip of the abdomen is furnished with a tuft of dense long scales which is capable of expansion. *Macroglossa gyrans* is common on the hills and *M. bengalensis* in the low country. *Cephonodes hylas* is peculiar in having the wings clear and transparent. The larvæ are remarkable for their colour and form. They nearly always have a conspicuous stiff horn-like tail In the genus *Chærocampus*, of which six species may be met with about Trivandrum, the caterpillar can retract the front segments into the fourth which is capable of expansion and makes the caterpillar more or less like a small hooded snake. The *Sesiidæ* are a small family of day-flying moths remarkable for having a large part of one or both wings clear of scales, hence they are known as clear-wings. *Sesia flavipes* which is a good example is found only on the hills. Another family of semi-diurnal habit are the *Syntomidæ* which have the body as well as the wings highly coloured. Many of them are like wasps. *Euchromia polymena*, a very common insect in the plains, though not a mimetic form, is a good example of the family. The *Zygænidæ* or Burnet-moths number a good many day-flying insects that are very like butterflies. *Cyclosia australinda*, which is not uncommon about Trivandrum, might very well be mistaken for one of *Pieridæ* or Whites and *Histia nilgira* found on the hills is very like one of the Swallow-tailed butterflies, while *Himantopterus caudatus*, a tiny reddish moth with orange lined wings with black spots, is a regular miniature one. *Heterusia virescens* and *Chalcosia affinis* are common on the hills. The *Psychidæ* are interesting from the fact that their larva cover themselves with a case composed of grass sticks, bits of leaves and lined with silk. The female remains always in the case and is wingless. The males pass their pupa stage in the case but emerge from it as winged insect. *Clania variegata* which is fairly common, forms its case of small bits of stick. The *Cossidæ* or goat-moths are chiefly interesting from the fact that the larvæ bore into trees and often do considerable damage. Mr. Bourdillon has brought to notice the harm done to teak by the caterpillar of *Cossus cadamba*, a brown moth about an inch and a half in expanse. The family *Callidulidæ*, which are day-flying moths of medium size, is represented by *Cleosiris calamita*, a plain brown insect like one of the Nymphalid butterflies. The family *Limacodidæ* contains one form peculiarly interesting to planters as the larva of *Thosea cana*, an insignificant looking moth, does great damage to tea bushes by feeding on the leaves. The *Lasiocampidæ*, Eggers or Lappet moths, are mostly of large size. *Suana concolor*, a somewhat sphinx-like moth having dark red-brown

wings with a lighter margin and one or two yellowish spots, is a good example, the caterpillars are hairy with the tufts directed downwards, the hairs causing irritation. The family *Hypsidæ* though small contain some species that are very common of which *Hypsa aleephron* is perhaps the most abundant; it has buff forewings with one white spot and yellow hindwings with round black spots. The *Arctiidæ* are a very extensive family containing four subfamilies. Those constituting the *Certhinæ* are known as Tiger-moths. They are well represented in Travancore. The caterpillar of *Arctia ricini*, as its name implies, is destructive of the castor oil plant. The moth has the forewings brown with numerous light-ringed blackish spots and the hind wing crimson with irregular wavy blackish bands. *Nyctemera laticinia* having brown forewings with a white band and white hind wings with a brown border is a very common moth both in the hills and plains. *Argina cribraria*, *Deiopeia pulchella* and *Eligma narcissus* are all abundant about Trivandrum; of these *Deiopeia pulchella*, about an inch in expanse having white forewings with black and red spots and white hind wings with an irregular black marginal band, is very wide spread being found in Europe, Africa, all over India, the Malay Archipelago and Australia. The *Noctuidæ* or Owl-moths form a large assemblage of night-flying insects of sombre colours usually marked with large eye-like spots. Some of them are of considerable size. Many of the caterpillars feed under ground on the roots of plants and are in consequence very destructive. *Nyctipao macrops*, a dark coloured moth about five inches in expanse, often comes into houses in Trivandrum, and two other smaller species, *N. crepescularis* and *N. hieroglyphica*, sometimes do the same. The moths of the genus *Ophiderc*, unlike them, are brightly coloured having green or red brown forewings and yellow hind ones with black markings and usually a black lunule. There are four species, *Ophideres ancilla*, *Ophideres hypermnestra*, *Ophideres salaminia* and *Ophideres fullonica*; the latter is said to have the power of piercing with its proboscis and to do damage to crops of oranges by thus inserting it through the peel and sucking the juices. The *Uraniidæ* are not a large family but contain some conspicuous insects. They are more or less day-flying. Some are white with ample wings and light bodies. Two very common species in the hills are *Strophidia fasciata* and *Micronia aculeata*; the latter is also not uncommon about Trivandrum.

The *Geometridæ* are a large family of moths of slender build with large wings and a narrow elongated body; they are semi-nocturnal, the larvæ are called "loopers" from their mode of progression which consists in moving the fore and hind segments alternately the centre of the body

being raised in a loop. *Eumelia rosalia*, a yellow insect with crimson specks and a crimson band across both wings common about the low country is a good example. *Naxa textilis* is white. *Euschema percota* is a day-flying brightly coloured insect blue with purple markings. Its caterpillar does great damage to the leaves of lilies. Another common species is *Macaria fasciata*, slaty grey with a white band across both wings and two orange blotches on the hind-wings. The *Pyralidæ* include a large number of small or moderate-sized moths of fragile structure often having long legs. The genus *Glyphodes* is very well represented in Travancore, there being five species that are common about Trivandrum. *Glyphodes glauculalis* is blue green, *G. celsalis* white with some brown markings, *G. sinuata* yellow with some crimson on the forewings, *G. laticostalis* white with a brown band, and *G. actorionalis* brown with diaphanous white bands. They are all small and more or less insignificant. *Dichocrocis punctiferalis* is a small straw-coloured moth with black spots on both wings common about Trivandrum; *Lepyrodes neptis*, yellowish brown with black edged white bands, is also very common.

Coleoptera. The Coleoptera or beetles are well known. Most of them are possessed of a hard exterior, and the front pair of wings, called Elytra, are not used for flight but serve as cases to protect the body. They are very numerous and are divided into six series. The first of these, the *Lamellicornia*, are so called as the terminal joints of the antennæ are leaf-like. They include the Stag-beetles, Chafers, Dung-beetles and Rose-chafers. *Odontolabis carera* is an example of the first which is common on the hills. Its thorax is black and the wing cases are dull yellow with a triangular black mark down the middle. The male has the mandibles produced at least three quarters of an inch. The female is coloured like the male but the mandibles are not produced into horn-like processes. The *Scarabæidæ* or Chafers are divided into several subfamilies, one of the most interesting of which is that of the Scarabæ whose members may be recognised by their habit of rolling about balls of dung and earth. One species of *Ateuchus*, a black insect is very common about Trivandrum. They act as scavengers by breaking up and removing the droppings of cattle and other animals. Another subfamily includes the Cockchafers or Melolonthides. *Agastrata orichalcea*, which is brilliant metallic greenish all over with purple reflections, is a good example common about Trivandrum. So is *Heterorhina elegans var cyanoptera*, a dark metallic blue insect also with purple reflections. Some of them do damage to cultivation as for instance *Serica pruinosa* which defoliates coffee bushes. Another subfamily, the *Dynastidæ*, though small contains

some very large insects with curious horns and projections. *Eupatorius cantori*, 2½ inches long reddish brown with reddish yellow margin having a long recurved horn in front and two others rising from the middle of the thorax, is a good example; another is *Oryctes rhinoceros*, a large black or brown beetle with a minute rhinoceros-like horn in front. It does great damage to the palms in the Public Gardens in Trivandrum by boring into the stems. The second series, the *Adephaga*, contains the Tiger-beetles, Ground-beetles and Water-beetles; of the first *Collyris insignis* is a good example. It has no wings and the Elytra are firmly soldered together. It has a long rounded thorax somewhat globular in the middle. They are very swift on foot and prey on other insects. *Cicindella sexpunctata* is another example which is of use as it preys on the destructive Rice-sapper. Of the Ground-beetles or *Carabidæ*, a species of *Calosoma* is not uncommon in Trivandrum and a species of *Brachinus* which is able to eject an explosive liquid, also *Pterosophus bimaculatus* dark blue with yellow markings. The Water-beetles or *Dytiscidæ* are carnivorous both in the larval and in the adult stage. *Cybister limbatus* is a common species in water about Trivandrum, and *Hydaticus festivus* and *H. vittatus* are also numerous. The former is a gaily coloured insect having a yellow or orange ground colour with shiny black or dark brown markings.

The third series, the *Polymorpha*, is a very large one containing about fifty families of which the most interesting are the curious Burying-beetles, the Lady-birds, Fire-flies and Glow-worms, Click-beetles and the beautifully coloured Buprestidæ. The *Histeridæ* or Burying-beetles are very compact insects with a very hard shell, they dig under any carcase and so gradually bury it and they were supposed to live on it, but it is now ascertained that they are really predaceous and live on the larvæ of flies which are found in the carcase. There are several species of *Hister* to be found in Trivandrum. The Lady-birds are useful as they prey upon plant lice. *Epilachna innuba*, a small red and yellowish beetle with black spots, is a not uncommon species in the low country. A nearly allied family contains those curious insects which have the elytra flattened to form a rim under which the legs are hidden. They look like animated golden nuggets. Unfortunately when dead the colour fades completely. Their identity has yet to be determined. The family *Bostrichidæ* are very injurious as they attack timber. There are several species some of which do damage to teak while *Bostrichus æqualis* attacks the cotton tree. *Bombax malabaricum*. A small brown beetle of a closely allied family, the *Ptinidæ* of the genus *Dinoderus*, damages bamboos by boring into

them. Another of this family *Lasioderma testaceum*, a small brown beetle with white grubs, is most destructive to cheroots into which the larvæ bore holes. A species of Glow-worm of the genus *Lampyris* is not uncommon, the female is wingless and luminous. The Fire-flies which are so numerous and beautiful at certain seasons belong, I believe, to this family of the *Malacodermidæ*, but their identity has not been made out. The click beetles or *Elateridæ* have the power when lying on their backs of jerking themselves into the air at the same time giving a distinct click. *Agryphnus fuscipes*, a brown insect, is common about Trivandrum and *Alaus speciosus*, a white insect with a curious black irregular line down the centre of the thorax and some black spots, is common in the hills. The last family I need notice, the *Buprestidæ*, is a large one and contains many insects remarkable for the magnificence of their colour. A very common example is *Sternocera dasypleura*, a reddish brown insect having the thorax deeply pitted, and coloured metallic green with golden reflections while beneath it is uniform metallic green also with golden reflections. *Belionota scutellaris* is another example, it is uniform metallic golden green, with some violet on the posterior margin and on the sides of the thorax. The larva is said to do damage by boring into the wood of *Acacia catechu*.

Of the fourth series, *Heteromera*, the great family *Tenebrionidæ* contains the greater number, they are mostly black ground-beetles. There are several species to be found in Trivandrum but they are as yet unidentified. The most interesting are the *Cantharidæ* or *Meloidæ*, Blister-beetles or Oil-beetles. One of the commonest is a species of *Mylabris* black with red markings on the elytra very common on grass.

The fifth series, the *Phytophaga* or plant-eaters, contains among other families, the *Chrysomelidæ* which are as a rule leaf-feeders and the *Cerambycidæ*, or Longicorns, which are wood and stem feeders. Of the former, *Corynodes peregrinus* and *Corynodes corulentus* are examples as also *Crioceris impressus*. The larvæ of some species of this genus have a peculiar method of protecting themselves. "The anus", says Dr. Sharpe, "is placed on the upper surface and formed so that the excrement when voided is pushed forward on to the insect; here it is retained by means of a slimy matter, and a thick coat entirely covering the creature is ultimately formed". Some of the longicorn-beetles are very large. One rather common species is quite four inches long dark brown and the male has the mandibles produced almost as largely as some of the stag-beetles. The name of this species I do not know. The well-known coffee-borer *Xylotrechus quadrupes*, a slender beetle some three quarters

of an inch long belongs to this family. Other examples are *Batocera albofasciata*, about two inches long reddish brown with white spots and beneath dirty brown margined with white. *Mecotagus gnermi* (?) about an inch long is dull brown with some white lines on the thorax and head and white vermiculations on the elytra. *Clytus annularis* about half an inch long is yellowish white with reddish brown markings. *Oleocampus bilobus* rather more than half an inch long is ashy brown with four white round marks on the elytra, the first two approximating the sides of the head and thorax margined with white.

The sixth series, the *Rhyncophora*, contains the Weevils. They can be recognised by their having the head more or less prolonged in front to form a mouth or beak. Some of them are large, for instance, the Palm-weevil, a reddish brown insect some two inches long whose white fleshy legless grubs tunnel into the trunks of various palms. Another curious insect is *Cryptorhynchus mangifera*. It is an earth-coloured weevil and as a grub lives inside the stone of the mango fruit finally eating its way out when full grown.

Neuroptera. This is the last Order of insects that undergo a complete metamorphosis. The mouth organs in the adult are adapted for biting and grinding. The wings are membranous and are covered with a net-work of veins. It includes the Caddis-flies constituting the suborder *Trichoptera*, and the Scorpion-flies, Lace-wing Flies, Ant lions and Mantis-flies constituting the suborder *Planipennia*.

The larvæ of the Caddis-flies are with few exceptions aquatic and construct cases of all sorts of materials. There are several species in Travancore but not yet identified. Among the *Planipennia* there is a remarkable insect of the family *Sialidæ* that has large sickle-shaped mandibles, it belongs to the genus *Corydalis*. The *Mantispidæ* or mantis-flies are well represented but have not been worked out. The Ant-lions are well known. The larvæ make pit falls to catch crawling insects. Wherever there is a dry sandy spot these funnel-shaped pits may be seen and at the bottom the larva sits with its sickle-shaped jaws extended ready to seize its prey when it falls down the loose sandy sides of the pit. The adult Ant-lions are winged insects whose wings when at rest spread like a roof over the hinder part of the body. Some have the wings plain, others spotted. There is one large species whose wings are marked with obliquely transverse brown bands. The expanse is over 4 inches. It often finds its way into houses at night and flutters about against the ceiling. When the larva is full-fed it encloses itself in a more or less

spherical cocoon made of sand grains fastened together with silken threads, the interior of which is lined with silk, within this it undergoes its metamorphosis.

Orthoptera. This Order includes the Dragon-flies, May-flies, Stone-flies, Termites or White-ants, Crickets, Grasshoppers, Locusts, Stick and Leaf-insects, Mantises, Cockroaches and Earwigs.

None of these undergo a distinct metamorphosis but by the gradual succession of changes pass from the larval to the adult stage, the larvæ are wingless at first, and the wings are developed during the moults, being fully formed only at the last moult. The mouth organs are adapted for biting. Most of the members of the group are of large size.

The Dragon-flies (*Odonata*) live entirely upon insects, which they capture on the wing. In the larval and pupal stages they live in water and are equally carnivorous. In both stages there is a peculiar structure fixed under the head known as "the mask" which is a jointed weapon armed at the end with a pair of toothed processes. It can be protruded with great quickness and serves to seize the prey. There are three families, the *Libellulidæ*, *Æschnidæ* and *Agrionidæ*. In the two first the head is rounded but in the third it is much wider than long, almost cylindrical and set on the body like the head of a hammer on its handle. Many of the species are very beautiful as their wings often glitter with varied iridescence. There are many species in Travancore of all three families, but no attempt has yet been made to ascertain their specific names.

The Termites or White-ants (*Termitidæ*) are well known on account of their destructive habits. They live in colonies which consist of a queen and king with some supernumerary individuals which may, by a system of diet, be matured into royalties if required, another lot of individuals with very large heads and formidable jaws, who may be called soldiers and finally the workers, who are by far the most numerous. The perfect individuals have compound eyes but the soldiers and workers are as a rule eyeless. The mouth parts are formed for biting. Just before the rains, when the first showers fall, great swarms of winged termites make their way out of the nest. Most of these are destroyed by birds or lizards but the survivors may form new colonies. Their food consists generally of decaying wood or other vegetable matter. On the hills a species may be seen which tunnel into the branches of trees and make nests round them. Another species seems to live on grass, but so far, these, like so many other insects, await identification.

Crickets (*Gryllidæ*) belong to the suborder of true Orthoptera which differ from those so far mentioned in having the two pairs of wings unlike, the first pair being usually stiff and horny, and serving as covers to the hinder pair which are membranous and folded. The chirping noise made by crickets is produced by rubbing the base of one wing-cover over the other. It may often be heard at night in houses; it is uttered only by the male and is supposed to attract the female. The abdomen bears two flexible appendages and the female has in addition a long ovipositor. A black insect of the genus *Gryllus* is common in houses and a green one of the genus *Calyptotrypus* is found in the fields, but the one that forces itself most into notice is the mole-cricket, *Gryllotalpa vulgaris*, as it flies into the verandah attracted at night by the light and flaps about in an irresponsible way. It is a large insect and can at once be recognised by the form of its front legs which are greatly thickened for digging. It burrows underground and so destroys the roots of plants. All crickets lay their eggs in holes in the ground glued together in masses.

The long-horned Grasshoppers (*Locustidæ*) are so called because they have very long bristle-like antennæ. The true locusts do not belong to this family but to the next. They are usually green or brown in colour. Like the crickets they produce sound by rubbing the base of one wing-cover over the other. The females have a long sabre-shaped ovipositor. *Mecopoda elongata*, a large greenish brown insect with very long hind legs is a common species. Some have the wing-covers very much enlarged and veined like leaves. *Onomarchus leuconotus* is an example, the wing-covers are light green and quite leaf-like. A species of *Aprion* also has green wing-covers but is not so large an insect. Another very curious insect is *Acanthodis ululina*; its wing-covers are like lichen-covered bark.

The Locusts (*Acrididæ*) have short antennæ and they produce sound in a different way to that by which the crickets and grasshoppers produce it namely, by rubbing the inner side of the hind legs, which has certain bead-like prominences, against the outer face of the wing-cover in which there is a prominent sharp-edged vein. The females have only a short ovipositor. In Travancore we are not troubled by swarms of migratory locusts but there are several species of locusts to be found. One of the largest is *Acridium flavicorne*. The most abundant and widely distributed of the migratory locusts is *Pachytylus cinerascens* which may be found throughout the Oriental Region, in Europe and even in New Zealand. It is common in Travancore but does not swarm. Another species of

short-horned grasshopper common about Trivandrum is *Aularches miliaris*. Its thorax is curiously rugose, highly polished and with a yellow margin, the wing-covers are bluish green with round sealing-wax-like yellow spots and in fact it is highly ornamental. Another species, *Œdaleus marmoratus*, has the wing-covers and the base of the hind wings yellow bordered with brown. A very curious looking insect is *Acrida turrita* which has the head very much prolonged into a cone-shape with the antennæ and eyes near the apex.

The Leaf and Stick-insects (*Phasmidæ*) are very curious and derive their name from their likeness to dry sticks and leaves. The wings of the stick-insects are rudimentary and their legs very long and are usually stretched out unsymmetrically. They are generally to be found amongst underwood or on the stems of long grasses. They are vegetable feeders. The female lays eggs singly dropping them casually on the ground. Each is enclosed in a capsule and they are very like seeds of plants. One species over a foot in length is found on the hills. It is, I believe, a species of *Lonchodes*. Wingless species of the genus *Bacillus* are common about Trivandrum. The only leaf-insect found here is *Phyllium scythe*. Its body is flat and broad and the wing-covers are leaf-like. Its colour is more or less green. The legs have broad leaf-like expansions. It is not very common.

The Praying Insects (*Mantidæ*) usually have the prothorax very much longer than the other two segments of the thorax. The two hinder pairs of legs are long and are used for progression but the front pair are peculiarly formed and are used to seize their prey, for they are carnivorous, the thighs are strong and are provided with two rows of spines and the shanks are also furnished with two rows of spines and can be folded back on the thighs. When at rest these joints are thus kept folded as if the insect were at prayer, hence their name. They lay eggs in masses which are attached to plants and are surrounded by a parchment-like capsule. The commonest form is *Gongylus gongyloides*. Another species very like *Harpax ocellata* of Africa has eye-like marks on the wing-covers. There are many species and they often come into the verandah at night attracted by the light.

Cockroaches (*Blattidæ*) are very common. Their legs are eminently fitted for running and they can move very quickly. They have strong horny jaws well fitted for biting. They generally have two pairs of wings, the front pair being stiff and horny, while the hinder pair are more membranous. The ordinary large form that infests houses is *Periplaneta*

americana. *Periplaneta decorata* is a smaller insect having some brown markings. *Leucophaea surinamensis* is another common insect about Trivandrum. On the hills a rather ornamental form is found, *Corydia petiveriana*. The under wings and sides of the body are yellow and the upper side of the front wings are black with cream-coloured marks. The eggs are laid in a capsule formed in the interior of the females. The capsule is a horny case which is carried about for sometime by the mother protruding from the hinder part of the body. Eventually it is laid in some suitable locality and the young make their way out. Earwigs (*Forficulidæ*) can be at once recognised by the fact that they bear at the end of the body a pair of forceps or callipers. Many are wingless but in those forms that possess wings they are folded in a complicated way. They are not common and so far none have been identified in Travancore, though there are several species. The females lay eggs and are said to watch over them with great care.

Rhynchota. This Order also called Hemiptera includes the Bugs and is well represented in Travancore. It is divided into two suborders, *Hemiptera heteroptera* and *Hemiptera homoptera*. Few however have given attention to the order and only lately has any attempt been made to work it out in India. The insects constituting it may be readily recognised by the possession of a long proboscis which is usually bent under the body. Some are vegetable feeders and some carnivorous. Many of them are brilliantly coloured. In the family *Pentatomidæ* or Shield-bugs, which is one of the largest and most important, there are several such, *Scutellera nobilis* is metallic bluish green or purplish with indigo blue spots and bars. It is a common insect about the low country. *Chrysocoris stolzerus*, also common, is bluish green with black spot and *Catacanthus incarnatus* is reddish yellow with black spots. The best known members of the family, however, is the green bug *Nezara viridula* on account of its evil scent. Most bugs possess the power of emitting an unpleasant odour but the green bug seems to exercise it more particularly. Some are injurious to plants as the well-known Rice-sapper, *Leptocorisa acuta*, which destroys young paddy, also those of the genus *Helopeltis* which are most destructive to the tea plants. On the other hand *Aspongopus nigriventis* is of use in effecting the pollination of the Sago palm. Some bugs feed exclusively on other insects, especially those of the family *Reduviidæ* of which *Conorhinus rubrofasciatus* and *Euagoras plagiatus*, common insects about Trivandrum, are examples. Unlike the other land-bugs they have no smell. When writing of carnivorous bugs mention must be made of the common Bed-bug, *Cimex lectularius*, which is unfortunately too well

known throughout the world. The water-bugs, like the *Reduviidæ* are innocent of smell. A species of *Naucoris* which swims about on its back is very common, also one of *Hydrometra*. These fly well and at night are often attracted by the lights to enter houses. A species of *Belostoma*, a huge brown insect over three inches long, is sometimes attracted in this way. Water-scorpions of the genus *Nepa* are also common; their fore-legs are specially modified to serve as prehensile organs and they have a long slender siphon behind. Of the suborder *Hemiptera homoptera*, *Cicadas* are most in evidence. One does not meet with them in the low country but from the foot of the hills to the summits their voices are to be heard at times in a chorus which is almost deafening. The males alone possess the power of emitting sound, hence a Greek poet has written "Happy the Cicadas' lives, for they all have voiceless wives". There are several species in Travancore but they have not yet been indentified. The Lantern flies of the family *Fulgoridæ* have a horn-like extension of the top of the head which was supposed to be luminous, hence their name. The species common on the hills here is *Fulgora delesserti*. Its forewings are brown with yellow spots and the hind are blue with the apical area dark brown. The genus *Flatta* is represented by *F. acutipemis* and *F. tunicata*, their forewings are green and the hind are white. The family *Membracidæ* have the prothorax prolonged backwards into a hood or into other strange forms. There are several curious examples to be seen about the low country, of which *Centrotypis flexuosus* is about the commonest. The frothy masses seen at times hanging to branches of trees or bushes are the work of the larvæ of the Frog-hoppers or *Cercopidæ* of which there are many species. Others of this family secrete fluid so abundantly as to make it appear to drop like rain from the trees in which they are. The Plant-lice or *Aphidæ* are another family of this sub-order and, though small, are from their enormous numbers most injurious to trees and plants. There are many species in Travancore. The Scale-insects or Mealy-bugs of the family *Coccidæ* are also very injurious but on the other hand some produce useful substances, as for instance white wax is formed by a Lecaniid, *Ceroplastes ceriferus* and lac is the shelly covering of *Carteria lacca*, unfortunately neither of these species occurs in Travancore but only the injurious forms of which there are many.

Thysanoptera and Thysanura. The insects comprising the first of these Orders are all very small and feed upon the juices of flowers and sometimes do great injury as they are often found in large numbers. The most familiar members of the *Thysanura* are the little silver-fish which may always be found among papers or books that have been allowed to lie

for any length of time undisturbed. They do damage to books by feeding on the paste used in binding them and they also eat old paper.

Myriapoda. This group includes the *Millipedes* and *Centipedes*. The former are distinguished by their slow movements and are exclusively vegetable feeders. They have no weapons of offence but are able to secrete a strong smelling liquid. Their bodies are more or less cylindrical. They include the Pill-millipedes *Oniscomorpha* and the worm-like Millipedes or *Helminthomorpha*. The former are not quite so much in evidence as the latter, but one species which I believe to be *Arthrosphæra inermis* is fairly common. There are several species of the latter of which *Spirostreptus malabricus* is the commonest; it is a long black millipede about ten inches to a foot in length and is found abundantly both in the hills and on the plains: the liquid it secretes smells strongly of iodine and leaves a brown stain on the hands. A species of *Trachyiulus* each segment of which carries from 11 to 18 warty spines, is also common on the hills. Another, a species of *Leptodesmus*, brown with yellow lateral line is common on the low country; it is about 2 inches long. The Centipedes are more or less soft and flat-bodied, they are active and swift and live for the most part in dark places under stones, logs of woods &c., they prey upon insects or worms which they kill by means of their large poison claws or maxillipedes. One of the most peculiar is *Scutigera longicornis*; it is about an inch and a half long with a small body and about 15 pairs of long legs so arranged as to give it on oval shape. Unlike most it enjoys sunlight and may be seen in its native haunts darting about and catching insects regardless of the blazing sun. It is common about Trivandrum. Of the *Scolopendridæ*, *Rhysida longipes* and *Scolopendra morsitans* are the commonest. They live on cockroaches, beetles, worms, &c., and are frequently found about houses. The *Geophilidæ* are long worm-like centipedes with from thirty-nine to over one hundred segments; they are subterranean in their habits and feed almost entirely on earth worms. *Mecistocephalus punctiferus* is the commonest species.

Arachnida. This class includes the Scorpions, Spiders, Mites &c. Of the former so far as six species have been identified in Travancore of which one *Chiromachetes fergusoni* is peculiar to it. The great black scorpions of the genus *Palamnæus* are to be found under stones. *P. scaber* is about four inches long and has the hands and vesicle tinged with red. *Lychas tricarinatus*, a brownish yellow scorpion about two inches long, is often found in houses especially about the bath-rooms.

The Whip-scorpions or *Pedipalpi* resemble the true scorpions but may

be recognised by the fact that the abdomen is sharply marked off from the cephalothorax by a constriction. They are divided into a tailed group *Uropygi* and a tailless *Amblipygi*. The former have a movable tail corresponding to the sting of the scorpions. They live in damp places under stones or in crevices of wood or rock. There are two species of *Uropygi* identified, *Telyphonus indicus* and *Thelyphonus sepiaris subspecies muricola*, about an inch and a half long and with a tail rather more than an inch. It is black above with red legs. There are some smaller species which have not yet been identified. Of the *Amplipygi* the only species yet found is *Phrynichus phipsoni*; the body is much flattened and kidney-shaped, the abdomen oval. The body is about an inch and a quarter long and black. All the legs are long especially the first pair which are like antennæ. Except for the long prehensile chela, it is outwardly like a spider. The true spiders or *Araneæ* are well represented. Of the larger species some twenty have been identified but there are many more as yet unnamed. Of the named ones six have not been found elsewhere, but this is probably due to the fact that very little attention has been paid to this order. The six species peculiar to Travancore are *Sason armatoris* and *Sasonichus sullivani*. Ground-living burrowing spiders, *Pœcilotheria rufilata*, a large hairy red spider obscurely mottled, total length of body two inches legs about three, which lives in trees; there is another species *P. striata*, grey with dark stripes not quite so large. They hunt by night and feed on beetles, cockroaches, &c. *Psechrus alticeps*, about three quarters of an inch long with slender legs about two inches which spins a large web, is found in the hills and in the plains. It is yellowish brown variegated with black. *Pecenia travancorica*, an allied species has been found at Madatora. *Pandercetes celatus*, a hunting spider, coloured grey and mottled with brown so as to match the lichen-covered bark of trees is the last of the spiders peculiar to Travancore. Of the others those most frequently met with are *Nephila maculata* and *Nephila malabarensis*. The former is about an inch and a quarter long with long strong legs. It has the thorax black, the abdomen olive brown with yellow lines and spots. The latter is less than an inch long, the thorax is black with yellow hairs on it, the abdomen greyish brown mottled darker. They spin webs composed of radiating and concentric threads. That of *Nephila maculata* is often found across bridle paths in forest on the hills, and the threads are very elastic and strong and appear to be covered with some glutinous substance as they stick if one comes in contact with the web. Some spiders of the genus *Gasteracantha* are curiously shaped. *G. geminata* has the abdomen twice as broad as long, with paired spines sticking out on each side and behind, it is yellow with two transverse black

stripes. Of the hunting spiders, *Peucetia viridana* is common on the hills. It is about half an inch long more or less green all over and lives amongst grass and other plants where it seeks its prey. In houses *Heteropoda venatoria* is very common. It is a greyish brown spider about three quarters of an inch or more long with legs about twice this length and moves sideways running very quickly. Of the Acari or Mites, I can say little, a species of velvety mite of the genus *Trombidium* about half an inch long, looking as if it were covered with plush, is found at Udayagiri, but probably the commonest is the microscopic itch-mite, *Sarcoptes scabiei*, which tunnels under the skin of man where it lays eggs which hatch and the young then start burrowing also. Ticks of the genus *Ixodes*, are very common on cattle and in fact they attack all land vertebrates including snakes and lizards. They are common in grass lands.

Crustacea. The Crustaceans comprise a large assemblage presenting great diversity of structure. They are divided into two subclasses, the *Malacostraca*, and *Entomostraca*. The former comprises, among others, the familiar Crabs, Lobsters and Cray-fish, the latter the Barnacles and the tiny water-fleas. The Crabs form the short-tailed group of the order *Decapoda* and the Lobsters and Cray-fishes are members of the long tailed division. Both are well represented in Travancore, and so far some 30 species have been identified. The crabs are divided into five tribes, representatives of three of which have so far been found; the first of these, the *Cyclometopa*, are distinguished by having rounded foreheads. Most of the commoner species are included in this tribe. The field-crab, *Thelphusa leschenaulti*, which is so abundant, is an example. Some of the sea-crabs belonging to this tribe are very large, for example *Scylla serrata*, dull greenish blue and *Charybdis cruciferа*, which is also conspicuous by its colour, purplish red with creamy white markings suffused with lighter purple, one of them forming a more or less conspicuous cross. The edible crabs, *Neptunus sanguinolentus*, reddish yellow with bright reddish round marking and *Neptunus pelagicus*, olive green with orange markings, belong to this tribe, as also *Cardiosoma carnifex*, a dark reddish brown crab having the appendages covered with hairs. It is found on the margins of lakes. The second tribe *Catometopa* has the frontal region of the carapace broad and square and bent downwards. The crabs which are so commonly seen on the sands belong to this tribe, they have very long eye-stalks and apparently see remarkably well. They are gregarious and each one forms a burrow for itself; they run very swiftly and are by no means easy to catch; two species, *Ocypoda platytarsus* and *Ocypoda cardimana*, have been identified. Nearly allied to

them are the curious Calling-crabs, *Gelasimus annulipes*, found on the shores of the backwaters. The male has one pincer enormously developed and it brandishes this as if it were beckoning, hence the name of calling-crab has been given to it. This claw is highly coloured and Major Alcock has suggested that the males wave it to attract the females. Another example is *Grapsus grapsus* which is bright reddish brown and possesses long and powerful legs which enable it to dart about the rocks very quickly and its flattened carapace enables it to find shelter in amongst the crevices. It is fairly common at Cape Comorin.

The third tribe, the *Oxyrhyncha*, is unrepresented so far in the Museum collection.

The fourth tribe, the *Oxystomata*, or sharp-nosed crabs have the carapace produced in front into a short beak-like prominence. They vary in habit; for instance, a species of *Matuta* found in the beach at Trivandrum, a pale olive-coloured creature having a roughened carapace with two prominent lateral prolongations forming spines, is an active swimmer. *Calappa lophos*, on the other hand, leads a sluggish life on the floor of the sea. It is found at Tiruvallam and Puvar. It has a strongly convex carapace with the sides produced into shelf-like plates covering the legs, and the pincers are enlarged and compressed, so that when folded they form a covering to the face and so give it complete protection. *Leucosia craniolaris*, another example of this tribe, is remarkable for the porcelain-like appearance and texture of its pale bluish carapace. It is found on the Trivandrum beach.

The remaining tribe, the *Anomala*, is so far without a representative in the collection.

There are several species of Hermit-crabs, which, having the integument of the abdomen soft, use empty shells of the Mollusca to protect themselves. None of these have been identified as yet. The Lobsters, Prawns and Shrimps are numerous. *Palinurus dasypus* is perhaps the commonest; it is a large lobster reaching a length of over a foot. The cephalo-thorax is olive green with dull reddish yellow markings, the abdominal rings are finely spotted with orange. It has long antennæ and the cephalo-thorax is thickly covered with spiny tubercles and there is a large spine over each eye. *Panulirus fasciatus*, another lobster, has even longer antennæ; it is a bluish green with orange transverse lines a little above the posterior margins of the somites. A specimen 9 inches long has the antennæ 2 feet 4 inches in length. It is found among rocks.

Thænus orientalis, also found on rocky shores, is reddish brown and the head appendages are curiously produced into leaf-like processes.

Shrimps and prawns are common; a species of *Palæmon* grows to nine inches in length and is commonly sold in the market. In the backwaters a very large prawn, *Palæmon carcinus*, is found. The cephalothorax and the anterior portions of the somites are light purplish green followed by deep blue with orange spots on the sides and tail. Its length is 12 inches and the pincers are 19 inches.

The order *Stomapoda* is represented by a species of Mantis-shrimp (*Squilla*) which makes burrows in the sand. They have a very short carapace and their seizing limbs are not chelate, but toothed, like the forelimbs of a mantis, hence their name. The *Isopoda* are represented by *Hippa asiatica*, pale bluish ashy, which lives in the sands also by *Sphæroma* whose convex body is capable of being rolled into a ball; they live under stones. The fish-lice, some of which attain a length of 2 inches, also belong to this group. On land the wood-lice represent it; there are several species to be found, but they are as yet unidentified.

The *Entomostraca* are well represented. A species of *Lepas* is common and so is *Balanus tintinabulum*, one of the Acorn Barnacles. Of the remaining subkingdoms, the Echinoderms, Molluscs, Worms, and Coelenterates, I can say nothing, as it has not been possible hitherto to collect them systematically and to ascertain how far they are represented in Travancore.

CHAPTER V.

ARCHÆOLOGY.

"And, when I am forgotten, as I shall be,
And sleep in dull cold marble, where no mention
Of me more must be heard of, say, I taught thee,
Say, Wolsey, that once trod the ways of glory,
And sounded all the depths and shoals of honour,
Found thee a way, out of his wreck, to rise in."

Shakespeare.

The prehistoric archæological remains are mostly natural or artificial caves used by primitive men as dwelling places or for other purposes. Numbers of such caves have been recently discovered all over Southern India. But in Travancore owing to the paucity of archæological researches in which only a beginning has been made, no definite information is available. Rude stone pillars, probably menhirs, indicating burial places and small cup-like stone hollows just large enough to hold a human body, have been discovered in parts of North Travancore. When the Varkala tunnel was bored, rude natural and artificial hollows were discovered here and there containing old pots, human skeletons and the like. These remains no doubt indicate that the tracts in which they were found were inhabited by the same race of men that constructed the 'Pandu Kulies' of the adjoining British tracts. The absence of any implements ordinarily associated with such burial places probably indicate their great antiquity; but the exact nature of the civilisation and the period at which such caves were constructed have not yet been ascertained.

Sepulchral urns have also been found in North and South Travancore; one large pot discovered in one of the caves showed signs of rude ornamental work, thus testifying to some advance in civilisation. At Ilauji, near Courtallam on the borders of Travancore, on opening an urn some traces of the shape of a human skeleton were discovered by Dr. Fry, a former Residency Surgeon in Travancore. Who the people were who buried their dead in these urns is a problem yet unsolved. Dr. Caldwell, who saw personally some urns both in the Tinnevelly and Madura Districts and in North and South Travancore, i. e., on both sides of the Western Ghauts, is of opinion that "the unknown people must have lived in villages. They were also a comparatively civilised people .....what seems to be most probable is that they were the ancestors of the people now living in the neighbourhood."*

* Indian Antiquary, Vol. VI. Page 280.

The area within which these traces are found would, if accurately determined, throw considerable light on early history and civilisation, but this has not been done yet. No provision exists at present for making excavations, which is the chief method of discovering prehistoric remains; other improved appliances are also wanting to help the work. Little is therefore known definitely of the remains of the period usually termed prehistoric. A start will have to be made in this direction.

Regarding the historic period, however, more definite, though still far from satisfactorily utilised, information is available and this will be here dealt with under the following heads:—

1. Architecture.
2. Sculpture.
3. Coins.
4. Inscriptions.
5. Forts and military works.
6. Tombs and monuments.

Architecture. The Dravidian style of building is the most prevalent, especially in South Travancore where examples of the indigenous style are not commonly met with. The northern limit of the Dravidian style is Trivandrum. This is probably due to the easy accessibility of the southern parts to the outside world and the intimate connection that has existed between them and the adjoining districts of Madura, Tinnevelly, Coimbatore &c., where the Dravidian races flourished and constructed some of their best architectural works. Some of the southern Taluqs were for a time under the sway of the Pandyan and other Kings and were wrested from their hands by the Rajahs of Travancore.

There are also a few remains of Jaina and Buddhistic architecture. The temples at Chitaral near Kuzhittura in the Vilavankod Taluq, and Madavur Parai in Kalakuttam, Trivandrum Taluq, are stated to be of Buddhistic origin. But examples of these styles are rare and have not been properly studied.

Besides these foreign styles, there is also an indigenous style. The temples and other buildings constructed in this style lack both the costliness and grandeur of the Dravidian structures, but they are neat and simple with provision for admitting plenty of light and fresh air, and in these respects are undoubtedly superior to the costly edifices of the Dravidian style. The indigenous style is peculiar to Malabar and indeed the like of it is not known to exist anywhere else in India. The chief characteristic of this

style is that wood enters largely in its construction. This style, recurs, with all its peculiarities, in Nepal and Tibet and the resemblance between the two is so strong that from this fact, among others, Sir James Fergusson argues that "it cannot be doubted that an intimate connection once existed between Nepal and Tibet on the one side and Malabar coast on the other", though it has not yet been possible to ascertain when. The large employment of wood in the place of stone is, according to Mr. Fergusson, the chief peculiarity of the Jaina temple architecture; and he would set down the style prevalent in Malabar, Nepal and Tibet, to the influence of Jaina example. But more definite and reliable evidence should be sought before laying it down finally that the Malabar style is a copy of the Jaina temple architecture. The large employment of wood is sufficiently accounted for by the abundant supply of building timber available in the forests of Malabar; the same conditions exist in the Himalayan valleys of Nepal and Tibet. The indigenous style combining with it the advantages of neatness, health and ventilation, fulfils the function of true architecture, which, according to Ruskin, is the art "which so disposes and adorns the edifices raised by man, for whatsoever uses that the sight of them may contribute to his mental health, power and pleasure". The peculiarities of the Dravidian and Malabar styles of architecture are dealt with at length elsewhere. The great temple of Sri Padmanabhaswami in Trivandrum is one of the best specimens of the Dravidian style of architecture in Travancore. In my Report on the Census of Travancore (1891), I described it thus:—

"This temple stands in the most elevated part of a vast plain about 20 square miles in extent. The site itself is only a few feet above the sea-level. The area covered by the temple enclosure is 570×510, or 290,700 square feet, equal to about 7 acres. The temple faces the east, and the view on that side through the large fort gate and a long line of bazaars with paddy fields and cocoanut topes behind them is most charming. A handsome flight of stone-steps on the eastern side shows the gentle entrance of the temple-area, the first portion of which is covered by a huge gopuram or tower, pyramidal in shape and built of granite stone and brick. This tower is about 100 feet in height, and has seven stories with window-like openings in the centre of each of them. These openings, as well as the face of the tower, are lighted every evening, the illumination being visible at a great distance. The stone basement of the tower is covered with elaborate sculpturing, and the masonry above with ornamental work of Hindu figures. On the top are seven gold steeples or turrets known as *Swarnastupis* in the vernacular. These are seen at an immense distance from the town. Underneath the gopuram is the main gateway leading to the temple, well protected by a number of massive doors all guarded day and night by faithful sentries. The gopuram and the lofty temple walls were in the olden times not merely an ornamental appendage to the pagoda, but a stronghold of the temple jewels and the king's treasure, and under the simpler system of warfare and weapons then known, they yielded an effectual protection from foes. Between the gateway and the inner shrine, or holy of holies, there is a fine broad open corridor in the form of an oblong, supported by 324 stone pillars and covered with a terraced roof. This is a most beautiful and useful structure. It is called the *Seevalimantapom*, meaning the walk of the god's procession. On one side it is 450 feet long, on the shorter side 350 feet. It is 25 feet broad. The two rows of granite pillars and the stone ceiling above have been made the receptacle of the talents of the sculptor's chisel. Every stone pillar has the figure of a Nair girl bearing a lamp in the palm of her hands joined together and raised above her waists. The niche of the lamp will hold four ounces of oil, and this quantity will keep the light burning for four hours of the night. The top of the pillar is surmounted by the head of a unicorn, in the mouth of which rolls a ball of stone in the manner of a Chinese puzzle. On each side of the pillar is suspended a pretty brass lamp at a height of ten feet from the floor. Between the pillars are also placed rows of iron lamps, like butties fixed to pieces of planks pressed in between the stone pillars, also of the same height as the hanging brass lamps. When all these are lighted, as well as the numerous rows of cocoanut oil lamps on the outside walls of the inner shrine to which I shall presently refer, the effect on the visitor is most dazzling. The reader will not have seen anything like it in any other part of India. It is impossible to describe in words what beggars the imagination. This *Seevalimantapom* is also used as the dining hall on important occasions, and I counted so many as 2,500 leaves on one occasion, showing that so many people could sit down there simultaneously to breakfast. I do not think the wealthiest Duke or Marquis in Great Britain can ask so many guests to dinner at a time. And this, I believe, is a spectacle unrivalled in any part of the world. At the four points of this oblong corridor, but not connected with it, stand four stone-mantapoms or raised platforms, from which the women and children witness the god's procession during the important festivals in the temple, when the *Seevalimantapom* and the courtyard are fully crammed with people. These are called *Uchamantapoms*. On ordinary days, these are used for the reading of the Puranas or the Chakkiyar's entertainment or the *Patakam* recital. Sometimes Vedic scholars from distant parts of India here announce themselves to the sovereign, by reciting some of the hymns of the Veda. On the south of the southern *Seevalimantapom* is a house dedicated to the performance of the chief State ceremonies. North of the oblong is the cooking apartments of the feeding house attached to the temple, commensurate in size and area to the needs of the thousands daily fed on important occasions. Here you have hearths of the height of a full-grown man, and spacious enough to hold tons of firewood at a time, large bell-metal caldrons, the hollow of which can contain condiments to feed 5,000 people at a meal, and so deep that a boy can swim in it if filled with water, large canoes made of wood capable of holding several hundred pots of curries or buttermilk, altogether presenting the appearance in every respect of Brobdingnagian arrangements. Everything here is on a stupendous scale. Beyond this magnificent corridor or covered walk is the great flagstaff of gold or the *Dhwajastambhom*, the emblem of victory, a *sine qua non* to every Hindu temple, considered so by the immemorial usage of Hindus and by their sacred books. The staff itself is a fine teak log 80 feet in length without a flaw, and shaped circular, tapering towards the top. This log is covered with a series of copper-plate rings from the foot upwards, and surmounted on the top by a massive pewter image of Garuda said to be the god's *vahanom* or favourite riding animal. The copper plates and the image are gilded thickly on the outside with fine gold in a fashion peculiar to the native artisans of Travancore. The gold used is of a very superior touch, which is beaten into thin plates of the thickness of ordinary paper, then cut into small pieces and ground down on a stone with sand and quicksilver into a fine pasty substance. This pasty substance is laid on the copper rings,

themselves highly-polished, and well rubbed into them. The quicksilver disappears in the subsequent heating over the fire. This process is repeated seven times, or more according to the quantity of gold available, when the rings assume a very pretty colour. This is the gilding process in vogue here. During the *oolsavam* or season of festival a flag of silk is hoisted high on the staff; the processes of hoisting and lowering are accompanied by long and detailed ceremonies in every temple. South of the flagstaff and connected with the 'Seevalimantapom' roof, is the famous 'Kulasekhara mantapom,' sometimes called 'Ayirakkal mantapom'. This place is entirely a work of the sculptor's art. The best specimens of carving in stone of old Travancore are preserved here. The former Maharajahs imported several families of talented masons and carpenters and artisans from all parts of India, and gave them special privileges and patronised them. The descendants of these families are still living in Travancore. I have not the patience to write here a full description of the excellent specimens of stone-work as displayed in the 'Kulasekhara mantapom.' It is enough to say that the obdurate granite has been made to bend and mould in obedience to the artist's chisel in very remarkable and unlikely ways. Between the flagstaff and the temple door is the 'Velikkapurai', in which also specimens of stone workmanship known to native sculpture are profusely shown in the huge pillars and the ceiling above. Before the Hindu enters the temple door, he bows respectfully from the big *Balipeetham* directly in front of the God in the inner shrine. A long gallery underneath a magnificent upstair hall is passed before the *Jeyamantapom* is reached, from which a flight of steps leads you down to the yard of the inner shrine, also beautifully paved with fine slabs of granite stone, the interstices between being well closed by a solution of tin. Another flight of stone-steps takes you up to the front of the inner shrine. No worshipper is allowed to enter the shrine itself. Only the specially privileged priests can enter. Even 'Sankaracharyar' the 'Loka-Guru' has certain restrictions placed on him in his pooja to the God. This shrine is a small room with three doors, and the devotaries worship at all *three* of them. All the standing room for the worshippers is afforded by one large slab of stone* measuring 20 feet by 25 feet and 4 feet high, brought thither according to popular belief not by human hands, but with the help of the local deity himself, and the simple folk still point to the deep ditch in the neighbouring mountains from which this huge stone was quarried. I should not omit to mention that on this side of the *Jeyamantapom* as well as of the inner shrine there are two open yards also nicely paved with granite stones. It is scarcely necessary to inform the Hindu reader that the inner shrine, the single-stone mantapom, the open yards, the *Jeyamantapom* and all thereabouts are kept most scrupulously neat and sweet by perfumes, and cleaning and washing continually going on for several hours of the day. Outside the inner shrine, but within the enclosure itself, there are other small shrines, dedicated to Krishna, Kshetrapala, Sastha, Narasimha, Vyasa, Siva, Ganesa, Rama, Sita, Lakshmana and Hanuman, Garuda, &c. These are the minor deities, the chief deity being a favourite form of Vishnu or the Protector of the world. On the hind walls of the chief shrine are scenically represented in water colours the whole of the Puranas including such minute and complicated details as the wars of Rama and Ravana, the Pandavas and Kurus, the marriage of Sita, the deeds of Krishna, and such like, too numerous to mention. The devout worshipper passes by looking at them reverentially, and touching his eyes with the fingers consecrated by the touch of the holy walls on which these scenes are painted. There are two or three walls within the sacred precincts in addition to a large flat tank outside the temple itself. A cellar underneath the shrine secures the temple jewels, and a massive offertory made of wood, covered

* This is known as the 'Ottakal mantapom'.

with copper-plates, receives the daily offerings in cash of the worshippers. Half an hour's perambulation in the temple is to the pious Hindu a supremely happy portion of his existence."

Sculpture. The sculpture of Travancore is necessarily limited to the temples and fanes of the Hindu religion, as the Mahomedan religion forbids representations either of men or animals in their buildings. The sculptures to be found in Travancore may be divided into three classes,

(a) Indigenous,
(b) Buddhistic and Jaina and
(c) Brahminical,

according to the religious belief which occasioned them.

The *Indigenous* sculptures consist of 'Naga-kals' or serpent figures, 'Veera-kals' or figures of heroes and representations of village goddesses, demons &c. The serpent figures are most common in Travancore and the 'Kavu' or abode of serpents, where images of serpents are set up and worshipped, is to be invariably seen in the garden of every Nayar house. The 'Veera-kals' are also to be largely met with here, most of them being the representations of Parasurama, the Brahmin hero and the reputed founder of Kerala, to whom however only a few temples are dedicated. Images of village gods and goddesses, demons &c, are also not uncommon, as idol worship in one form or other is the cult of the lower classes.

The *Buddhistic* sculpture consists of bas-reliefs and detached statues. A few of these are to be found here and there in Travancore. There is an image of Buddha standing on the roadside between Mavelikara and Kandiyur. In the Museum at Trivandrum are a few images distinctly Buddhistic in appearance.

The *Jaina* sculptures are for the most part restricted to a representation of their twenty-four hierarchs or Thirtankaras with their symbols. These are very rare in Travancore. Some of them are to be hardly distinguished from Buddhistic images so much so that a few which are considered Buddhistic are not infrequently styled Jaina images. The figure popularly known as *Karumadi Kuttan* in the canal near Karumadi is said to be of Jaina origin, while some put it down as a Buddhistic image. In the central compartment of the rock-cut hall in the Bhagavati temple on the summit of Chitaral near Kuzhittura is a figure which "would appear to be a Jaina image as it is said to be 'quite naked'. It is in sitting posture on an elevated stone plinth and has three umbrellas over its head. There is

another in the southern compartments. On the rock-face on the north of the temple are thirty-two figures, repetitions of the images in the pagoda. I take these also to be of Jaina origin"*.

The *Brahmanical* sculptures are countless. Hindu religion and mythology afford inexhaustible subjects for sculptural representation and ornamentation. A detailed account and a few examples of the Hindu sculptures found in Travancore are given under the head of "Sculpture" in the chapter "Arts and Industries".

Coins. A. INDIGENOUS.—The history of Travancore coins mounts up to remote antiquity. Sir Walter Elliot, the eminent numismatist, is of opinion that the Travancore mint "is the only Hindu tankasala still maintained in its original form"†. A close examination of the old records relating to coinage should have disclosed very interesting and valuable information about the early history of Travancore, but the records in the mint were destroyed by an accidental fire and hence the difficulty of procuring information regarding the ancient coins of Travancore.

Gold Coins. Parasurama, the founder of Kerala, after crowning Bhanu Vikrama as its king is stated to have minted gold coins called *Rasi* and made them over to the king for circulation as the currency of the country. Tradition says that Parasurama sowed the Rasi coins broadcast and buried some in cairns, which are seen here and there on the Travancore mountains. "On the high ranges there are three Parasurama cairns, where the mountain tribes still keep lamps burning.....one much dilapidated was called 'Rasi hill of Parasurama'. Along the western coast the approaches to fords over large rivers...are especially prolific of them (Rasi coins); after heavy floods of the monsoon people often regularly resort to and minutely scrutinise the tracts leading to the fords"†.

According to the belief of the people, Rasi is the oldest coin in Kerala. The specimens sent to Sir W. Elliot were found to weigh (five and eight-tenths) 5 $\frac{8}{10}$ grains each, "with an obliterated form on the obverse, probably a Shanka". Though seldom seen in circulation, the Rasi was till very recently the denomination used in North Travancore for the valuation of lands.

The coin next in point of age was the *Kaliyuga Rajan* or *Kaliyuga Rayan Panam*. As its name implies, it was probably issued by the

* Sewell's List of Antiquities, Madras. Vol. I. Page 168.

† Mr. Wallace, in the Ind an Antiquary, Vol III. Pages 191.

sovereign who reigned in the beginning of the Kaliyuga. It has a faint resemblance to the Rasi coin. According to Sir W. Elliot it was at one time current over the whole of Kerala. Inscriptions and Sasanams show that it was current in the 3rd century A. D.

Ananta Rayan Panam and *Ananta Varahan* were two gold coins issued subsequently. Ananta is the appellation of God Sri Padmanabha, the tutelary deity of the Travancore Royal family, and the coins derive their name from this Deity. Their values were Rs. 0-4-7 and Rs. 3-15-5 (British currency) respectively. The precise dates of their issue are not ascertainable as there have been many subsequent issues of the same coin. A large number of Ananta Rayan Panams full and half, and Ananta Varahans were coined during the reign of Rama Varma the Great (1758-1798 A. D.).

Besides these, special gold coins were minted during the performance of the important ceremony known as "Tulabharam" which the Travancore Maharajahs celebrate once in their life-time. On these occasions the body of the king is weighed against an equal weight of gold coins, which are then distributed among the learned Brahmins. The gold, after purification, is coined in different sizes and weights. Originally these coins were circular pieces of gold with letters "Sri Padmanabha" in Malayalam on the obverse, the reverse being blank. But those coined in later times retained the letters within a floral wreath while on the reverse was the *sankha* or conch-shell (the State emblematic device of Travancore) encircled by a wreath. The coins struck in 1860 A. D. were of four denominations weighing approximately 76·65, 38·32, 19·16, and 9·58 grains respectively. The old Venetian Sequins were also used for Pagoda offerings and to meet the difficulty of securing them in large numbers, Dewan Ramiengar suggested the coinage of token gold coins which were not to be part of the currency. But instead of being modelled after the sequins, the new token coins were minted of two sizes, one equal to the English Sovereign in weight and purity and the other to the English Half-sovereign. 1,000 full and 2,000 half Sovereigns were accordingly minted in the British Indian mint at Bombay in 1862 A. D.

In 1052 M. E. (1877 A. D.) two gold coins called *Travancore Varahans* and *Half Varahans* were struck and declared legal tender by state legislation. The obverse contained the inscriptions "R. V." (the initials of the Maharajah) and the words "Travancore Varahan" or "Half Varahan", as the case may be, in Malayalam, with the years of issue both English and Malayalam; the reverse contained a *sankha* and a flag.

The two coins weighed 78 $\frac{4}{10}$ and 39 $\frac{4}{10}$ grains and their values were 7$\frac{1}{2}$ Rs. and 3$\frac{3}{4}$ Rs. respectively. But the new currency failed in its object as there was hardly any circulation, and was discontinued.

Gold *Chuckrams* are stated to have been minted at one time * but nothing is now known of these coins and no specimens are to be found.

Silver Coins. Silver *Chuckrams* were issued from the earliest period and they were stated to have been current even in the Pandyan kingdom. This by repute is the earliest silver coin of Travancore.

Later coinages were of three different sizes:—

Double chuckram	weight	11 $\frac{7}{10}$ grains.
Single chuckram	,,	5 $\frac{7}{10}$,,
Small or Chinna chuckram	,,	3 $\frac{1}{2}$,,

The exact date of their coinage is not known but all accounts agree in assigning to them a period of more than 200 years. In the year 985 M. E. (1809 A. D.), Double and Half chuckrams were coined by the order of the then Dewan Oomminy Tampi and it is said that their coinage was immediately afterwards discontinued. From some specimens now available, it is found that on the obverse of the double chuckram was a *sankha* or shell and on the reverse was the *chuckram*, resembling what is called a Solomon's seal with the inscription "Padmanabha" in Malayalam. The impression on the chuckram represents on the obverse a head ornament of Siva, a curved line representing the moon with a star above it. The moon appears also on the reverse with the twelve signs of the Zodiac above, marked by dots and an ear of corn below. The representation is of course primitive and rude. The Chinna-chuckram resembled the chuckram in all respects and it was perhaps the smallest silver coin in the world.

In 1035 M. E. (1860 A. D.) a new silver coin of the value of 4 chuckrams and known as the *Panam* was introduced. These coins were minted in Trivandrum with the aid of stamping presses got down from Madras.

In 1065 M. E. (1889) Quarter Rupees and Half Rupees equal in value to 7 and 14 chuckrams respectively were coined, and by a Royal Proclamation dated 31st October 1889 they were declared part of the currency of the State. These coins bore the device of the *sankha* and the name of the coin in Malayalam on one side and the inscription "Rama Varma-Travancore" with the year and name of the coin in English on the other side. It was

* Vide Shungoonny Menon's History of Travancore, Page 88.

also then under contemplation to issue full Rupees valued 28 chuckrams or 7 fanams each, but the idea was given up subsequently. The Travancore Rupee by which the Sircar accounts are calculated is only an imaginary coin.

In 1076 M. E. (1900 A. D.) when the silver chuckrams were discontinued, an improved silver coin of the value of 2 chuckrams was minted instead and declared part of the currency of the State.

Copper Coins. The coin known as Kasu or *Cash* is the earliest copper coin minted in Travancore. It is valued 1/1,456 of a British Rupee and is undoubtedly the smallest copper coin in the world. It was first minted in 991 M. E. (1815 A. D.). The cash issued in 1006 M. E. bore a different stamp, which was again changed in the coinage of copper cash made in 1014 M. E. The dies &c. are not preserved and it is not possible to ascertain what the early copper cashes were like, as specimens are not to be found. But later issues resembled the silver chuckram with its rude and primitive device.

In 1024 M. E. (1848 A. D.), three varieties of copper coins were minted viz:—

cash =	$\frac{1}{8}$ of a chuckram
double cash =	$\frac{1}{4}$ do.
four-cash coins =	$\frac{1}{2}$ do.

On the obverse of all these was the figure of Krishna and on the reverse the *chuckram*. The double cash contained in addition the numeral "2" in Malayalam below the figure of Krishna. In the four-cash piece the numeral "2" was replaced by "4" also in Malayalam, and there were two floral sprigs in addition. The last two coins were however subsequently given up.

In 1076 M. E. (1900 A. D.), owing to the facilities which silver coins of the value of one chuckram afforded for counterfeiting, it was resolved to discontinue the minting thereof and the Government issued instead copper coins of the value of one, half and quarter chuckrams for the convenience of the public. At the same time an improved copper cash was also struck with the inscription 'ഒരു കാശു' (one cash) on one side and the *sankha* in an ornamented circle on the other side. These coins form the present copper currency of the state.

Zinc Coins. In 988 M. E. (1812 A. D.) zinc coins of the value of one cash were issued from the Travancore mint. This was the first 'cash' coined but it was soon replaced by copper coinage. Specimens of the zinc

cash are not avilable. It is not therefore possible to give any description of the coin.

B. FOREIGN COINS. A large number of foreign coins appear to have been current in early times and numbers of them have been subsequently unearthed in different parts of the State.

EARLY BUDDHISTIC.—The earliest of such coins were the punch-marked coins current at the time of Buddha. So late as January 1900 A. D., 306 old silver and 2 old copper coins were found in an old earthen vessel in a cutting near Angamali Station on the Shoranore-Cochin Railway. They were sent to Mr. Edgar Thurston of the Madras Government Museum and he identified them as the punch-marked coins referred to above, "which are found all over India from Kabul to Cape Comorin". According to Sir A. Cunningham, "they were certainly current in the time of Buddha i. e., in the 5th century B. C. But I have no difficulty in thinking that they might mount to as high as 1,000 B. C."*

EUROPEAN. The extensive commercial relations that had existed in early times between the Malabar coast and the maritime nations of the west introduced a large number of European coins into the country. Of the European nations the Romans were the first to come in contact with the west coast and accordingly a large number of their coins of dates ranging from 30 B. C. to 547 A. D. have been found in several parts of Travancore. Mr. Cunningham asserts that these coins were current in Southern India in the early years of the Christian era.

The Venetian Sequins popularly known as *Shamir Kasu* are also to be met with in large numbers and are in great demand for jewelry. They appear to have been current in the State once. Until lately the sequins found in the country were purchased by the Government and distributed to learned Brahmins during the temple offerings.

SOUTH INDIAN. Portions of the country now included in the State of Travancore were at various times under the sway of the foreign powers viz., the Bellalas, Kadhumbas, Chalukyas, Cholas, Pandyas, Mahomedan rulers (who overran the Pandyan territory), the Zamorin of Calicut and the Rajah of Cochin.

The coins of all these powers were current in the tracts under their respective sway and when the several parts were conquered and consolidated

* Coins of Ancient India from the earliest times to the 7th century (1891). Page 13.

into the kingdom of Travancore, there were large numbers of foreign coins in circulation. Specimens of several of these foreign coins are to be found in His Highness the Maharajah's Palace at the Capital. The following names of the coins in the Palace collection are sufficiently expressive and clearly indicate the source or authority to which they own their origin.

Sultan Varahan.
Sultan cash.
Kumbakonam Varahan.
Thayangambady Varahan.
Parangy Varahan.
Calicut Fanam.
Ramnad Chuli Fanam.
Madura Velli Fanam.
Cochin Puthen.

CEYLON. There are evidences of an intimate connection, commercial and even political, between Ceylon and the south of India—not excluding Travancore—in early times. This is fully borne out by the occurrence of Ceylon coins in several parts of South India, Madura, Tinnevelly &c. Even in Travancore they are found though only rarely. The Elavas, Tiyas and some of the Shanans in Travancore are asserted to have come from the north of Ceylon. From a South Travancore inscription dated 98 M. E. (922 A. D.), it is found that Ceylon gold coins were once current in that part of the country.

Inscriptions. For some years past, an attempt has been made to collect and decipher inscriptions found in temples, mantapams, forts, palaces and isolated landmarks all over Travancore. No regular department has been organised, but the late Mr. P. Sundaram Pillay M. A., F. R. H. S., a very talented Professor of His Highness the Maharajah's College, Trivandrum, was appointed Honorary Archæologist and a small staff was given him to start the researches. His Field Assistant, Mr. T. S. Ganesa Pillay, still continues to do some work, but since the Professor's untimely death seven years ago, the work has made but little progress. As archæological work is of an extremely important nature and Travancore abounds with material of that kind for constructing authentic history, it behoves His Highness' Government to organise a regular establishment and work it on more methodical lines. There must be a large number of inscriptions and plates available for research all over the country. Whatever work has been done by Professor Sundaram Pillay and Ganesa Pillay up to date is here presented to the general reader in a brief compass.

The following statements disclose some interesting particulars regarding the nature of Travancore inscriptions:—

(1) Inscriptions arranged according to their age.

Age.	Number.
Anterior to the Malayalam era.	42
1st century of the Malayalam era	6
2nd ,, ...	11
3rd ,, ...	9
4th ,, ...	46
5th ,, ...	28
6th ,, ...	20
7th ,, ...	56
8th ,, ...	72
9th ,, ...	48
10th ,, ...	41
11th ,, ...	35
Date not ascertained yet	22
Undated ,, ...	14
Total.	450

(2) Inscriptions arranged according to the Taluqs in which they occur.

Taluqs.	Number.
Agastisvaram	221
Kalkulam	58
Tovala	49
Neyyattinkara	34
Alangad	19
Trivandrum	19
Vilavankod	14
Eraniel	16
Chirayinkil	12
Anchanad.	8
Total.	450

(3) Inscriptions arranged according to their character.

Character.	Number.
Vattezhutta	84
Kolezhuttu	12
Old Tamil	77
Modern Tamil	252
Nagari	1
Grantha	11
Malayalam	9
Canarese	1
Tamil and Malayalam	1
Roman	2
Total.	450

(4) Inscriptions arranged according to their language.

Language.	Number.
Tamil	425
Malayalam	8
Sanskrit	13
Hindustani	1
Canarese	1
Dutch	1
Latin	1
Total.	450

(5) Inscriptions arranged according to the materials on which they are inscribed.

Material.	Number.
Rocks	52
Temples and other buildings ...	298
Images	3
Pillars	70
Vessels	16
Bells	8
Copper plates	2
Cadjan leaf	1
Total.	450

(6) Inscriptions arranged according to their subject-matter.

Subject-matter.	Number.
Gifts for construction of Temples ...	73
" consecration of temples and images	22
" special pujahs and offerings ...	221
" to Brahmins for their feeding &c.	14
" Kalmatams, water-sheds and other public uses	58
Charter of privileges	2
Writs (Nect)	21
Proclamations	7
Edicts (Sasanam)	14
Orders of appointment	18
Total.	450

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(7) Inscriptions classified according to the donors.

Donor.			Number.
Sovereigns	Travancore		98
	Foreign		30
Members of Royal families	Travancore ...		11
	Foreign		5
Chieftains	Travancore		86
	Foreign		40
Corporations	Travancore		80
	Foreign		7
Private Individuals	Travancore		76
	Foreign		17
Total.			450

(8) Inscriptions classified according to the donees.

Donee.	Number.
Hindu Temples	316
Jaina Temples	20
Christian Churches	1
Brahmins	21
Service holders	28
Kalmatams and water-sheds for the public ...	44
Inferior castes	6
Agricultural ryots	7
Christians	7
Total.	450

It will be seen from the statements given above that the Taluq of Agastisvaram in South Travancore claims the largest number of inscriptions. The reasons for this are not far to seek. The Pandyan Empire extended up to the Taluq of Tovala. The victorious Pandya or Chola always wished to commemorate his successes in the conquered territories more than in his own. Kottar was for a long time the most important city in Venad and its capture was therefore more important for the enemy than the possession of several miles of land outside. The country east of Kottar was known in the olden days as "Purattayanad" or the country outside Venad. Another reason is probably the existence of important Hindu shrines in this Taluq. Suchindram, the divine court of justice in the olden days, has nearly 100 inscriptions and Cape Comorin has more than 50. The expression 'Suchindram Satyam' is still remembered and acted upon by the more orthodox, though its 'ghee ordeal' is now a thing of the past. The persons condemned on oath at this temple had generally to undergo a course of expiatory ceremonies, part of which was the making of some gift to the temple. Most of the inscriptions in this temple record such small gifts as atonement for various sins. The other three Taluqs viz., Tovala, Kalkulam and Eraniel, contain a smaller number of temples and were apparently not considered as very valuable possessions by the invaders. Tovala was for a long time either forest or waste land with a sparse population. Kalkulam was called 'Padappanad' indicating the jungly nature of the gardens of which it was composed. Eraniel was known as 'Kurunad', showing the small revenue realised therefrom.

Regarding the character of the inscriptions, it is only the Vattezhuttu, Kolezhuttu and Old Tamil that call for any remarks as their use ceased long ago while the other characters are still current.

VATTEZHUTTU. Vattezhuthu is the oldest in Malabar and the earliest Vattezhuttu inscription known to scholars is the one on the pillar in front of the Napier Museum at Trivandrum. (Vide Plate A. herewith annexed). It is in the well-known Chera-Pandya characters with the exception of the first letter 'Sri' which is in Grantha. All the letters of this inscription are more arrow-headed than round and are peculiarly ornamented and every consonant has a dot on the top according to the rules of ancient Tamil Grammar texts—Tolkappiyam and Nannul. The language of the inscription is the old classical Tamil, and contains certain words which have gone out of use at the present day, such as பெருந்திரை, விடிதழக்க, ஒற்றுச்சுவடுகள், சோட்டை அழிப்பான்வர, சேகமுஞ் சுற்றமுஞ் &c.

The date of the inscription has been mentioned as the twenty-seventh year of the reign of Sri Ko-Maran Chadayan, and Professor Sundaram Pillay roughly estimated its age to be at least a thousand years. It records the death of a Malabar Chief at Vizhinjam.

The characters of the inscriptions of Ko-Raja Rajakesari Varman *alias* the great Raja Raja I. on the rock at Periyakulam, Eraniel Taluq (Vide Plate B_3) are also in Vattezhuttu character, but the letters are slightly different from those of the preceding one and less ornamental.

KOLEZHUTTU. The Kolezhuttu is only a variety of the Vattezhuttu. Kolezhuttu inscriptions are to be seen in Central and North Travancore and it appears from the epigraphical records that Kolezhuttu was in use in Travancore from the commencement of the sixth to the tenth century of the Malabar era. It is also known as Malayazhma and until the beginning of the last century this character was in use for "all grants, patents, decrees and in general all papers that can be considered records of Government".

The inscription in the temple of Manambur in the Taluq of Chirayinkil (Vide Plate C.) contains five lines of well-preserved characters.

There is another inscription in the same character but of an earlier date in the temple of Chengavanadu. It contains two lines of Kolezhuttu characters intermingled with Grantha letters. (Vide Plate D.)

OLD TAMIL. Old Tamil was the Court character of the Cholas and all the old Tamil inscriptions found in Travancore are due to their influence, as is evidenced by the fact that no inscriptions in old Tamil are met with to the north of Vizhinjam which marked the limit of Chola conquest in Travancore territory. They are mostly to be found in the Taluqs of Agastisvaram, Tovala, Eraniel and only a few in Kalkulam. Old Tamil appears to have been current in those parts from the second to the eighth century of the Malabar era. The inscription dated the 154th day in the fourth year of the reign of the Chola king, Parakesari Varman *alias* Rajendra Deva, on the walls of the inner temple of the goddess Bhagavati at Cape Comorin (Vide Plate E.). may be taken as a type of this character.

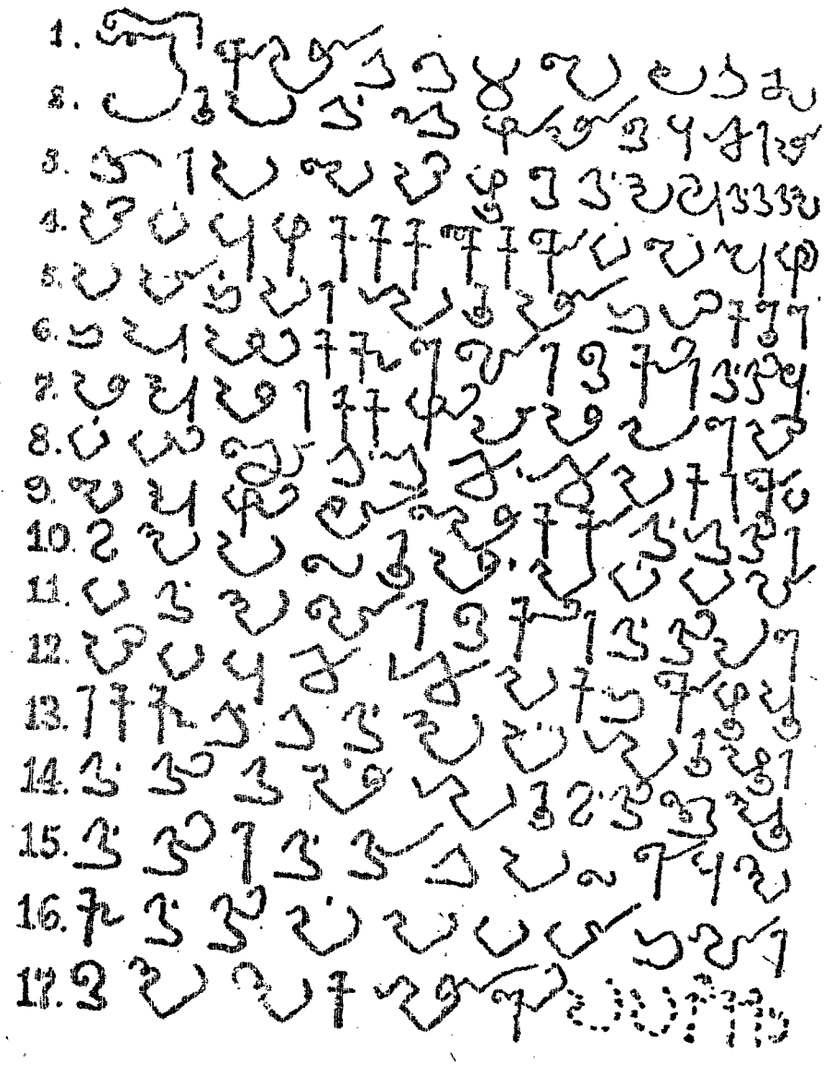
Plate A. Text (in current Tamil).

ஸ்ரீகோமாறன் சடையற்கிருபத்தேழாமாண்டு சேரமானுர் படை
விழுஞ்து யுத்சத்தி விட்டேழுக்க கரைக்கோட்டை அழிப்பான்வர பெ
ருமானடிகளுளன்புமிக்குள இரணகீர்த்தியும் அமர்க்கழிஉம் உள்விட்
டினெற்றைச்சேனகர் கோட்டை அழியாமைக்காத்தெதிர்ந்து பலரும் ப
ட்ட இடத்து இரணகீர்த்தி உள்விட்டுச்சேவகன் கொழுவூர்க்கூற்றத்து
ப்பெருமுர்த்தி நம்பெருந்திணை ஆற்றச்சாம் பலரோடெங்குத்திப்பட்
டான் இரணதங்கமெளலி * * * *

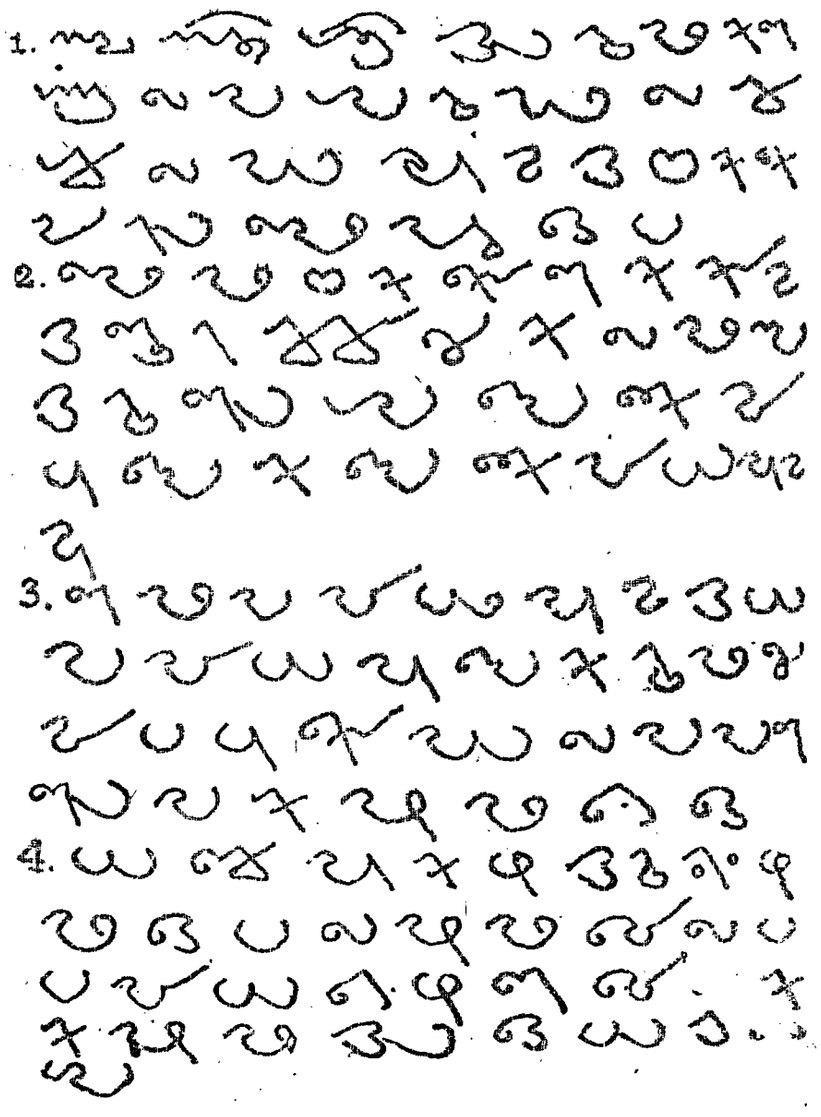
Plate A. (*English Translation*).

In the twenty-seventh year of the reign of Sri Ko-Maran Chadayan, when the forces of the Cheraman were besieging Vizhinjam intent on the demolition of Karaikkottai, two loyal warriors of the garrison guarding the fortress viz., Ranakirti and Amarkkali, who were devotedly attached to their Lord Perumanadigal (master) defended it to the last. In the heavy fight which ensued, the loyal warrior Ranakirti (the famous in battle) succeeded in making havoc in the enemies' ranks but was himself slain by Perumurti of Koluvurkuttam, who came up with large reinforcements.

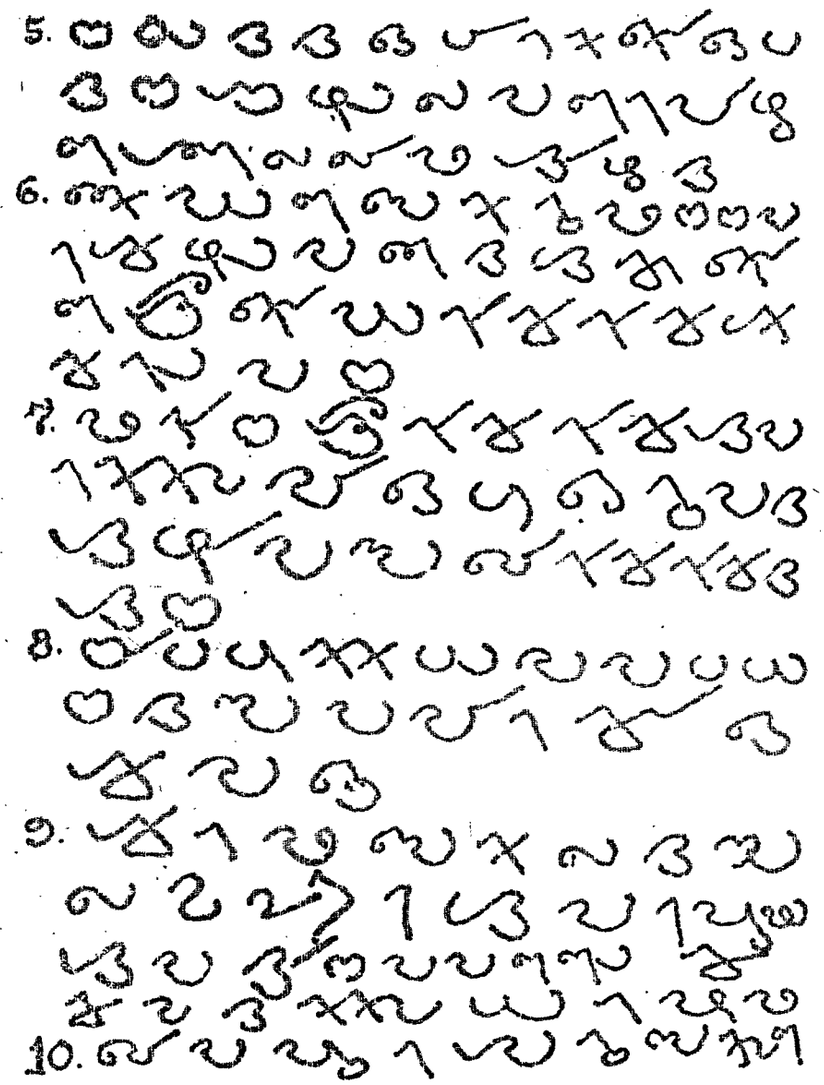
A—Text (*in Vatteluttu*)



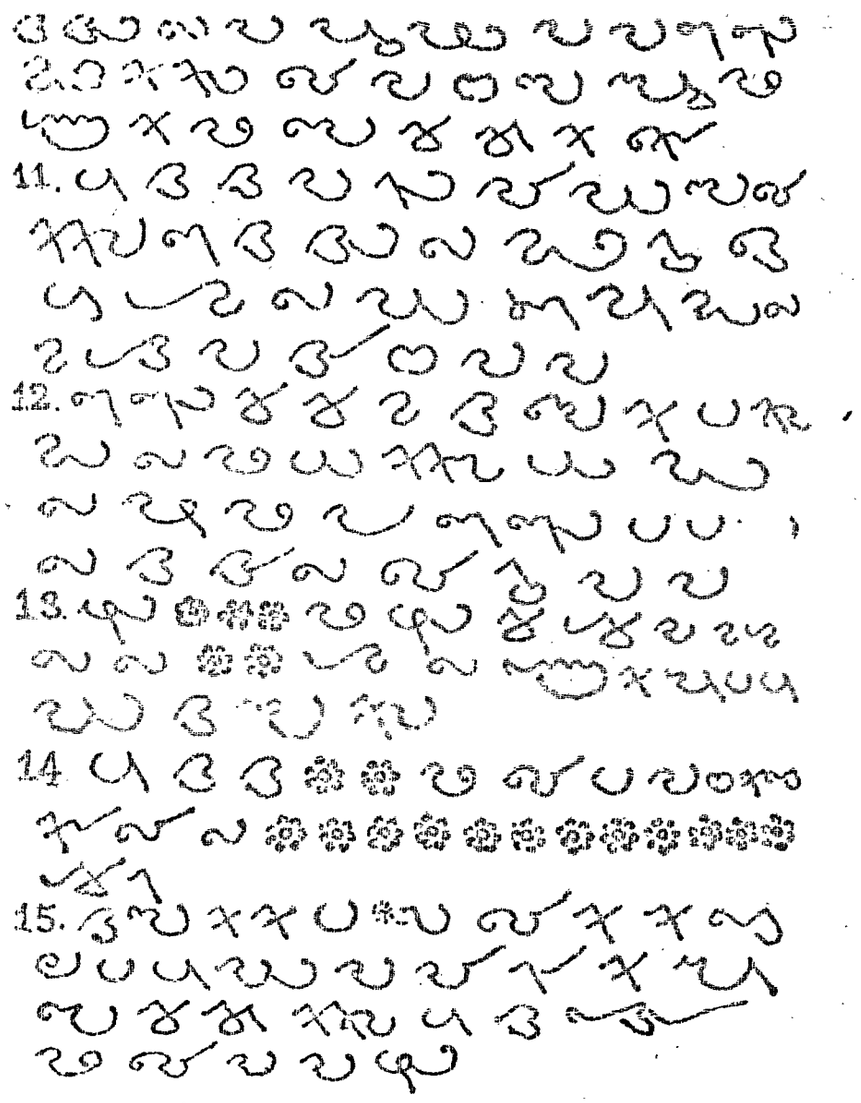
B—Text *(in Vatteluttu)*



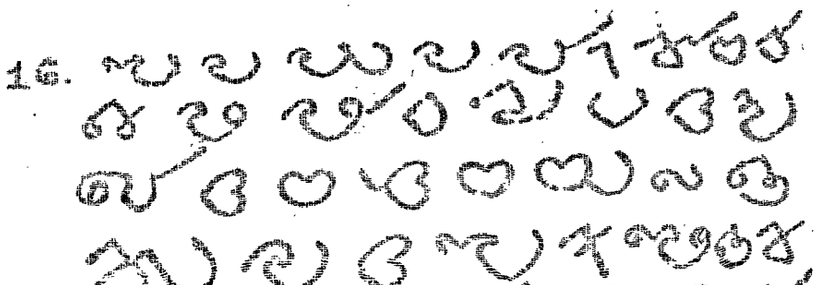
B—Text *(Continued.)*

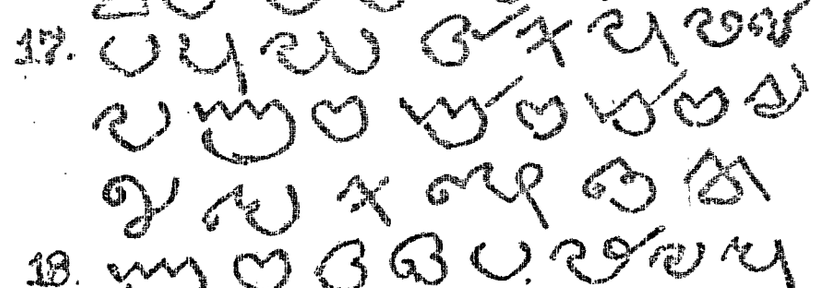


B--Test (Continued.)

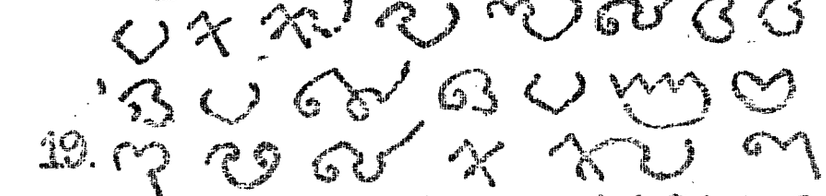


B—Text (*Continued.*)

16. 

17. 

18. 

19. 

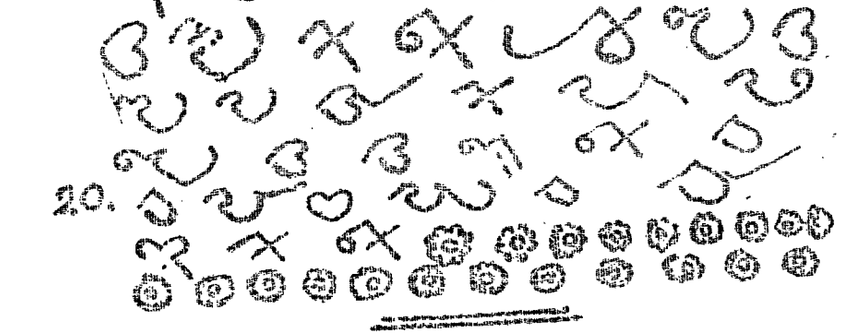
20. 

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Plate B. Text (in current Tamil).

ஸ்வஸ்திஸ்ரீ திருமகள் போலப பெருநிலச செல்வியுந்தனக்கே உ-
ரிமை பூண்டமை மனக்கொளக்காந்தளூர்ச்சாலை கலமறுததருளி
வெங்கை நாடுங் கங்கை பாடியுந்நுளமப பாடியுந்தடிய பாடியுங்குடம
லை நாட்டு[க்]கொல்லப் பள்ளியமும் எண்டிசை புகழ்தரு ஈழமண்ட
லமும் இரட்ட பாடி ஏழரை இலக்கமும் திண்டிறல்வென்றித்தண்டாற்
க கொண்ட தனனெழில்வளர் ஊழியுள்ளெல்லாந் தொழுதகை விளங்க
கு மனனவர் செழியரைததேசுகொள ஸ்ரீகோவி ராச ராச கேசரி
வனமரான ஸ்ரீராச ராச தேவர்க்கு யாண்டு ஒருபத்தேழாவது இராச
ராச தெனனாடுக கழயபாடினத்து உடைய ராசராசசசருவேசரமங
கலததில 8 ஹாதேவா பூமி தேவதானபபள்ளிச சந்தக்குடி[வா]ரமு-
ம் இவவூரபபெருஙகுளததில பயூமிப்பள்ளி நீக்கி இயனறு ஆமபோக
ம் வைசசுககொடுதத பரியாவிது இககுளத்தில் நீருண்டு நெலவிளையு
நிலங் தேவதானப்பள்ளிச சந்தஙகட்கு நிலமடிககுடி நிலமும் உளளிட்
டநிலததால் இருபபழி[வு] மழிசசெய்ந்நெலல[ழிவு] நெல்போக அட்டு
விததுக்குடுதத[நில]ம் இடையனகறை காலால * * * சேர்
ததுக் கட [மை] இக்கறை. அட்டு விப்பாராக அடைசசு கருந்ததோம
இவ்வழி துபபிப்பார் சான்றுகை மாமறறிட தது இதன் தென்னிலநி
யத்து (க்) க மைஞசடவெதாகவும் இப்பொன்னெனை நெனறிலெ ங்கை
ழஞசு பொன தண்டமாய அடககுவது இததண்ட (ங்) கொண்ட பொ
னனும் இககுளததுக்கேச செலுததுவதாகவும் வைததளகேற்பான
விறழுனுக்கே

*

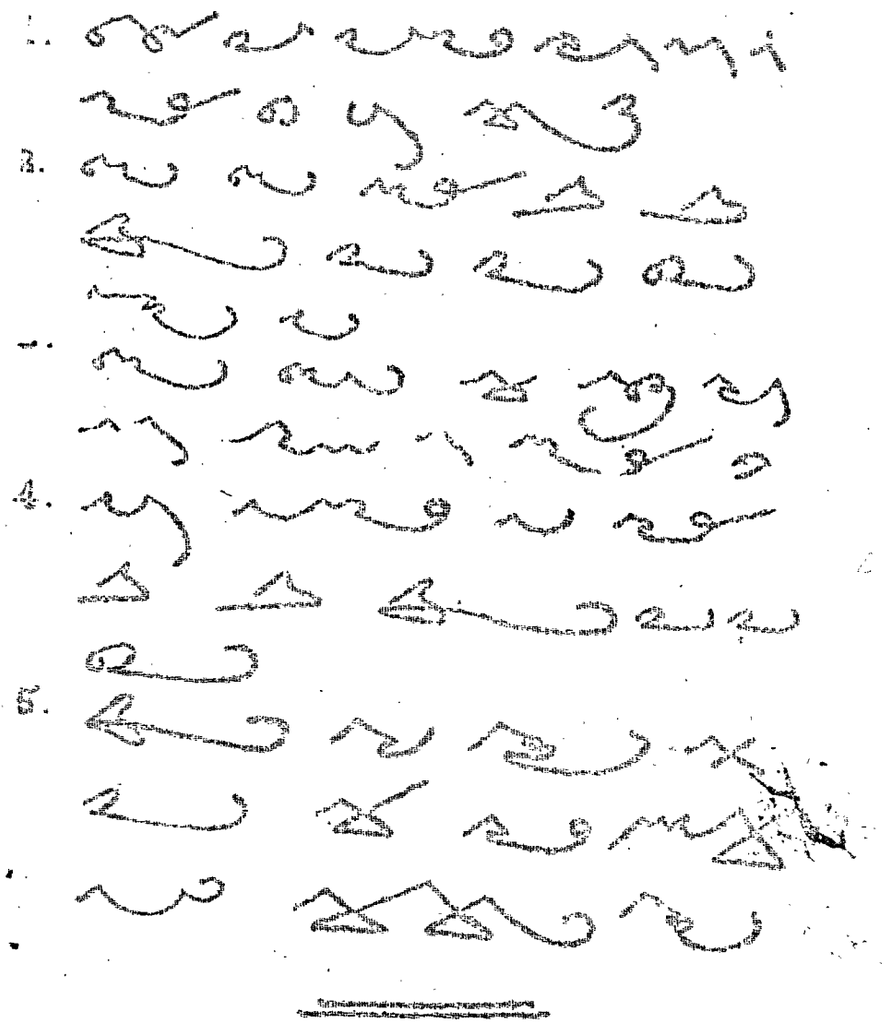
Plate B. (*English Translation*).

Hail ! Prosperity ! In the seventeenth year of the reign of king Raja Rajakesari Varman *alias* Raja Raja Deva, who, in the belief that the goddess of Fortune as well as the goddess of the Earth were wedded to him, destroyed the Kantalur salai, who conquered by his army Vengainadu, Gangapadi, Nulambavadi, Tadiyapadi, Karumalainadu, Kovilpalliyakam, the far-famed Izham (Ceylon), and the country of Irattaipadi with its seven and a half lacs and who by the prowess of his arms deprived the Sezhiars (*i. e.* Pandyas) of (their) glory and splendour. The Lord of Cadiapat nam in Raja Raja Thennadu made over the following dues and incomes from lands (derived from) Perungulam except those belonging to the Palli to the God Mahadevar of Sanjayan Cheramangalam to be enjoined as follows :—

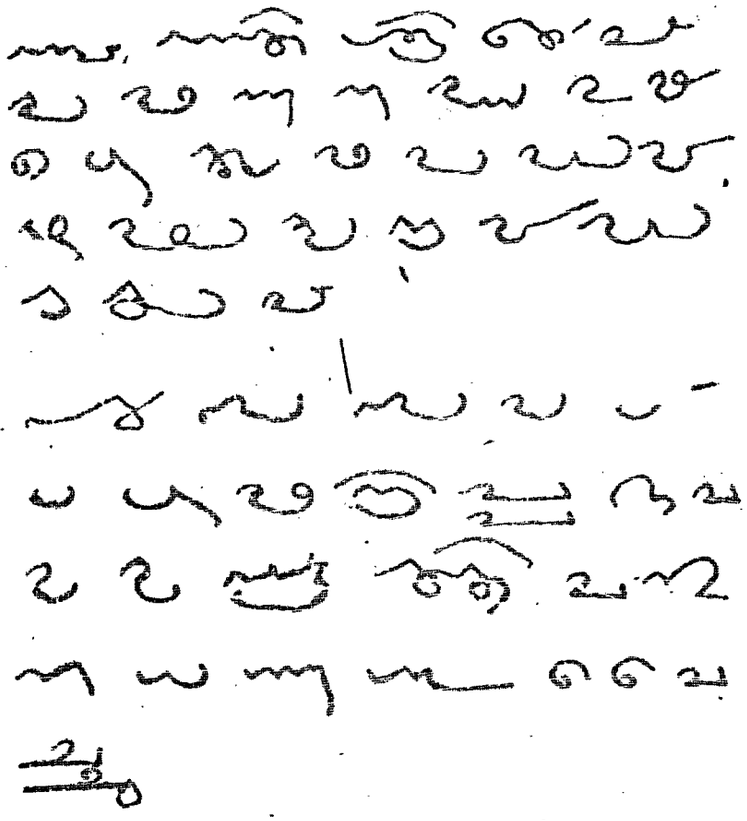
The dues in kind from the lands (assigned for) Devadanam and Pallichantam watered by Perungulam tank including the dues from the lands (granted for) *Adikhudi* (village service) should be paid to the Ikkaraiar according to the measurement (used in) Idaiyankarai after deducting for wastes and failure such as *Iruppazhivu* (இருப்பழிவு), *Azhacchai nellazhivu* (அழச்சை நெல்வழிவு) &c ; failing which the defaulters should pay a fine of five kalanji gold for every *pon* which together with the dues should be made over to Thennilanjiyam. The amount of fine collected should be utilised for expenditure on account of this tank and should be made over to the *Alakeyan* (contractor) who should (duly account for it to the person from whom he recived it).

119

C—Text (*in Kolelutu or Malayanal.*)

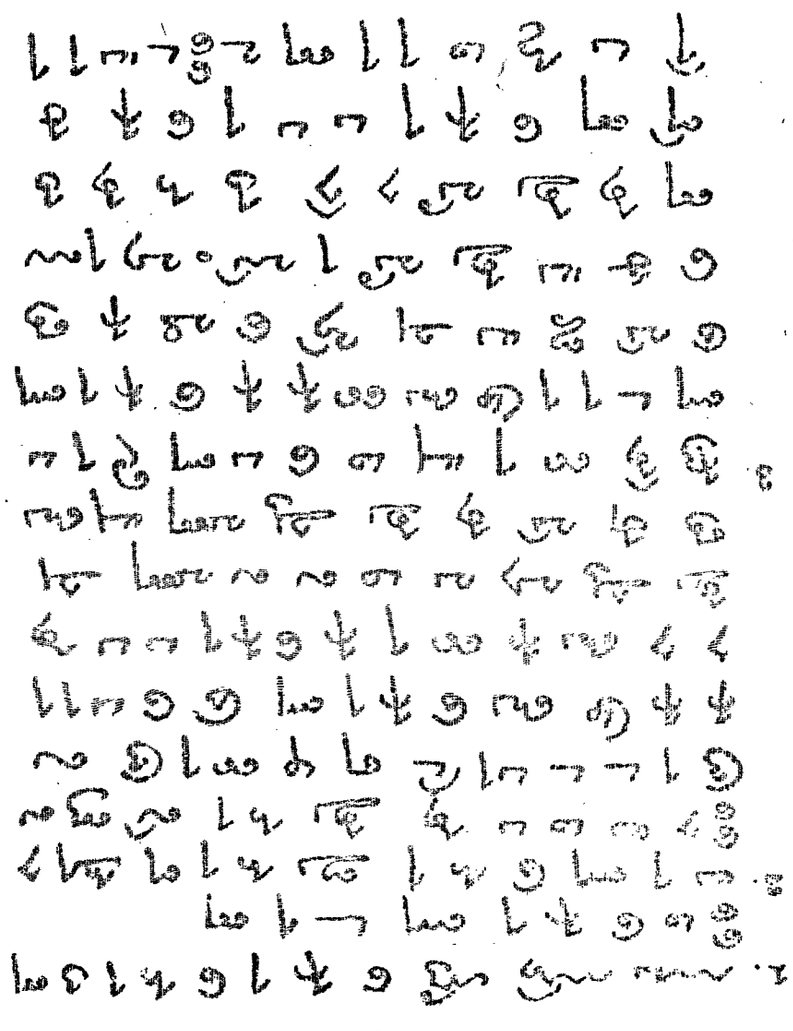


D–Text (*in Kolelutțu*)

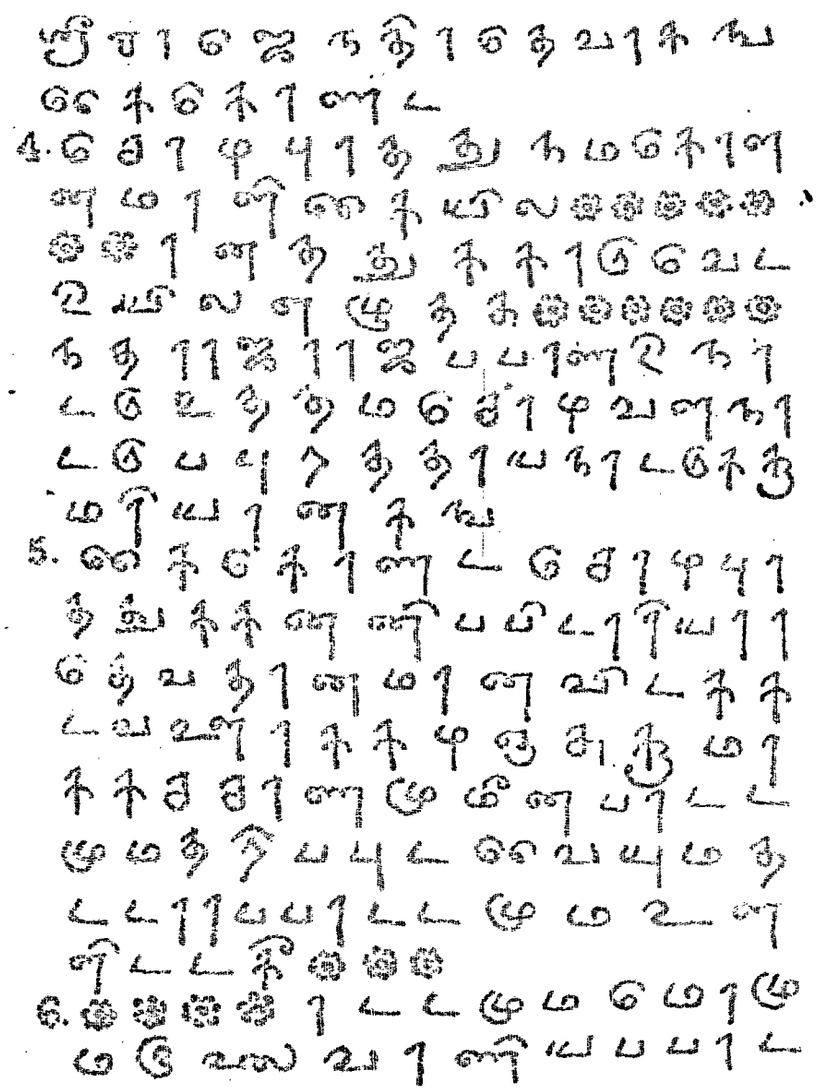
1. 

2.

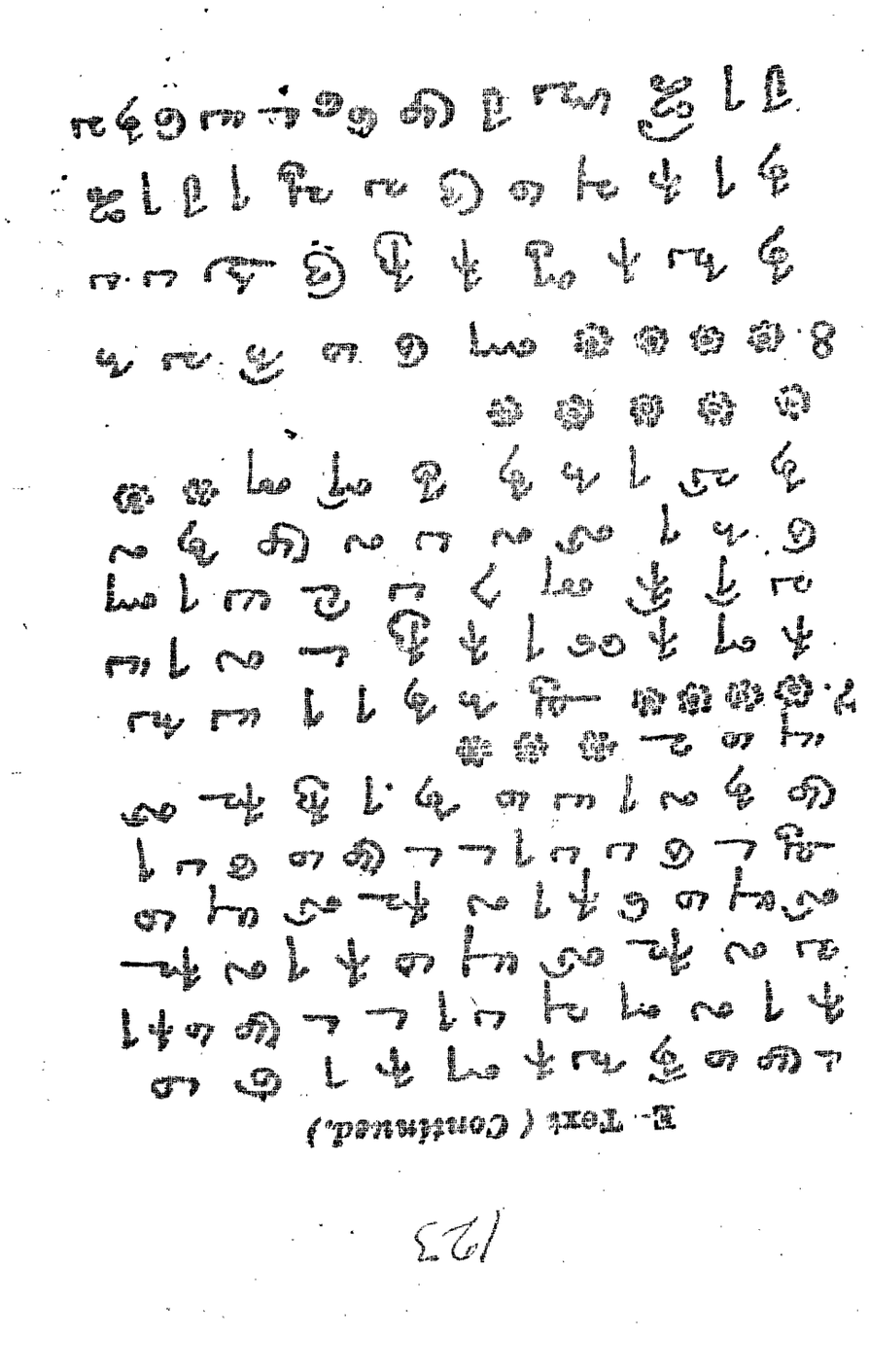
Text (in Old Tamil)



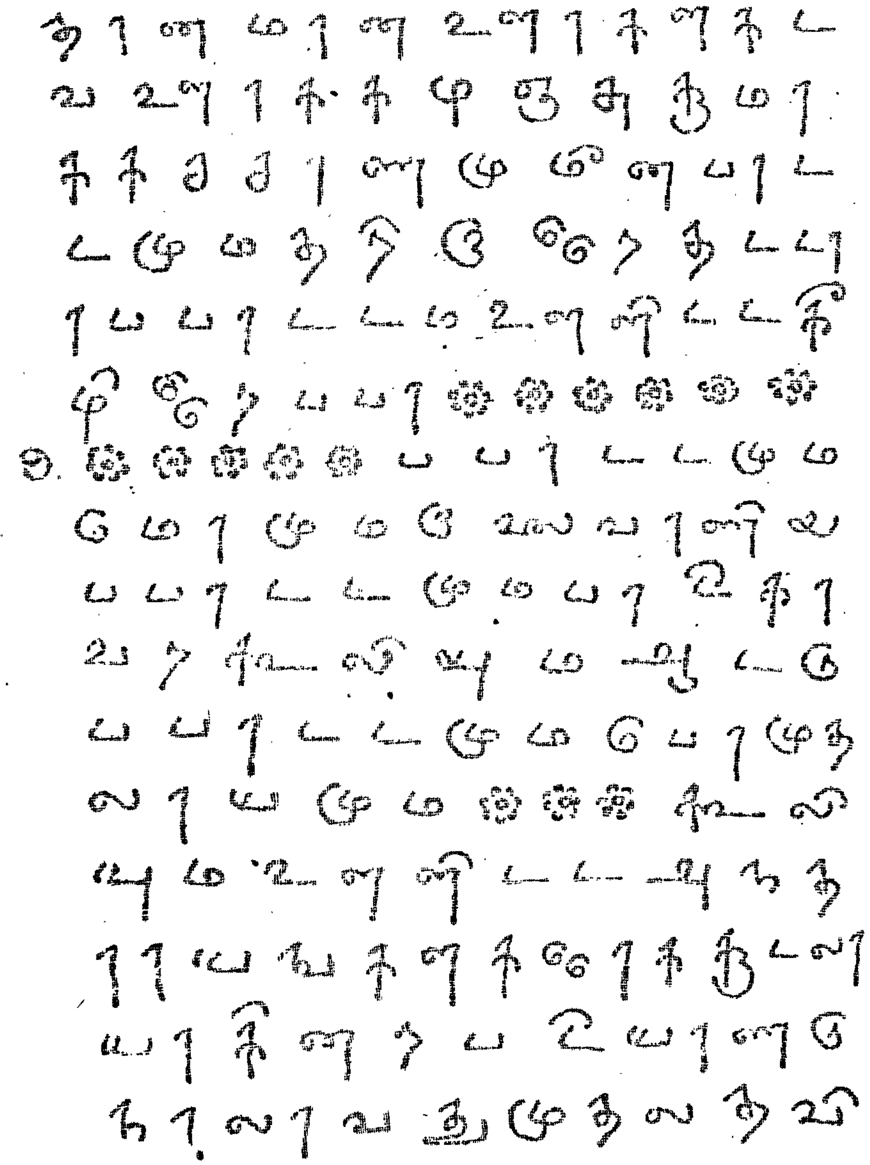
E—Text (Continued.)



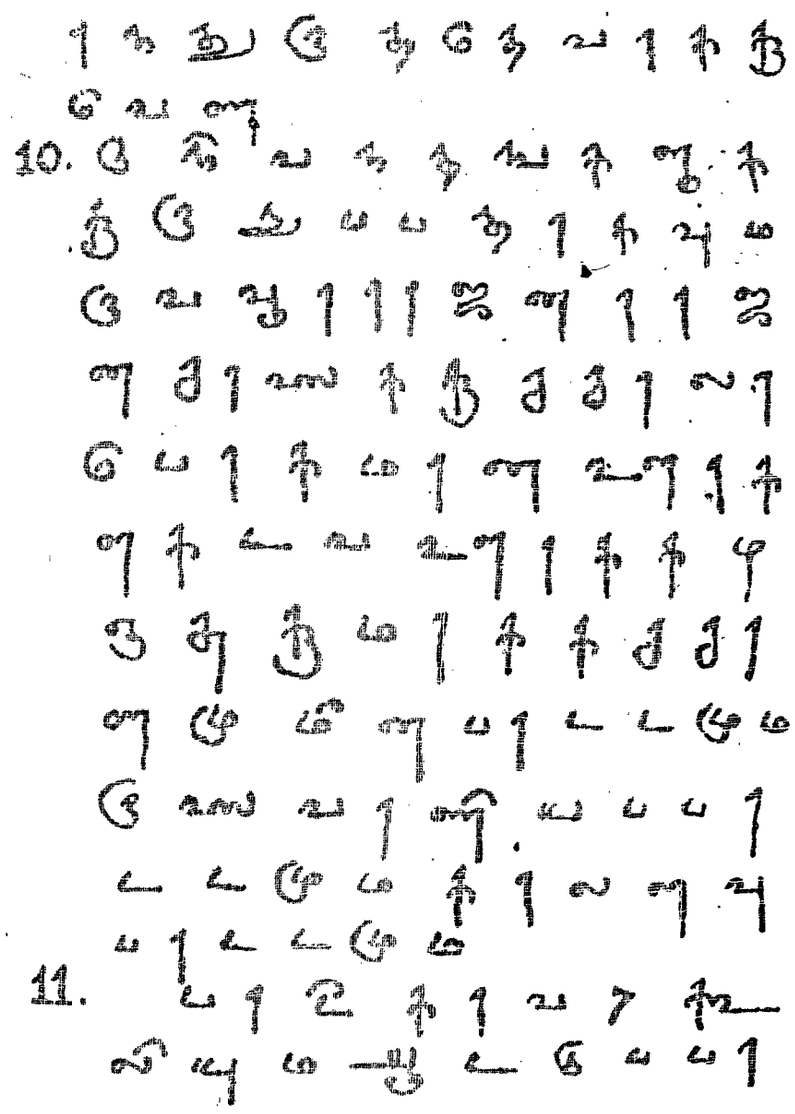
B- Text (continued.)



E—Text (*Continued.*)



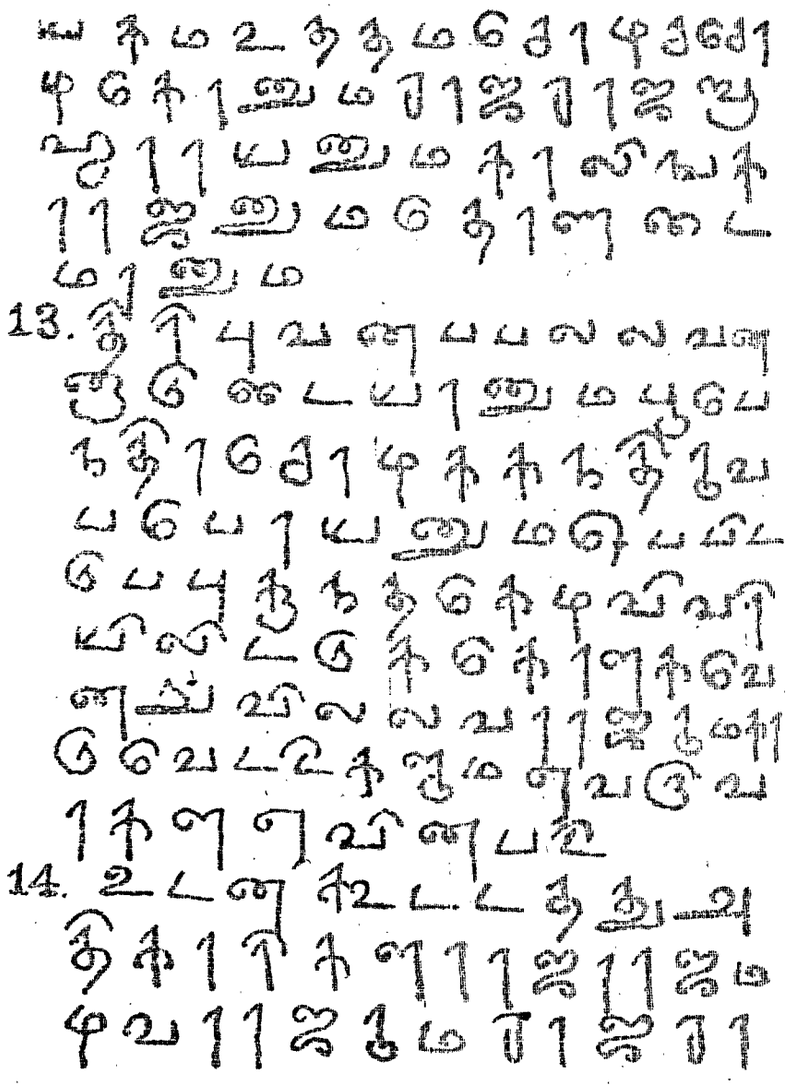
E—Text (Continued.)

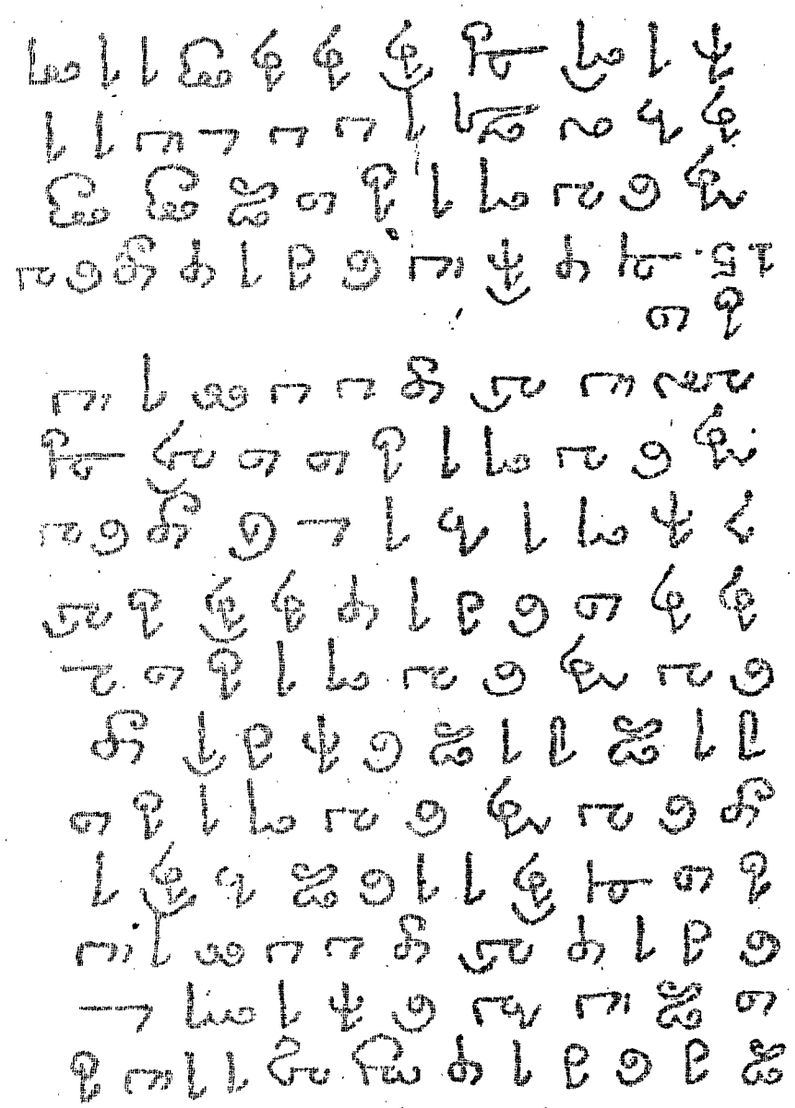


E—Text (Continued.)

12.

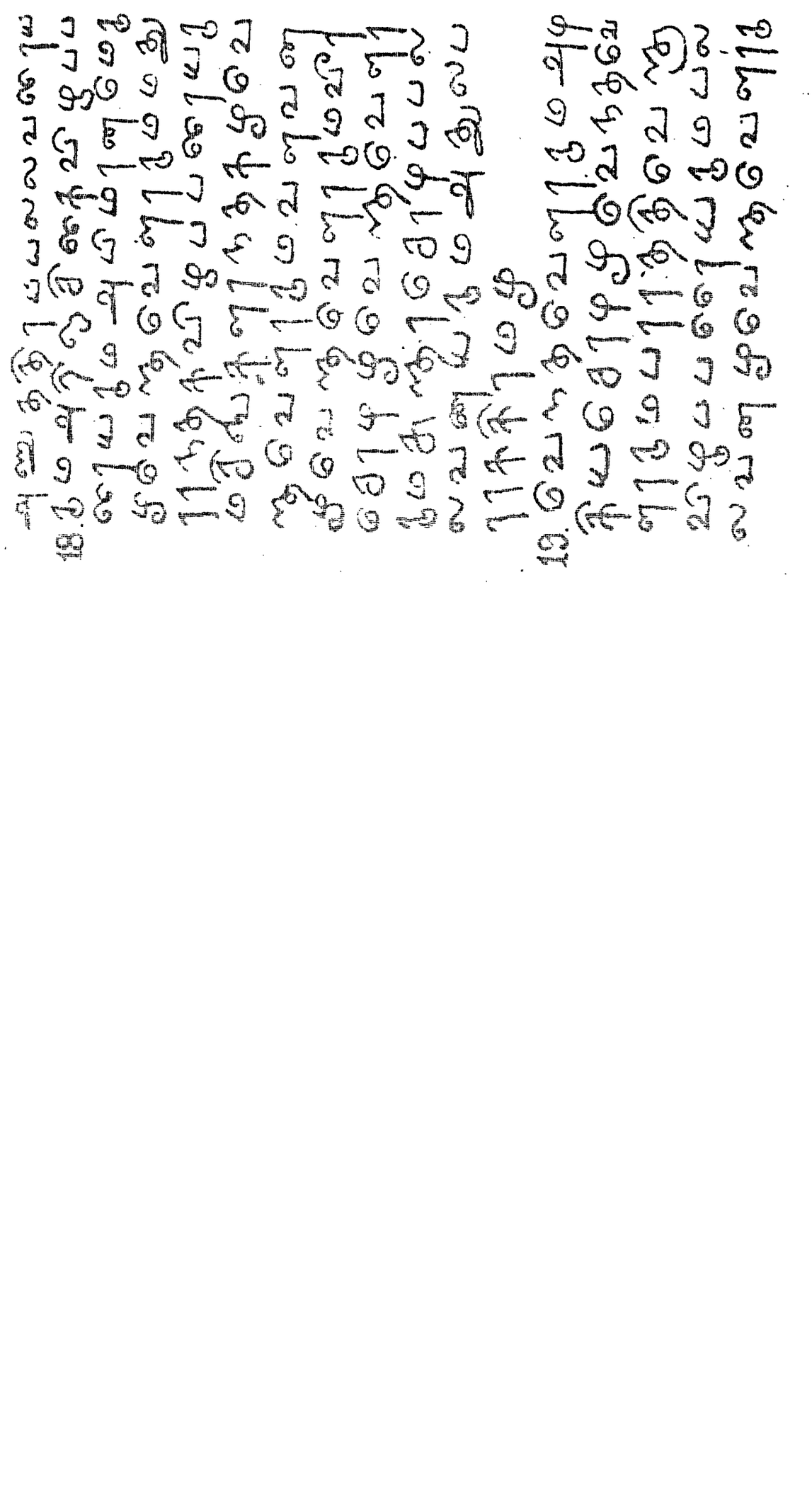
E—Text (Continued.)



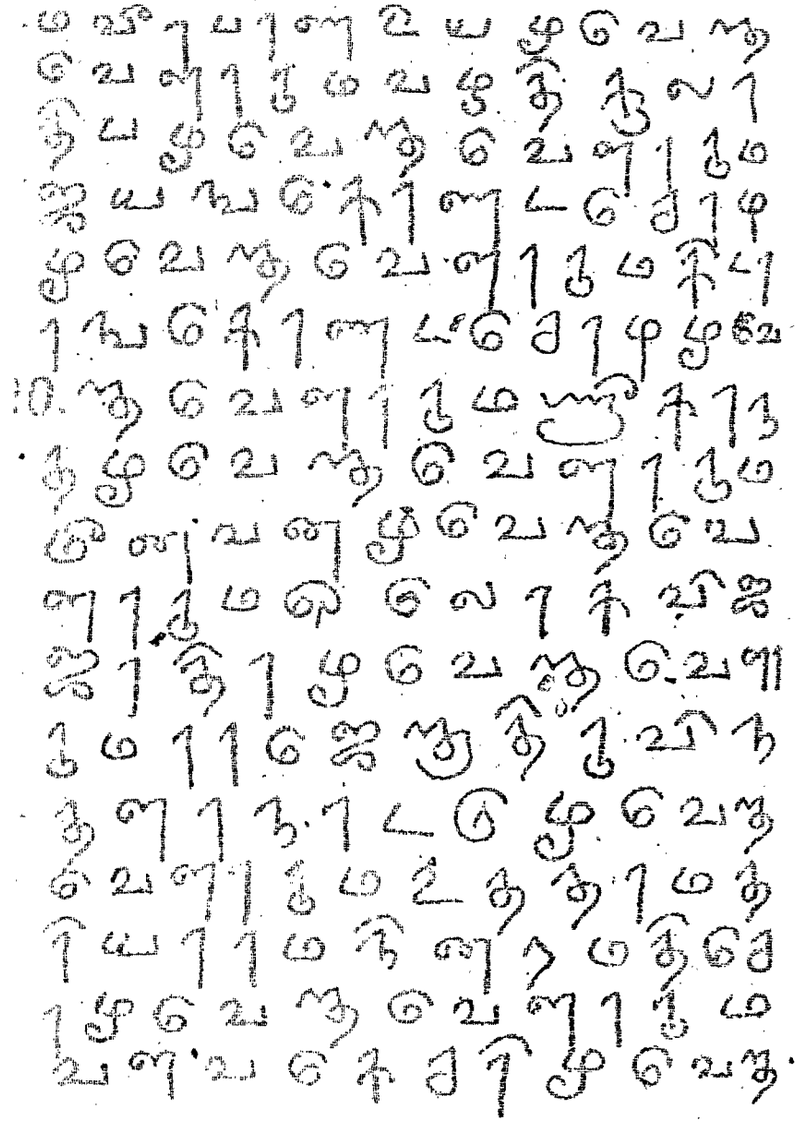


P.T.O.—Text (Continued.)

E-Text (Continued)



E—Text *(Continued)*



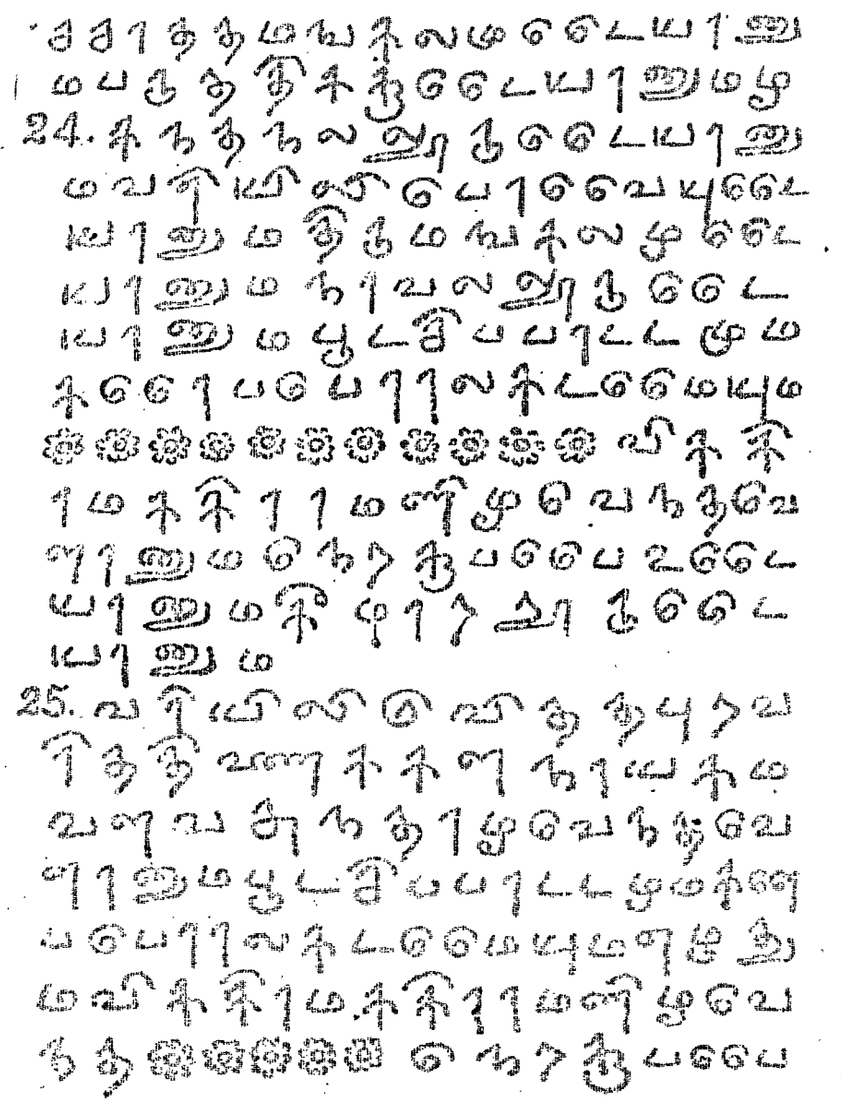
II—Text (*Continued.*)

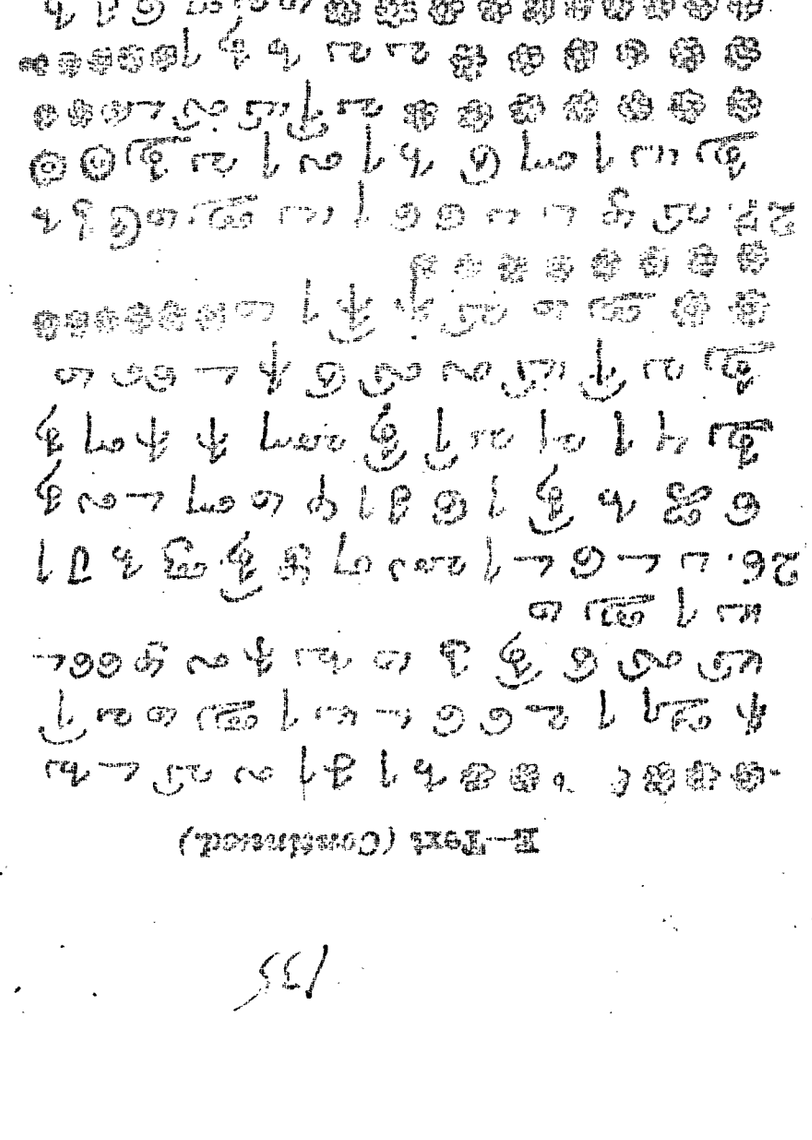
E—Text (Continued.)

22. ෆ්‍රාණ්‍ය මපුෆ්‍රාපුවර්තිණෘකර්ණම
ඌර්තෘත්වණූඵෙෘත්ඵවෆ්‍රාණ්‍ය
මඝ්නර්ත්‍රිමඉෆ්‍රාඵපෆ්‍රාණ්‍යයූවේ
ෘත්තෙවෆ්‍රාණ්‍යමත්‍රාවෆ්‍රාතෘත්ථ
ඔවෘත්තෙවෆ්‍රාණ්‍යමත්‍රාවෘලයර්ති
වෆ්‍රාර්ථඔවෘත්තෙවෆ්‍රාණ්‍යමර්ත්
වමඎකලූඪටයෆ්‍රාණ්‍යමර්ත්
ර්තෆ්‍රාඎකූඵඔවෘත්තෙවෆ්‍රාණ්‍යම
ෆ්‍රාෘෘෆ්‍රාඍණූඵඔවෘත්තෙ
ෆ්‍රාණ්‍යමවඊපඉපාත්තර්මඪ
ඎකූඵටයෆ්‍රාණ්‍යමඊ෴මල
මඋටයෆ්‍රා

23. ණ්‍යමඊෘත්ෆඉෆ්ර්ලණ්‍ය
ත්ඉටයෆ්‍රාණ්‍යමුර්තඔවටඋ
මණ්‍රාත්තඉටයෆ්‍රාණ්‍යමපත්ත
ර්තඔත්ඉටයෆ්‍රාණ්‍යම-ඊෘඉත්ත
ර්තූණ්‍යමඉඉෆ්‍රාඵමඅර්තඎඋ
ඉටයෆ්‍රාණ්‍යමවලලූඉටෙ
යෆ්‍රාණ්‍යමවර්තත්‍රාඉටයෆ්‍රා
ණ්‍යමඉඉඵඉයූත්‍රාටයෆ්‍රාණ්‍ය
මවඊපඵෙෆ්‍රාත්තර්තර්ණෘකත්

E—Text (*Continued.*)





E—Text (Continued.)

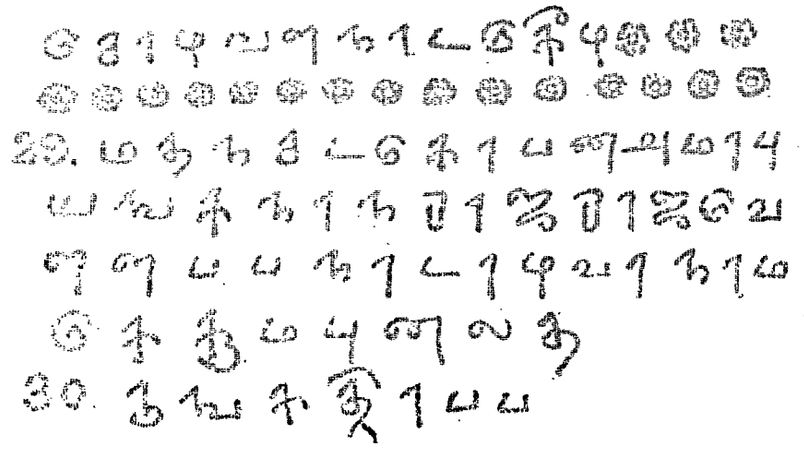


Plate C. Text (in current Tamil).

1 கொல்லம ௮௱மாணடு
2 ஙிஙக மாதததில பணிதுட
3 காசிசசு ௮௱உ௰ாமாணடு
4 மேட மாதததில பணி
5 தீ (ர்) நது கலசம ஆடிசசிது

(கொல்லம் ௮௱ ம் ஆண்டு சிங்கமீ கோவில் கட்ட ஆரம்பித்தது : 820 ம் ஆண்டு மேட மாதத்தில் கோவில் கட்டி முடிந்து கலசம் ஆட்டுவித்தது)

Plate C. (*English Translation*).

The construction of the temple was commenced in the month of Chingom in Kollam year 800. It was finished and consecrated in the month of Me lam in the year 820.

Plate D. Text (in current Tamil).

1. ஸ்வஸ்திஸ்ரீ கொல்லம் ௬௱௨௰௨ மாணடு கும்ப வியாழமிதுன ஞாயிறறில்
2. செஙகவ நாட்டு மணிப்பனவ ௱௰௬ ஸுசுதித்து ஊடடு வெஞ்சு.

Plate D. (*English Translation.*)

Hail! Prosperity! In Kollam year 622 when Jupiter was in Kumbham and the Sun was in Mithunam (*i. e*, in the month of Adi), the sum of one hundred and sixteen fanams was set apart (for feeding Brahmins) from Manippanavam Agram in the temple of Chengavanadu.

Plate E. Text (in current Tamil).

ஸ்ரீஸ்ரீகோகேர் இன்மை கொண்டான் யாண்டு காலு காள் தாற்மைம்பத்து காவினுல், இரட்டை பாடி ஏழரை இலகமுங்கொண் டு, பேராறறங்களைக் கொப்பத்து ஆஹவமல்லனை அளுசுவித்து ஆனை யுங் குதிரையும் பெண்டீர் பண்டாரமும் கைகொண்டு விஜய அபிஷே கம் செய்து வீரஸிம்ஹாஸனத்து வீற்றிருந்தருளின கோப்பர கேசரி வன்மரான உடையார் ஸ்ரீராஜேந்திர தேவர் கங்கைகொண்ட சோழ புரத்து நம் கோளன் மாளிகையில் (தேவதா) னத்துக் காடுவெட்டியில் எழுததா[ல் வரியிலிட்டிரு]ந்த ராஜ ராஜப் பாண்டி நாட்டு உதமசோழ வளநாட்டுப புறதாயநாடுடுக்கு மரியான கங்[கை கொ]ண்ட சோழபு ரத்துக் கன்னிப்பிடாரியார் தேவதானமான, விடக்கடவ ஊர்க்கழஞ்சு, குமரக்கச்சாணமு[ம்,] மீன் பாட்டமும், தறிப்புடைவையும், தட்டாரப் பாட்டமும் உள்ளிட்ட கீழிறைப் பாட்டமும் மேரமுமிங்கள் காமே கா ளளவுபாட்டமும் காவல்கூலியும், கால்கூலியும், கோல்கூலியும், ஆட் டுப்பாட்டமும், பேர்முதலாயம் தரகுகூலியும், ஆந்தராயங்கள் கரைகு டலாய் வருகின்ற படியாண்டு நாலில் பல முதல் தவிர்ந்தருளின (கட மை வே)ண்டும் நிவந்தங்களுக்கு இறுப்பதாகவும் இவ்வூர் ராஜ ராஜே சுவரமுடைய தேவதானமான ஊர்கள், கடவ ஊர்க்கழஞ்சு, குமரக் கச்சாணமும், மின்பாட்டமும், தறி இறை, தட்டாரப்பாட்டம் உள்ளிட் ட கீழிறைப்பாட்டம முதலான பாட்டமுமேரமும், இலவாணியப் பாட்டமும், காலளவுபாட்டமும், பாடி காவம கூலியும், ஆட்டுப் பாட் டமும், பேர் முதலாயமும் (தரகு) கூலியும் உள்ளிட்ட அந்தராயங்கள் கரைக்குடலாய வருகின்றபடி யாண்டு நாலாவது முதல் தவிர்த்து இத் தேவர்க்கு வேண்டி நிவந்தங்களுக்கு இறுப்பதாகவும் இவ்வூர் ராஜன ராஜன சாலைக்கு போகமான ஊர்கள் கடவ ஊர்க்கழஞ்சுகுடாக்க ச் சாணமுமின பாட்டமும் இலவாணியப் பாட்டமும் காலளவு பாட்ட மும் பாடிகாவற்கூலியும் ஆட்டுப்பாட்டமும் நேற் முதலாயமும் தரகு கூலியும் உள்ளிட்ட அந்தராயங்கள் கரைக்குடலாயவருகின்றபடி. யாண்டு காலவது முதல் தவிர்ந்து வேண்டி நிவந்தங்களுக்கு இறுப்ப தாகவும் இவ்வூர் ராஜன ராஜன் சாலைகுச சாலாபோகமான ஊர்கள் கடவ ஊர்கழஞ்சு குமரக்கசசாணமு மினபாட்டமும் இலவாணியப் பாட்டமும காலளவு பாட்டமும் பாடி காவம் கூலியும ஆட்டுபபாட்ட மும் பேர் முதலாயமும் தரகு கூலியும் உள்ளிட்ட அந்தராய்ங்கள் க ரைக்குடலாய வருகின்றபடி|யாண்டு காலாவது முதல் தவிர்த்துவேண் டு நிவந்தங்களுக்கு|இறுப்பதாகவும் ஆக இப்படி யாண்டு காலாவது

முதல் இறையிலியாக வரியிலிட்டுத்திருவாய் மொழிந்தருளினர் என்று திருமந்திர ஓலை ஜயங்கொண்ட சோழ மகா ராஜன எழுத்தினாலும், திருமந்திர வோலை நாயகம் உத்தம சோழச் சோழகோனும், ராஜ ராஜ ஸுஹராயனும் காலிங்க ராஜனும், தொண்டைமானும் திரிபுவனப்பல்லவ நாரிகைப்பானும், பூபேந்திர சோழகக்திருவப் பெரயனும் ஒப்பிட்டுப புருந்த தென்னி வரியிலிட்டுக் கொள்க என்று வில்லவராஜரும், காடு வெட்டிகளும் ஏவ, இவர்கள் ஏவினபடி உடன் கூட்டத்து அதிகாரிகள் :—

ராஜராஜ மழுவ ராஜரும
ராஜராஜச்சோழ ஸுஹராயரும்
ஜயங்கொண்ட சோழவிழுப்பரையரும்
அதிராஜேந்திர மூவேந்த வேளாரும்
ராஜ ராஜ கேசரி மூவேந்த வேளாரும்
உத்தம சோழத்திருவிற்களாநாட்டு மூவேந்த வேளாரும்
மறி ஆயைவிழுப்பரையரும்
அழகியசோழ மூவேந்த வேளாரும்
ஜனநாதநல்லூர்ப்படையார்காளி ஆதித்தனர் ஆன ராஜேந்திர சிங்க மூவேந்த வேளாரும்
பாசியமங்கலம் உடையார் மன்றின் லோகபுத்திரனுன் ஆன திருபேந்திர சோழ மூவேந்த வேளாரும்
சிவகூடவுடையான் பற்பநாபன பள்ளிகொண்டாரான வளவநாராயண மூவேந்த வேளாரும்
ஸுஹபபலலவரையரும்
நடுவைக்கும் கொற்றமங்கலத்துபபற்பநாபன் சோமாசியாரும்
நல்லூர் சககரபாணி ஸுஹராயரும்.

இடையில் அதிகாரிகள்.

சோழ மூவேந்த வேளாரும்
முடிமுடி சோழப்பல்லவரையரும்
ராஜராஜ தமிழப்பேரரையரும்
ஜயங்கொண்ட சோழசோழக மூவேந்தவேளாரும
உத்தமசோழ மூவேந்த வேளாரும
மனுகுல மூவேந்த வேளாரும
நிருபவிசேந்த மூவேந்த வேளாரும
க்ஷத்திர சிகாமணி மூவேந்த வேளாரும
கங்கைகொண்டசோழ பல்லவரையரும

பார்த்திவேந்திர மூவேந்த வேளாரும
பூபாலதொங்க மூவேந்த வேளாரும
ராஜராஜ அநுத்திரப்பல்லவரையரும
அருஞ்சிகைவிழுப்பரையரும
அபிமானமேரு மூவேந்த வேளாரும
மதுராந்தக விழுப்பரையரும
சிங்களாந்தக மூவேந்த வேளாரும்
அழகியசோழ மூவேந்த வேளாரும
பார்த்திவேந்திரவிழுப்பரையரும
பல்லவன் மூவேந்த வேளாரும
வீரபாண்டிய மூவேந்த வேளாரும
வழுதிகுலாதிப மூவேந்த வேளாரும
ஜயங்கொண்ட சோழமூவேந்த வேளாரும
கிடாரங்கொண்ட சோழ மூவேந்த வேளாரும
ஸ்ரீகாந்த மூவேந்த வேளாரும்
மீனவன் மூவேந்த வேளாரும்
லோக விச்சாதர மூவேந்த வேளாரும
ராஜேந்திர திருவிந்தளா நாட்டு மூவேந்த வேளாரும்
உத்தரம் தரியாரம் நின்ற மதிசேர் மூவேந்த வேளாரும்
வளவகேசரி மூவேந்த வேளாரும்
நடுவிருக்கும் ஊரவர் ஸுஹ அநதிராத்திர யாஜியாரும்
கோள மங்கலத்தில் பட்டஸோம யாஜியாரும்
பசலை பெரிய நம்பி ஹட்டபாகந்தாங்கியாரும்
எவ்வூரவவர் தமனைக்காத்துக் கண்காணி குமரவிஜநாதர மூவேந்த வேளானும்

கோதண்டல் மூவேந்த வேளானும்
அதிசய சோழ மூவேந்த வேளானும்
பூவேந்தன் வேந்த வேளானும்
ஜயங்கொண்ட சோழ லோக வேளானும்.
புரவரிதிணைக்களம் அரிந்தவன் மூவேந்த வேளானும்
விக்கிரம சோழபாண்டிய மூவேந்த வேளானும்
வளவசுந்தர மூவேந்த வேளானும்
குவலயதிவாகர மூவேந்த வேளானும்
தேவமங்கல முடையானும்
திரிதொங்க மூவேந்த வேளானும்
வீரநாராயண மூவேந்த வேளானும்

வரிப்புஸ்தகம் விடங்கமுடையானும்
சிற்றம்பலமுடையானும்
சுத்தசோழநல்லூர் உடையானும்
முகவெட்டி மணற்குடையானும்
பருத்திக்குடையானும்
ஆற்றை கிழானும்
சோழ மாதேவி உடையானும்
வல்லமுடையானும்
வடிகைகுடையானும்
மழையூருடையானும்
வரிப்புஸ்தகக் கணக்கு
சாதத்மங்கல முடையானும்
பருத்திக்குடையானும்
முகந்த கல்லூருடையானும்
வரியிலி பேரளவு உடையானும்
திருமங்கலம் உடையானும்
காவல்லூருடையானும்
பூட்சிப்பாட்டமும் கரைப்போல் கடமையும் * * * *
விக்கிரம சிராமணி மூவேந்த வேளானும்
கெற்குப்பை உடையானும்
சேரம்பருடையானும்
வரியிலிடுவித்த புரவரித்திணைக்கள நாயகம் வளவகுதர மூவேந்த வேளானும்
பூட்சிப்பாட்டமும் கரைப்போல் கடமையும் எழுதும் விக்கிரமசிராமணி மூவேந்த வேளானும்
கெற்குப்பை * * * * விடங்கவூர் உடையானும்

வரியிலிடு திருமங்கல முடையானும் பட்டோலை எழுதினன் ராஜேந்திர சோழமண்டலத்து புரவரித்திணைகளதது வரியில்லிடு கடமை உடையான் விக்கிரமசோழ * * * *
விழுபத்தரையனும் இருக்கு யாண்டு காலாவது * * * *
எழுதி வரியில்லிட * * * * *
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இசையவரியிலிடுவித்தான் ராஜப்பாண்டி நாட்டு முடிகொண்ட சோழ

வள நாட்டுத்து * * * * *
* * * * * * *

மதுன சடகோபன் அம்ப புயபகனை ராஜராஜ வெள்ளப்ப நாடாழ
வான கட அடிக்கும புனல் தருங்கதிர்பப

Plate E. (*English Translation*).

Hail! Prosperity! In the fourth year and on the hundred and fifty-fourth day of his reign, king Parakesari Varma *alias* Rajendra Chola Deva, the unrivalled among kings, who, after annexing Irattaipadi with its seven and a half lacs, striking terror into the heart of king Ahavamallan at (the battle of) Perattankarai and taking possession of his elephants, horses, women and treasure, held a grand celebration in commemoration of his conquest and sat on his victorious throne, made the following gifts from his palace Keralan Maligai at Kaduvetti of Gangaikonda Cholapuram when he had encamped there:—

To the Kanni Pidari—the Goddess of Cape Comorin, the following taxes due from the settled Devedanam lands in Gangaikonda Cholapuram *alias* Kumari in Purattaya Nadu of Uttama Chola Vala Nadu of Raja Raja Pandi Nadu:—

Urkkazhanju (village tithe),
Kumarakkachanam (marriage dues),
Meen Pāttam (fishery tax),
Tari Irai (tax on looms),
Thattara Pāttam (tax on gold-smith),
Kaval kuli (protection dues),
Kâl kuli and Kôl kuli (tax on measures and measurements),
Attu Pāttam (cattle tax),
Permutal Ayam (tax on title deeds),

and other taxes.

To Raja Raja Perum Salai of the same place, the following taxes arising from the Devadanam lands of Raja Rajesvaram Udaiyar Temple:—

Urkkazhanju (village tithe),
Kumarakkachanam (marriage dues),
Meen Pattam (fishery tax),
Tari Irai (tax on looms),
Thattara Pattam (tax on gold-smith),

Ilaivania Pattam (tax on leaf merchants),
Tharagu kuli (tax on commissions),
Kâl kuli and Kôl kuli (tax on measures and measurements),

and other taxes.

This settlement was concluded under the king's orders and the said lands were freed from all payments to Government from the fourth year of his reign. This order was communicated to Tirumandira Olai Jayamkonda Chola Maharajan and with the knowledge of Tirumandira Olai Nayakam Uttama Chola Kôn, Kalinga King, Tondaiman, the Lord of Tribhuvana Pallavanadu and Bhupendra Chola Kandrivaperarayan. In accordance with the above order and under the immediate command of Villavarayan and in the presence of the chiefs of the lands reclaimed from the forests, who had assembled, this settlement was entered in the account register with the help of the under-mentioned people.

Koottattu Adhikaricâl.

Rajaraja Mazhava Rajan.
Rajaraja Chola Brahma Rajan.
Jayamkonda Chola Vizhupparayar.
Atirajendra Muvendavelar.
Raja Raja Kesari Muvendavelar.
Uttama Chola Muvendavelar of Tiruvirkalanadu.
Mahi Alaya Vizhupparayar.
Azhakia Chola Muvendavelar.
Jananathanallur Padaiyar Kali Adittannar *alias* Rajendrasinga Muvendavelar.
Tirupendra Muvendavelar, Mandin Lokaputrar, the Lord of Pasiyamangalam.
Valava Narayana Muvendavelar, the Lord of Sivakudal, Padmanabhan Pallikondan.
Brahma Pallavaraiyar.
Padmanabhan Somayajiyar of Kottemangalam.
Chakrapani Brahmarayar of Nallur.

Idayil Adhikaricâl.

Chola Muvendavelar.
Mummudi Chola Pallavaraiyar.
Raja Raja Tamil Peraraiyar.
Jayamkonda Chola Senamuka Muvendavelar.

Uttama Chola Muvendavelar.
Manukula Muvendavelar.
Nittavinotha Muvendavelar.
Kshathra Sikhamani Muvendavelar.
Gangaikonda Chola Pallavaraiyar.
Parthivendra Muvendavelar.
Bhupala Tonga Muvendavelar.
Raja Raja Anuthira Pallavaraiyar.
Arunchika Vizhupparaiyar.
Abhimana Meru Muvendavelar.
Madhurantaka Vizhupparaiyar.
Simhalantaka Muvendavelar.
Azhakia Chola Muvendavelar.
Parthivendra Vizhupparaiyar.
Pallavan Muvendavelar.
Virapandya Muvendavelar.
Vazhuti Kuladipa Muvendavelar.
Jayamkonda Chola Muvendavelar.
Kidaramkonda Chola Muvendavelar.
Sreekanta Muvendavelar.
Minavan Muvendavelar.
Lokavidyadhara Muvendavelar.
Muvendavelar of Rajendra Tiruvintalanadu.
Valavakesari Muvendavelar.
Brahma Atratrayajiyar.
Bhatta Somayajiyar of Keralamangalam.
Pasalai Periya Nambi, Bhatta Bhagamtangiyar.
Kumara Vidhyadara Muvendavelan.
Kotandala Muvendavelan.
Atisaya Chola Muvendavelan.
Puvendan Venthavelan.
Jayamkonda Chola Lokavelan.
Puravari Tinaikkalam Arindaman Muvendavelan.
Vikrama C[illegible] Pandya Muvendavelan.
Kuvalaya [illegible]vakara Muvendavelan.
The Lord of Deva[illegible]angalam.
Tiritonga Muvendaven[illegible].
Vira Narayana Muvendavelan.
Varippustakam Vidangamudayan.
Chittambalam Udayan.

Sundara Cholanallurudayan.
Mukavetti Manarkudayan.
Paruttikkudayan.
Cholamadevi Udayan.
Vallamudayan.
Vadugakkudayan.
Malaiyurudayan.
Varippustakam Sattamangalamudayan, Paruttikkudaiyan, etc. etc. etc.

Another fact disclosed by the statements already given is that the language of most of the inscriptions is Tamil. The reason here is equally simple. Malayalam as a national language is not very old. Its resemblance to old Tamil is so patent that one could hardly help concluding that Malayalam is nothing more than old Tamil with a good admixture of Sanskrit words. There are some very old works in Tamil composed in Travancore and by Travancore kings. Besides, the invading Pandyas and Cholas were themselves Tamilians and their inscriptions form more than 70 per cent of the total in South Travancore. The Sanskrit inscriptions are very few and record 'Dwaja Pratishtas' and other ceremonies specially connected with Brahminical worship.

With regard to the date of the inscriptions, the Chola inscriptions are the most common ones till the 3rd century M. E. (12th century A. D.). Subsequently we meet with Pandya inscriptions interspersed with those of the native kings. The later inscriptions are generally those of the sovereigns of Travancore with a small sprinkling of Pandya inscriptions. Later still, we have several Neets and Proclamations issued by the dynasty of the Nayak chiefs.

It will also be observed that most of these inscriptions are found in temples and other sacred places. Charity, according to the Sanskrit texts, loses its merit when the donor boasts of or advertises it. This is the reason why so little is known of private charities of Hindus, though they are extremely liberal and cosmopolitan in the matter. Let not the right hand giveth the left hand should not know. Such is the Hindu belief. An exception is however made in cases of gift to the temples, the object being that a publication of such gifts acts as an incentive to other endowments by men of wealth. Every success attained by a Hindu results in a religious or charitable endowment. The foreign kings that entered Travancore either as

enemies or as friends made their gifts to most of these temples chiefly as thanksgiving for the success given to them by the gods of the different temples, but also as a policy of conciliation of the conquered people.

Stress need not be laid here on the value of these inscriptions. Nobody will deny it. They are often the only records that contain the true history of Travancore. The late Mr. Sundaram Pillay wrote:—"That the Travancore inscriptions are fully worthy of that honour, I can now confidently assure the Government. They are sure to prove useful in every branch of archæology. They offer the only reliable basis for the ancient history of Travancore and are sure to render substantial service in placing beyond doubt certain leading facts connected with the fluctuating fortunes of the Pandyan kingdom and the Chola empire, not to speak of the steady light they throw on Dravidian philology and ancient history".

Of the 150 inscriptions that have been transcribed up to date, about 70 have been carefully and critically examined by the Archæological Department. The historical incidents of value disclosed by them have been incorporated in the Early History section of the next chapter.

Regarding the remaining inscriptions, which still await careful study, nothing but the bare outlines are available. Even as they are, they bring to light much useful information about the social and political condition of early Travancore. What is here attempted is to give a few interesting particulars which a casual examination of these inscriptions brings to light.

As is only natural to expect, nearly two-thirds of the inscriptions relate to gifts of lands and other valuables to the several temples in the State or for charitable purposes. Gifts to temples relate to construction, repairs and additions, consecration, nanda lamps, special pujas and offerings; and among charitable purposes are included the construction of wells, water-sheds, rest-houses and 'Chumadu-tangi' stones*, and the feeding of Brahmins and other castes. It is interesting to note that the sovereigns of Travancore have not been unmindful of the needs of other religionists. It is found from two inscriptions on pillars in the temple of Nagaraja at Nagercoil, dated 21st Aipasi 681 M. E., and 29th Puratttasi 692 M. E., that grants of lands were made at the requests of two Jaina priests, Guru Vira Panditan and Kamala Vahana Panditan. There is an inscription dated 15th Chitrai 669 M. E., in one of the granite pillars at Kumari-muttam, which records the assignment by the sovereign of the harbour dues of Kumari-muttam and Covalam to the Roman Catholic church at Kumari-muttam.

* Literally stones on which the passengers who carry loads on their heads place them and take respite while travelling long distances of 5 and 10 miles with heavy burdens. All over Travancore such 'Chumadu-tangis' exist on the roadsides, often 7 or 8 for every mile.

at the request of the congregation attached to that church. Considering the fact that these inscriptions are nearly four centuries old, the spirit of cosmopolitan tolerance is noteworthy.

There are six inscriptions which refer to caste and religious disputes and the Royal writs issued in settlement thereof.

1. On a granite pillar to the south of the temple at Quilon.

2. On a granite pillar near the temple of Adimula Vinayakar at Nagercoil dated 15th Ani 682 M. E.

3. On a granite pillar at Parasuraman Perumtera, Idalakkudi, dated 1st Chitrai 681 M. E.

4. On a granite pillar found in Kanara-Mudram Pudukkalam, Murungur, dated 12th Thye 670 M. E.

5. On a granite pillar in front of the temple of Karutha Vinayakar, Saliyar Pudutheru, Vatasseri, dated 4th Ani 911 M. E.

6. On a granite pillar at Kumari-muttam dated 20th Panguni 701 M. E.

In the first of these it is mentioned that the sovereign redressed the grievances of 18 castes at Quilon then known as Kurakkenikollam by assigning to them separate localities to live in.

The second remitted the following taxes, which were exacted from them by the higher classes without the knowledge of Government viz., Karamukattalai, Panam, Padavaram, Padippanam, and Anaivari, to the Nadars of Edanadu between the hills of Parali and Tovala.

The third granted certain privileges to the professional people called Sâyakars of Idalakkudi viz.,

(1.) They were allowed to appear before the sovereign during the Royal processions.

(2.) They were exempted from the payment of all dues with the exception of Padaippanam and Kappalvagai panam.

(3.) They were freed from persecution at the hands of Brahmins, Pillaimars and others who were in the habit of obstructing their passage to take water from tanks and wells, by putting up fences of thorns &c., assaulting and exacting unreasonable dues from them and interfering with and interrupting them in their public religious performances. Their residence was also prescribed within certain limits.

The fourth prohibited the lower castes of Valankai and Edankai from making religious gifts to the temple of Sakalakalai Martanda Vinayakar.

The fifth declared that the temple of Karutha Vinayakar belonged to the Saliars and not to the Chetties; and the sixth refers to the persecution of the Christian converts of Kumari-muttam by their Hindu kinsmen. The Royal writ assigned to them a separate locality to live in.

The next interesting point has reference to the village assemblies which appear to have been self-governing bodies. There were such associations in Suchindram, Trivandrum, Kadainallur, Nirankarai, Tirunandikara, Cheramangalam, Parthivasekharapuram, and Nanjanad. It appears that these village assemblies had the charge and management of the village temples, power to appoint temple accountants and priests and to regulate the system of worship. They levied fines and imposts on the villagers and an inscription on a granite pillar at Santhur in Toduvatti in Vilavankod Taluq, dated 20th Avani 819 M. E., records that a Royal writ was issued prohibiting the village assemblies to punish villagers without the knowledge of Government. There were large assemblies of Six Hundred and Three Hundred for Venad who met and deliberated on all questions of administration. The country was divided into Divisions, Districts and Desams, the last being apparently the unit or the smallest administrative division.

There are a number of inscriptions relating to taxation. A very important one on a pillar standing outside the temple of Manalikarai Alwar in Kalkulam Taluq, dated 27th Medom 410 M. E., (1235 A. D.), records a Royal Proclamation issued after a consultation held among the loyal chieftains of Sri Vira Ravi Kerala Varma ruling Venad, the members of the Kodalinallur assembly and the people of that village as well as the individual entrusted with the right of realising the Government dues. The chief points of interest in this inscription are that the whole village was responsible for the tax so that when any portion of the crops failed, the villagers and the village assembly should inspect and if satisfied of the drought, the sufferers had to pay only one-fifth of the normal dues, while the balance fell on those whose lands did not fail. If there was a general failure, then the village had to pay only one-fifth of the whole demand due from it; if the villagers should however desire that the collections should be postponed, it was done accordingly, the unpaid amounts being adjusted in the years of plenty. From another inscription on a granite pillar in Kandiripandi Vilai, Vadaseri, Agastisvaram Taluq, dated 4th Kartikai 873 M. E. (1697 A. D.), we gather that a Royal writ was issued to the people of Nanjanad remitting the taxes on their lands for 13 years on account of the in-

vasion of the Nayakkars into Nanjanad which evidently caused much loss and damage. Besides the land and other taxes noted in the inscriptions already referred to, there were a number of others also as revealed by the inscription on the southern wall of the temple at Keralapuram, dated 21st Kumbham 491 M. E. (1316 A. D.). They were :—

Othirai tax.
Bamboo grain.
Alageruthu.
Tax on palmyras.
Karaipattu.
Kadumakattalai.
Panam.
Padavaram.
Anaivari.

What these taxes were is not clear and further particulars regarding them are wanting.

There are references in some inscriptions to measures of land in vogue and to coins current in the country. In two granite pillars in Vatasseri, there are inscriptions dated 28th Thye 849 M. E. (1674 A. D.) and 1st Chitrai 793 M. E. (1618 A. D.), from which it is found that the measurement known in Tanjore and Trichinopoly as *Veli* was in use in Travancore also in early times. The different kinds of coins referred to are, Kaliyugarayan Panam, Erattarasi, Salakkai, Kalanji etc. It is not known what a Salakkai is Kaliyuga Rayan Panam has already been referred under coins. Erattarasi is apparently a single coin of the value of two Rasi fanams. No reference has hitherto been found about the existence of a double coin and further researches should throw light on this point. An inscription on the northern wall of the Bhagavati Temple at Cape Comorin, dated the 27th year of Sri Vikrama Pandya Devar, shows that a gold coin was granted to the temple. It is not clear what that coin was.

Some inscriptions refer to the troubles from external foes. The invasion of Nanjanad by the Nayakkars has been already referred to. An inscription on the granite pillar in the temple at Tirunandikara, Kalkulam Taluq, records the destruction of the Talakkulam Salai by the adversary of the Cheras and the destruction by Chola King Raja Raja Kesari Varma of the Kandalur Salai is inscribed on the Kailasanathapparai at Suchindram, dated the tenth year of the victor's reign, wherein he is stated to have conquered Gangaipadi, Nulambappadi, Tadukaipadi and Vengai Nadu.

Travancore inscriptions offer a remarkably rich and varied field for

archæological study and research. There is scarcely a temple in South Travancore whose walls and pillars are not covered with old inscriptions. The same must be the case more or less with North Travancore though that part of the country on account of its inaccessibility in the olden days was not the scene of successive invasions as the more open and flat tracts of South Travancore; but no archæological researches have been made there worth the name. The Travancore inscriptions apart from their historical importance are also valuable as evidence of their age. A dated inscription is a rarity in other parts of India but in Travancore nearly all inscriptions bear the years, months and sometimes even dates, days of the week and the position of Jupiter or other constellations to enable the student to trace their exact dates. There can be no doubt that when these are fully studied they will throw considerable light on the early history of Travancore.

We owe it to the genius and energy of His Excellency the late Viceroy (Lord Curzon) that these relics are being actively resuscitated in other parts of India. He said :—

"India is covered with the visible records of vanished dynasties, of forgotten monarchs, of persecuted and sometimes dishonoured creeds...If there be any one who says to me that there is no duty devolving upon a Christian Government to preserve the monuments of a pagan art, or the sanctuaries of an alien faith, I cannot pause to argue with such a man. Art and beauty, and the reverence that is owing to all that has evoked human genius, or has inspired human faith, are independent of creeds, and, in so far as they touch the sphere of religion, are embraced by the common religion of all mankind. Viewed from this standp int, the rock temple of the Brahmans stands on precisly the same footing as the Buddhist Vihara, the Mahomedan Musjid and the Christian Cathedral. There is no principle of artistic discrimination between the mausoleum of the despot and the sepulchre of the saint. What is beautiful, what is historic, what tears the mask off the face of the past, and helps us to read its riddles, and to look it in the eyes—these, and not the dogmas of a combative theology, are the principal criteria to which we must look. Much of ancient history, even in an age of great discoveries, still remains mere guess work. It is only being slowly pieced together by the efforts of scholars and by the outcome of research. But the clues are lying everywhere at our hand, in buried cities, in undeciphered inscriptions, in casual coins, in crumbling pillars and pencilled slabs of stone. They supply the data by which we may reconstruct the annals of the past, and recall to life the morality, the literature, the politics, the art of a perished age... To us the relics of Hindu, and Mahomedan, of Buddhist, Brahmin, and Jain are, from the antiquarian, the historical, and the artistic point of view, equally interesting and equally sacred. One does not excite a more vivid, and the other a weaker, emotion. Each represents the glories or the faith of a branch of the human family. Each fills a chapter in Indian history. Each is a part of the heritage which Providence has committed to the custody of the ruling power".*

* Speech on the 'Ancient monuments in India' delivered at the annual meeting of the Asiatic Society of Bengal on the 7th February 1900.

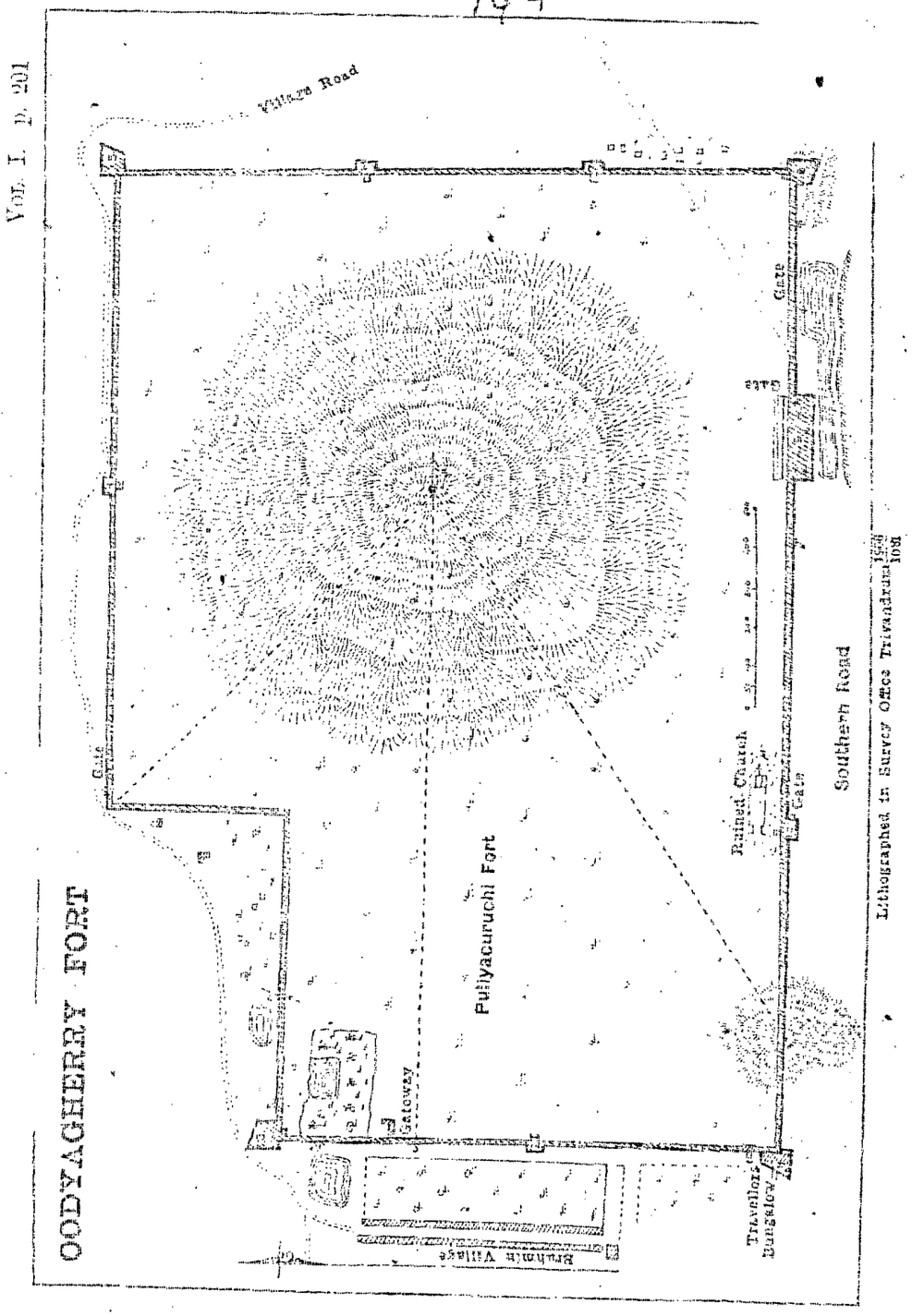
It appears to me that we could well follow the lead of the Government of India in this respect, for as Lord Curzon remarked,

"For my part I feel far from clear that Government might not do a good deal more than it is now doing, or than it has hitherto consented to do. I certainly cannot look forward to a time at which either the obligations of the State will have become exhausted, or at which archæological research and conservation in this country can dispense with Government direction and control. I see fruitful fields of labour still unexplored, bad blunders still to be corrected, gaping omissions to be supplied, plentiful opportunities for patient renovation and scholarly research. In my opinion, the tax-payers of this country are in the last degree unlikely to resent a somewhat higher expenditure—and, after all, a few thousand rupees go a long way in archæological work, and the total outlay is exceedingly small—upon objects in which I believe them to be as keenly interested as we are ourselves. I hope to assert more definitely during my time the Imperial responsibility of Government in respect of Indian antiquities, to inaugurate or to persuade a more liberal attitude on the part of those with whom it rests to provide the means, and to be a faithful guardian of the priceless treasure-house of art and learning that has, for a few years at any rate, been committed to my charge".

Forts and military works. The following account* of the character of the country from a military point of view, written a few years after the demolition of the fortifications, may be quoted with advantage:—

"We do not observe here that multitude of small forts so common in other parts of the peninsula, and which convey such an idea of the insecurity of the times. There is nothing in Travancore that deserves the name of a fortress; its aspect may supersede the necessity, at least render it less urgent of such defences. The lines at Arahmuhni commonly called Arambooly, (measuring 17 miles,) that guard the entrance of the country by the champaign tract bordering Cape Comorin, though raised with such immense labour were passed with a facility that proved their weakness. Those on the north terminating at Pullypuram and stretching the hazardous length of twenty-four miles, still further show the futility of attempting to fortify any large extent of the country. If Tippu was once foiled in his attempt to surmount them, the defeat is not chargeable to their strength. They now present only a high bank and narrow half-choked ditch, the whole overgrown with forest, but in point of structure they are greatly inferior to the southern lines, and could at no time have offered any difficulties the most ordinary enterprise would not readily overcome. The fort of Kodungaloor (forming a point upon those lines) which arrested Tippu's advance experienced his vengeance, and is now scarcely to be traced. The two lines of fortifications intersecting the country and passing Yaithumanoor and Muattupully are quite of similar character, only of a somewhat ruder structure; a strong fence of bamboos following the crests of the banks serve now to point out the course they pursued. In the obscure feuds of the petty chiefs whose boundary they marked or guarded, they may doubtless, however feeble the barrier, have answered the purposes of defence, but it is only for such warfare they are calculated, and it is impossible not to regret that the labour dedicatad to their erection had not been better applied. The walls encompassing a few

* Memoir of the Survey of the Travancore and Cochin States—Lieuts. Ward and Conner. Vol. I. Page 122.



towns in the southern parts have but a weak profile. Palpanaveram and Oodagherry are among the most remarkable, but are places of no strength; their fortifications planned on an extensive scale yet remain unfinished. The latter presents however many facilities for the improvement of its defence. The coast is entirely devoid of fortified places; the little fort of Chunganacherry, built by that warlike prelate Menezes, probably, to check the levity of his converts, is now dismantled. Its situation was valuable as a depot and its strength, sufficient to secure it against any attempts of the natives, rendered it in some measure a place of retreat against the accidents of war.

"The country is particularly strong and generally woody. The multitude of streams that intersect while they aid the agriculture guard the possessions of the people; the inequality of its surface renders cavalry almost useless and impedes the movements of regular troops, at least the exercise in some degree of that discipline which renders them formidable. The ghauts, that grand natural barrier which constitutes a no less striking physical than moral limit, at once defines and defends the eastern confines; the mass of hills descending from them are only traversed by narrow passes, which run into rugged defiles as they proceed eastward, but though opposing a strong and defensible frontier, its great extent would demand the exertions of an enterprising people to guard all its previous points—an undertaking rendered the more difficult from the bad climate common to those parts during a period of the year and the vast extent of hills intervening between the populated tracts and eastern confines. The northern frontier is for the greater part mountainous, and where not covered by hills, lines have been thrown up to defend it. The inefficacy of those works as a barrier has already been mentioned; they are crossed by a variety of roads, which running through a comparatively open and level country, present no material impediment. In fact, there is a considerable choice of entrances, but it is only the most northern and southern ones that admit the passage of artillery; light bodies of infantry unencumbered by heavy baggage might enter by all the smaller ghauts. It is said that Hyder or Tippu had it in contemplation to penetrate by the Goodaloor or Cumbum ghaut, and the choice would have been judicious, as enabling him by a few forced marches to reach the central parts of the country. The monsoon would necessarily affect the efficiency of any military equipment to a degree that would perhaps render it necessary to suspend operations during its violence; the period however that can be so considered is not of long continuance. This part of Malayalim eluded rather than opposed Mussulman and Mahratta dominions; its weakness almost courted aggressions, but to its remote situation and mountainous aspect may possibly be attributed its escape from the grasp of these conquerors, whose armies composed in a great measure of hordes of cavalry, have not ventured to pass the mountainous line that equally opposed their entrance as escape."

The following is a brief description of the three most important forts of Travancore.

1. THE UDAYAGIRI FORT* is situated alongside the main southern road (33 miles from Trivandrum), running south-east and leading to Tinnevelly.

The area of the ground enclosed within the walls of the fort is 84¾ acres. Within this area there is a small tank and a number of ruined

* The description of this and that of the Padmanabhapuram fort is taken from a Report submitted to Government by the Chief Engineer in June 1878

buildings amongst which is a church. In the centre of a large square of fort, there is a hill 260 feet high which commands the whole of the fort.

The walls enclosing the fort are, on an average, 15 feet thick and 18 feet high including the parapet. They are lined within and without with stone; the outside lining or fencing is of laterite imbedded in chunam. The facing is on an average 4 feet thick up to the foot of parapets. The parapets are 3 feet thick and on an average 4 feet high. The inner lining is of rough stone 2 feet thick and on an average 6 feet high. The space between the inner and outer lining consists of earth which goes to form the ramparts. The fort has in all ten bastions, five of which are intended for cannon, the others being pierced for musketry only. The main entrance into the fort is a gateway near one of the bastions which is 10×6. Besides the gateway, there are smaller inlets near three other bastions. The fort walls are in a fair state of preservation. The entire area is overgrown with jungle.

2. THE PADMANABHAPURAM FORT. This lies about half a mile north-west of Udayagiri fort, on the southern road 33 miles from Trivandrum, and is overlooked by a hill to the north on which there is a redoubt built. The distance of the redoubt from the nearest bastion of the fort is 2,540 feet bearing 12° w. of N. The height of the redoubt as observed by the aneroid is 220 feet above ramparts of fort. This was at one time the capital of Travancore and is still an important place being the headquarters of the Southern Division.

The area of the ground enclosed within the fort walls is 186¼ acres. The space is for the most part filled up with houses (amongst the most noteworthy of which are the palaces of the former Maharajahs and two large and famous temples). There is also wet cultivation within, irrigated by a large tank situated at the north-east corner of the fort.

The walls comprising the fort are 3 feet thick and built with granite up to within 8 feet of the parapets, the remaining portion being laterite. At the four corners of the fort there are four main bastions more or less of one size and shape. One of these was evidently intended as a sort of watch-tower since it runs out to the summit of a detached hill. The fort has ramparts only for half the length of the wall, the walls alone being defences for the remaining length. Even there the ramparts are not complete throughout, as in certain places the earth filling is wanted. The height of the walls varies according to the inclination

of the ground, the highest elevation being 24 feet and the lowest 15 feet, including the parapets which are all 3 feet high throughout. The principal entrances into the fort are four gateways situated one on each wall and there are also other smaller gateways near three of the bastions. The fort is not overgrown with jungle. Its walls to all appearance are generally sound. Over one of the gateways however there is an unfilled breach in the wall of 8 feet, and at another point it is observed that the wall for a length of 27 feet consists of nothing but laterite from top to bottom.

3. VATTAKOTTA FORT. The South Travancore lines or Vattakotta are worthy of notice extending as they do across the country. They are built of stone cemented with chunam, but are now in ruins having been demolished soon after the entrance of the British troops in 1809. The new lines, as they are called, commence on the coast ¾ of a mile west of the point of Cape Comorin, with bastions at 165 yards distant from each other; they run north 1½ miles to Chevery Kotta, a redoubt built on rocks which is conspicuous from thence, then W. N. W. 3 miles in a direct line where they are connected with the old lines about 500 yards S. S. E. of the village of Thanumalayan Putur, at which spot there are two gateways; the old lines from thence run at an obtuse angle with the new which still continue to the Pinnewaram gate and from thence in the same direction to the steps for the Nedunnalai hill and appear in on the steep on the opposite side and run 5 furlongs to the Rames- gate; from thence to the slopes of Kattadi hill, a distance of [illegible] (a granary and powder magazine are built a short distance [illegible] -neswar gate), and thence rather waving to Vattakotta, a strong irregular redoubt on the coast, which is the only part connected with the lines that has not been demolished.*

* Memoir of the Travancore Survey, Vol. II. Page 5.

List of Forts in Travancore.*

Name.	Station.	Remarks.
Keechari Fort ...	Vadayaru Proverty, Vaikam Taluq.	An earthen fort 100×75, all decayed and full of jungle.
Kilakkambagam Kara.	Ettumanur Proverty. Ettumanur Taluq.	An earthen fort all decayed, no masonry.
Padinjattumbagam Kara...	Do.	Do. Do.
Kadutturutti Kara ...	Kadutturutti Proverty, Ettumanur Taluq.	Do. Do.
Mannar Kara ...	Do. Do. Do.	Do. Do.
Kodamalur Kara ...	Karpola Do. Do.	Do. Do.
Lalam Kotta ...	Lalam Proverty, Minachil Taluq.	Do. 325×257; all public offices of Minachil are held within.
Nedum Kotta ...	Do. Do. Do.	A wall totally ruined and no masonry.
Karikod Fort ...	Karikod Proverty Do.	Of laterite masonry 450×420×14, almost in ruins; a small tank inside.
Menokunnu ...	Muvattupuzha Taluq	An earthen wall totally ruined; not a fort.
Nedum Kotta ...	Do. Enanallurmuri ..	Do.
Nedum Kotta ...	Do. [illegible]ri Kara ...	Do.
Manna Kotta ...	Do. ...	An earthen fort all ruined.
Vattamana Fort ...	Parur Muri, ...	The space within the fort is 1000×1500 feet. The enclosure boundary is formed of raised earth; divided at present into 3 compounds filled with cocoanut trees; a dilapidated temple in the centre.

* From a Report [illegible]mitted to Government in 1886 by the Chief Engineer.

List of Forts in Travancore *(Continued)*.

Name.	Station.	Remarks.
Kottapuram Fort ...	Vadakkekkara Proverty, Parur Taluq.	This is near the riverside, with dense jungle. A masonry wall is seen about 200 feet in length; also earth banks raised here and there and one solid masonry wall about 18 feet by 6 feet built of laterite in chunam.
Munampam	Do. Do.	An enclosure wall or earth, an octagonal building about 42 feet by 42, height 35 feet and 7 feet thick; there is a well inside with good water. There was a three-storeyed building with 18 windows and one door; no wood work seen at present. The door frame is of granite and arched. This building has also a cell 8×8. The masonry is laterite and chunam, now covered with jungle.
Parasuraman	Ayirur Proverty, Alangad Taluq...	A dilapidated building with masonry, laterite in chunam, void of all roof and wood work; divided into two rooms measuring 53×14 and 27×22; walls 9 feet high and 5 feet thick.
Manjummel	Parur Taluq	This stands on a hill and has a small building all broken and dilapidated. The walls are made of earth thrown up, about 10 feet high in 10 places.
Thaliki Kotta ...	North Travancore...	Situated on a hill to the east of Thalathangudi; built of laterite in chunam; plastered. It is battlemented and overgrown with vegetation and parts appear to have been dismantled; there are traces of a deep moat all round filled in mostly.

List of Forts in Travancore. *(Concluded).*

Name.	Station.	Remarks.
Mavelikara Fort ...	Quilon Division ...	A large fort about 2,500 feet square; walls entirely demolished, traces found only in parts.
Krishnapuram ,, ...	Do. ...	About 15,200 feet square; walls entirely demolished.
Trivandrum ,, ...	Trivandrum ...	A square fort, the 4 sides measuring 11,320 feet, of which 5,796 feet is of granite, 2,445 of laterite and 2,919 of mud; height about 15 feet; Maharajah's Palace, a large Pagoda, and many Brahmin streets; no rampart, only a wall.

Tombs and Monuments. The writer of the voluminous book, *Church History of Travancore*,* says that in point of ancient monuments the Christian church in Travancore is perhaps the poorest church in the world. It is strange, he says, that when there are monuments and epitaphs belonging to the Portuguese, Dutch and English periods, there are none belonging to the earlier period when the Christians were under the entire sway of Native Rulers. Excepting the tombs in the numerous Christian cemeteries in the State, there are no other kinds of monuments of any importance. The old tombs in the cemeteries are mostly of Portuguese, Dutch and English origin, all belonging to a comparatively recent period. The oldest tombstones yet found do not take us beyond the 17th century. These are mostly to be found in the following places:—

The Anjengo cemetery; the Cape Comorin Church; St. Francis Xavier's Church at Kottar; L. M. S. cemetery, Nagercoil; in the ruins of the old Church at Fort Udayagiri; Tiruvitankode Church; Kolachel; L. M. S. cemetery at Parassala; L. M. S. cemetery at Neyyur; Valiatora Church near Trivandrum; L. M. S. compound at Kannamoola, Trivandrum; Christ Church cemetery, Trivandrum; L. M. S. cemetery at Pattathanam, Quilon; Tuet Church, Quilon; Modakara Church, Quilon; St. Thomas' Church, Quilon; Shencottah; C. M. S. Church, Mavelikara; C. M. S. cemetery at Alleppey; C. M. S. cemetery, Kottayam; Verapoly Church; Puthenchera Church; Manjummel Church; and Tangasseri.

Mr. Agur believes that the utter absence of Christian monuments in the country belonging to the purely Hindu period does not much speak for the toleration afforded. Another reason urged by him is the absence of systematic archæological researches. It is unsafe to hazard any opinions on such matters without sufficient data. The tolerance of the ancient governments of Travancore under Hindu kings is established beyond a doubt. It is not an open question. It is handed down to us as an undisputed tradition. I should think that the absence of Christian monuments is due mostly to the apathy of the Native Christians themselves, an

* By C. M. Agur B. A.

apathy natural to the community as in the case of their Hindu brethren with whom they are one in race and sentiment. The real reason for the absence of such tombs and epitaphs is that, as admitted by the writer himself, "the mass of Native Christians for centuries seem to have never cared to erect tombs over the graves of their friends and relations. What a contrast these Malabar Christians are to their contemporaries, the early Christians of Rome and the West, who carefully deposited the remains of their dear departed ones in well-prepared chambers sealed and inscribed."

CHAPTER VI.

History.

"History at least in its state of ideal perfection is a compound of poetry and philosophy."

Macaulay.

Travancore, like the whole kingdom of Kerala itself, has had an uninterrupted succession of Hindu sovereigns from remote antiquity. It is probably the only country in this part of India, where Hindu traditions, Hindu manners and customs, Hindu learning and the Hindu religion are still preserved in their original simplicity and purity, owing chiefly to the continuous and prosperous rule of a long line of Hindu kings from of old. The natural barrier of mountain and sea was another circumstance which kept it intact as it gave it an inaccessibility to the outside world and contributed to its comparative immunity from molestation and conquest by the warlike races who successively swept over the rest of the Indian continent. But, as is generally the case in India, there has been no regular or continuous record kept of the kingdom of Kerala, its origin and progress, its peoples or its ancient administrations. As Bishop Caldwell justly remarks, "It is a singular fact that the Hindus though fond of philosophy and poetry, of law, mathematics and architecture, of music and the drama, and especially of religious or theosophic speculations and disquisitions, seem never to have cared anything for history". Its history therefore remains to be written.

There are, however, ample materials for a good and reliable account, lying scattered about all over the land, in old Olas, copper-plate and stone inscriptions, in the sacred Puranas and Temple Chronicles, in quaintly written old books of Sanscrit, Tamil or Malayalam, such as the Kerala Mahatmya, the Keralolpatti, the Nannul and the Tolkapyam, in the stray verses of Kambar, in proverbs and maxims, in nursery tales and maidens' songs, in ancient coins and in the fragmentary records of ancient commerce from the time of the Greeks, in the traditional architecture of houses, temples and temple flagstaffs, of Kavoo-shrines, Gopurams, Mantapams and old forts, in the diaries and note-books of old sailors and soldiers, in the ancient titles of kings and chiefs, or later on in the treaties and engagements with the Hon'ble East India Company, in the Residency and

Huzur records at Trivandrum, in the valuable archives of Fort St. George, in the Mission reports and private letters of the last century, in the modern but incomplete historical compilations of Sir Madava Row, Shungoonny Menon and Nanoo Pillay and a host of lesser writers, in the Manuals and histories of adjacent British Districts, in the records of various Departments of the State, in the State Administration Reports and Gazettes for the last half a century, in Almanacs and Calendars, in sundry magazines and newspapers and in the memories of old men still living—all awaiting the patient inquiry, the toilsome research and the genius of the true historian to collate, to discriminate and to depict. Until such a historian arises, the account attempted in the following pages may be taken as a faithful narrative, in which all available information about the country and its people, whether traditionary or of an authentic or historical value, has been carefully brought to book and as fully as the time at the disposal of a heavily worked Revenue official would permit.

SECTION A.—ANCIENT HISTORY.

The ancient history of Travancore is mostly tradition. The chief authority for the tradition is the *Keralolpatti*, a Malayalam treatise which fully gives whatever of tradition is known on this coast. What is traditional need not necessarily be false, and when that tradition is found closely interwoven with the details of the daily life of a population and its impress still left on the behaviour of races and classes towards each other as in Keralam, it attains the rank of authentic history.

According to this authority (*Keralolpatti*), Parasurama, a great Brahmin sage and warrior of the race of Bhrigu, the greatest of Rishis according to the Bhagavad-gita, created the land of Kerala. Parasurama's father was the great Rishi Jamadagni and his mother was Renuka. He is said to be one of the *Avatars* of Vishnu. His exploits belong to the close of the Treta Yugam just preceding the birth of Rama, another *Avatar* of Vishnu. While Parasurama was living with his parents on the banks of the Narmada, a distressing episode within the family circle embittered his early life. One day his mother Renuka was late in returning from the river with the usual pot of water for the household use, which pot was not a potter's baked vessel but one daily improvised by Renuka herself with the loose river sand, a feat ascribed to the miraculous power of her chastity. That day, it so happened, she returned without the water, for she could not make the pot of sand as usual; and on Jamadagni's enquiring for the cause of this failure in his faithful wife, she admitted that she was distracted by the beautiful form of a Gandharva reflected in the water, after which she could not, she said, make the pot of sand. This the Rishi thought was a deflection on the part of his wife and losing his temper, he ordered his sons to cut off her head. Parasurama's four brothers refused to obey their father's mandate, for they said, "the sin of killing a mother is even greater than that of disobeying a father". When Parasurama was asked, he loyally obeyed, took his axe and cut off his mother's head with one stroke. Jamadagni was gratified and commanded his dutiful son to ask of him any boon he pleased. Parasurama implored, "Holy sire, I have faithfully obeyed thy behests, for I knew full well thy wonderful powers. Restore to me, I pray thee, my dear mother, the sacred person to whom I owe my birth. I have killed her, for a father's command must not be disregarded". The Rishi wept for repentance and restored Renuka to life. But the sin of taking away his mother's life hung like a heavy cloud on Parasurama's youthful mind. This was one of the early causes, it is said, that subsequently led to Parasurama's creating and peopling Keralam.

He was then sent by his parents to the hermitage of his great-grandfather, Bhrigu, to receive his education. After some time the sage sent him to the Himalayas to pray to God Siva and obtain his blessing. Thus Parasurama spent many years on the Himalayas in devotion and penance, which pleased Siva who appeared to him in person, blessed him and directed him to visit all the holy places on earth, which he did. Meanwhile war broke out between the Devas and the Asuras, and the Devas being worsted in the fight sought the aid of God Siva who at once commanded Parasurama to assist the Devas, giving him the necessary instructions in the war and the use of his divine weapon *Parasu* (axe), from which circumstance he took his name Parasurama. He met the Asuras in war, gained a decisive victory over them, and restored the Devas to their former possessions. He again returned to the Himalayas and for a considerable time was engaged in penance there. Siva was much gratified, paid a visit again to his faithful votary and presented him with a divine chariot and a bow, which were to stand him in good stead whenever he wanted their use.

Having thus obtained all he wished for, Parasurama went back to Bhrigu and thence to his own parents on the banks of the Narmada; when to his horror he found that his holy father's hermitage had become the scene of robbery, violence and murder. This sad story may be briefly narrated here. Kartaviryarjuna, the well-known Kshatriya king, one day visited Jamadagni in his hermitage and as was due to a crowned monarch

of his position, the Rishi gave him a right royal reception, feasting him and his numerous retinue by the aid of his miraculous *Kamadhenu*—a celestial cow which only a Rishi's power could create; for, it is said, the Rishis of old were simple anchorites living in their jungle houses without neighbours or servants or relatives and trusting only to the powers of their *Tapas* (penance) for offering due hospitality to the kings and other great men who visited them. Kartaviryarjuna coveted so precious a cow and in a vein of absolute despotism took it away by force. Suffice it to say that the cow, however, had to be subsequently restored to the Rishi by Kartaviryarjuna himself. Thereafter his sons ever bore a grudge to the Rishi on account of their father's humiliation, and by way of vendetta they invaded the Rishi's home at an unguarded moment and put him to death. Renuka, his wife and the mother of Parasurama, then committed the act of self-immolation on her husband's funeral pile as became a true *Sati*. Soon after this tragedy was enacted, Parasurama returned home and his rage and sorrow knew no bounds, and he set out with his *Parasu* granted to him by God Siva vowing vengeance on the whole Kshatriya race, of whom he resolved not to let a single one survive on earth.

The story goes on to say that Parasurama destroyed the Kshatriyas in twenty one successive wars, and the whole of India thus lay devastated and prostrate before him—his own uncontested dominion. When his wrongs were thus avenged, he was stricken with repentance, called a council of the great Rishis * and begged of them to be enlightened as to how best he may expiate his *Virahatyadosham*, i. e., the sin of having killed so many crowned heads and their vast armies. He was advised to make a gift of the whole land thus acquired to Brahmins, which being done, the Brahmins who had received the land told him that his stay in the *Danam* land was opposed to the spirit of a free gift, and that therefore, if he would avoid sin, he must quit the land at once. Parasurama was convinced of the sin of using what he had given away and so retired to the Western Ghauts immediately for penance again.

By severe penance and the propitiation of Varuna, the god of the waters, and by offering due worship to Bhumi Devi, the Goddess of the earth, he got permission to claim as his own as much land as could be covered by the throw of his axe from Gokarnam, which was then the land's-end, into the southern sea. He hurled his axe and it fell at Kanya Kumari or Cape

* Vasishta, Vamadeva, Jabali, Kasyapa, Viswamitra, Markanda, Agastya, Narada, Satananda, Gautama, Atri, Rishyasringa, Parasara and Vedavyasa are said have met at this council.

Comorin. Thus was created the land of Keralam, extending from Gokarnam to the Cape, a length of 160 *yojanas* by 10 *yojanas* according to the Purana. The scientific aspect of the Puranic statement of the miraculous creation of Kerala by Parasurama is based on the upheaval of the earth and the subsidence of the sea by volcanic action, and geologists confirm the fact of Parasurama's land having been under water in past ages. The late Shungoonny Menon in his *History of Travancore* quotes the following observation, by a writer in the *Kottayam College Quarterly Magazine*, as regards the origin of Kerala:—

> "There was once a subsidence, probably sudden, at Gokarnam, and afterwards a perceptible upraising, most probably in this case gradual, of at least some portion, if not of nearly all the coast between Gokarnam and the Cape. The whole appearance of the coast of Kerala, wherever at least we find the low lands and backwaters, would appear to indicate that it has been raised, certainly during the present era; and if, as our legend would seem to tell, this has happened under the eye of man, it becomes the more deeply interesting".

The land thus reclaimed is even now known in common parlance as *Parasurama-kshetram* or the land of Parasurama. It is said in the Purana that Parasurama desired the Trimurtis and the Devas to give a fitting name to his new land. God Siva called it 'Kerala' in honour of the marriage of the Sea-king's daughter to Keralan, son of Jayanta. Vishnu gave him his *Sudarsanam* (Discus) and Siva his *Vrishabham* (Bull) and these were consecrated at *Srimulastanam* in Trichur. Then Vishnu crowned him king and commanded him to found 24,000 temples and govern the land according to the Dharma-Sastras. It is also known as *Karma-bhumi* or the land of good deeds, meaning that a man's salvation depends entirely upon good actions, as opposed to the other coast, which is called *Punnya-bhumi*, where mere birth goes a great way towards [illegible] emption from sin. The reclaimed land is the tract of country now [illegible]vered by Canara, Malabar, Cochin and Travancore.

The new land was not fit for habitation; the settling down had not been completed. The quaking did not cease, so the Purana says; hence Parasurama sprinkled gold dust and buried coins and thus formed a treasure-trove which stopped the quaking of the land. He prepared a great *yagam* (sacrifice) at Varkala for the same purpose. Thereafter Parasurama brought colonies of Brahmins from the north, from the banks of the Krishna, the Godaveri, the Narmuda, the Kaveri and from Madura, Mysore, the Maharashtra and from many other places and peopled Keralam. The Brahmin colonists so brought belonged to eight *gotrams* or families. The Arya Brahmins formerly set out from Ahikshetram and

came to reside in the Kshetram of Samanta-Panchakam called also Kurukshetra, from which they were brought by Parasurama and settled in Keralam.

Parasurama then went to Paradesa (foreign country), where he met a Kshatriya whom he persuaded to go with him to Kerala, and with his aid brought and established eighteen Samanta families there.

Then he brought a representative of each profession, viz:—Carpenter, Blacksmith, Oil-monger, Goldsmith, Barber, Stone-mason, Washerman &c. Separate houses were built for them and rules for their conduct were framed.

Then he brought all kinds of grains and seeds, such as black peas, green peas, gingelly seeds, all kinds of vegetable plants, medicinal plants and all kinds of trees, especially the cocoanut, the plantain, and the jack, which are peculiar to Kerala. All these were brought to Kerala by the sea. The cocoanut and the plantain trees were brought, it is said, on a New Moon day, and hence it is believed on this coast that these trees when planted on New Moon days yield better than other days. So every true Nayar selects the New Moon as the best day for planting them.

Parasurama introduced several changes in the customs of his Brahmin colonists to prevent them from going back to their native country, which they did from time to time and thus greatly retarded the progress of Parasurama's repeated attempts at colonisation of his new land. Some of the changes were:—

(1) That the males should give up their back tuft of hair and adopt the front tuft now so universal in Malabar;

(2) That the boy's *Samavartanam* should be celebrated at the age of sixteen, when he gives up the austerities of a bachelor's life. This is for the followers of the Rig-Veda. Those who follow the Yagur-Veda celebrate the Samavartanam at the age of 12;

(3) That in the reciting of the Veda, a nodding of the head is a necessary accompaniment, so abhorrent to the Vedic scholars of the old country. They also reprobate the *swaram* or intonation adopted by the Nambudiri Brahmins in the recitation of the Veda;

(4) That even married males need not wear more than one Brahminical holy thread or *Yagnyopavitam* while on the other coast the double thread is an invariable symbol of the married man;

(5) That the eldest son alone need marry;

(6) That one Brahmin alone is sufficient to be fed at a *Sraddham*, while two is the invariable number on the other coast;

(7) That a sweetmeat locally known as *Vatsan* be given to the fed Brahmins after Sraddha meal. This of course will be quite abhorrent to the feelings of the other coast people where the fed Brahmins are expected to eat nothing for the next twenty-four hours;

(8) That females when they get out of their houses should be protected from profane gaze by a big cadjan umbrella and accompanied by a Sudra maid-servant;

(9) That females need not adorn themselves with jewels considered so indispensable on the other coast;

(10) That women need not wear more than a single cloth tied round their loins. This is generally nine cubits long—one end of which is passed between the legs and fixed in the waist behind, while the other end is wrapped round. This covers but a small portion of the body below the waist, while on the other coast women wear a single cloth, of course, about sixteen or eighteen cubits long, which is tied round in such a way as to cover from ankle to the neck and sometimes up to the back part of the head. A short petticoat (ravika) is used there in addition, to cover the breasts; no such apparel is known on this coast.

(11) And that no Brahmin woman should take a second husband.

But the land newly reclaimed from the sea was a most inhospitable region to live in, being already occupied by fearful Nagas, a race of hill-tribes who drove the Brahmins back to their own lands. Parasurama persevered again and again bringing hosts of Brahmins more from every part of India to settle in and colonise his new land; the Nagas were propitiated under his orders by a portion of the land being given to them and thus his own Brahmin colonists and the Nagas lived side by side without molesting each other. And by way of conciliation and concession to the old settlers (Nagas) who were serpent-worshippers, Parasurama ordered his own colonists to adopt their form of worship, and thus serpent-worship on this coast early received Parasurama's sanction. These Nagas became the (Kiriathu) Nayars of later Malabar claiming superiority in rank and status over the rest of the Malayali Sudras of the west coast.

The land was parcelled out into sixty-four villages and given to the Brahmin colonists with flower and water to be enjoyed as a *Brahmakshetram*. This giving with water and flower is of the nature of an out and out free gift and is called the *Raja-amsam*. Parasurama also

brought other Sudras, to whom he assigned the duty of cultivating the land and otherwise serving the Brahmin colonists. These Sudras were in addition to the Nayars, the early settlers, who had been conciliated and won over as servants and tenants as shown above. He also brought cattle and other animals for agricultural purposes.

The Brahmins thus became the lords paramount of the new colony. It may be truly said of these Brahmin colonists of Parasurama that *though they had not the law and were a law unto themselves*, they were so good by nature that *they did the things contained in the law.* Owing allegiance to no one except to themselves and paying no taxes which would be indicative of the value of protection by a ruling power, they became the sovereign-jenmies of Keralam. But it soon transpired that the Brahmins were not able to rule the land properly.

Parasurama after consecrating the temple at Srivardhanapuram * brought a prince from the East Coast named Bhanuvikrama, a Soma-vamsa-Kshatriya, and crowned him King of Kerala at Srivardhanapuram, presenting him at the same time with his own sword. One of his brothers, Udaya Varma, was at the same time crowned at Gokarnam to rule over Chera.

According to the *Keralolpatti*, the land of Parasurama was very early divided into four separate Districts or Khandoms as they were called, viz.,

Tulu Khandom, from Gokarnam to Perumpuzha river.

Kupa Khandom, from Perumpuzha to Kottah river.

Kerala Khandom, from Putupattanam to Kannetti including the southern half of the Kurumbranad Taluq, Cochin and North Travancore, and

Mushika Khandom, extending from Kannetti to Cape Comorin.

Some time later, Aditya Varma, Bhanuvikrama's nephew, was crowned King again by Parasurama who presented him with a sword as bright as the sun. After peopling the land and finding kings to rule it, Parasurama inaugurated the military system, founded temples and shrines, laid down the *acharams* or rules of conduct to his new colonists and instituted schools of medicine. He instituted the *Mahāmakham*, *Hiranyagarbham* and *Tulapurushadanam* ceremonies and founded several more temples and shrines and places of pilgrimage. The origin of

* According to Shungoonny Menon, Srivardhanapuram is the modern town of Padmanabhapuram in South Travancore.

Hiranyagarbham ceremony is thus stated:— A relative of Udaya Varma, King of Kola (Kolathunad or South Canara) became a convert to Islam and went to Mecca where he died. As one of the females of the Kola family happened to perform the funeral rites of the convert, the Brahmins excommunicated the family of Udaya Varma, whereupon Parasurama in consultation with sage Narada advised him to perform the *Hiranyagarbham* as an expiatory ceremony. The ceremony was performed and Udaya Varma and his family were readmitted into caste. The ceremony has ever since been performed by all the kings of Kerala. It is said that Parasurama himself performed the *Hiranyagarbham* and *Tulapurushadanam* ceremonies before he celebrated the *Mahamakham*. At this ceremony it is said the first seat was given to Kulasekhara Perumal (King of Travancore), and the second seat to Udaya Varma.

The *Keralolpatti* then describes how certain of the Brahmins, namely those of the Bharadwaja gotram, received the *Sastra-biksha* (alms of weapons) with the consent of all and having stretched out their hands accepted the weapons from Parasurama; how fencing schools with tutelary deities were established; how the Goddess Durga was set to guard the sea-shore on the west and the God Sastha the Ghauts on the east, and also how all the sixty-four gramams having been ordered to adopt the law of succession through the females (Marumakkattayam), only one village (Payyannur) in the extreme north of Keralam obeyed.

He afterwards established 108 fields (parade-grounds) of 42 feet square each, called *Kalaris* for purposes of drill and training in arms, and in each of these he placed an image of the gods who preside over arms and war and then lamps were lit and *pujas* ordained. He also established 108 images of Durga Devi on the sea-shore, and besides erected shrines for snakes and petty Devatas. Having thus ordained the temples and ceremonies, he ordered rain for six months in order "that abundance of corn, fruits, &c., might be produced, that piety should flourish and wealth should be obtained, by which Iswara should be served and honoured and *pujas* performed with due respect in honour of the gods and to the ancestors, and that cows should increase"; and he ordered the sunny season for six months so that all the various ceremonies might be duly performed in honour of the gods of heaven and the secondary deities such as Sastha or Hariharaputra, Bhadrakali and Ganapati. The different ceremonies so ordained were:—

Oottu,—Offerings of food.

Pattu,—Singing hymns.

Utsavam,—Grand ceremonies.
Vela,—The lesser ceremonies.
Vilakku,—Lamp illuminations of the temple.
Tiyattu,—Ceremony of running over fire.
Bharani Vela,—Ceremony performed in the month of Kumbham under the Star Bharani.
Arattu,—Carrying the God in procession to a tank, and performing ablutions to it.
Kaliyattam,—Ceremony of singing and dancing performed by women in honour of Bhugavati.
Puram vela,—Ceremony performed in the month of Kumbham under the star Puram, the anniversary of the death of Kama or Cupid.
Daivamattam,—Dancing in the disguise of a God.
Tannir Amartu,—Offering of cakes etc., to the God.
Talappoli,—Ceremony of women carrying raw rice and flowers round the temple.
Vaikasi Visakham, and
Mahamakham,—the grand festival of 28 days celebrated once in 12 years when Jupiter enters Cancer.

"Thus in the land created by Sri Parasurama, the Brahmins should all bathe at dawn of day, and live virtuously, performing religious duties, worship and offerings of rice to the elements at the Kshetrams or holy places and Kavus (or lesser temples), and that the sorrow and the sickness which are incidental to mankind might be removed from the people, they were to cause to be performed *Iswara Sevakal* (or worship to God) by—

Homam,—Fire offering.
Dhyanam,—Meditation on the deity.
Bhagavati Seva,—Devotion to the goddess Bhagavati.
Pushpanjali,—Worship with flowers.
Andi-Namaskaram, —Prostration in the evening.
Trikala-Puja,—Worship at dawn, noon and sunset.
Ganapati Homam,—Fire sacrifice to Ganapati.
Mrityun-Japam,—Prayer or invocation in the name of Mrityu (or god of death) to avert accidents.
Munnu Laksha Sahasranamam,—The ceremony of repeating of the 1,000 names of Iswara, three lacs of times.
Brahmana Sahasra Bhojanam,—Distribution of victuals daily to a thousand Brahmins.
Maha-Mrityun Japam,—Prayer to Mrityu"*

After having ordered everything and having satisfied himself of

* Wilson's Mackenzie Collection of Oriental Manuscripts, Page 311.

the working of the various departments, Parasurama committed the Brahmins to the protection of Devendra, so that they should be in equal felicity with the inhabitants of *Devalokam*, and took leave of them, promising to them however that if anything extraordinary should happen and they collectively invoked his aid, he would immediately present himself before them. No sooner was the great hero gone, than the heads of the sixty-four villages wishing to test the promised word wantonly invoked his presence and, to their utter surprise, he presented himself before them and enquired what they wanted of him. But finding that he was invoked for no good reason, and being wroth that the Brahmins should have been so silly, he cursed them and said that they would never again unite in one place. According to tradition, the sixty-four villages have never met together since. Thus was the seed of dissension first sown in Keralam. According to the Puranas, Parasurama is still alive as one of the immortals among the Brahmin sages engaged in *Tapas* or penance on the Himalayas. He is therefore mentioned in the Puranas appearing again and again at different Yugas or epochs.

The Perumals. After the departure of Parasurama, the Brahmins became the virtual rulers of the land. They divided the land into a number of *Desams* (Cantons) and in each they erected a *Kshetram*, consecrated it and placed an image in them and performed *puja* with lamps and with the prescribed rituals. They also established *Adima* (bondage) and *Kudima* (husbandry), protected *Adiyar* (slaves) and *Kudiyar* (husbandmen) and appointed *Tara* and *Taravattukar*. They then established the privileges of their respective stations and continued the custom of Kanam and Jenmam and erected houses for the Brahmins.

They tried different systems of Government. An Oligarchy was tried first. Four villages namely:—Peryanur, Perunchallur, Parappur, and Chengannur were selected to represent the sixty-four villages and they were given authority to act in place of the whole.

The *Keralolpatti* thus describes the political organisation of this oligarchy: *—

"In this manner when sixty-four Gramams and twenty-one Desams were established, the sixty-four Gramams assembled and ordained or fixed that a *Raksha Purusha* should be elected once in three years in order to punish and protect.

"There were also appointed *Nal-kulakams* or four courts or assemblies at Panniur, Paravur, Chenganiur and Parumchellur.

* Wilson's Mackenzie Collection, Page 353.

"In order to appoint, if these Kulakams agree or concur in the election, it is sufficient; so they settled...

"Besides the said four Kulakams that were established, were four *Verna Kulakams* or assemblies of the representatives of the four castes.

1. Irungn'yani-Koda is the Brahmana Kulakam.
2. Muly-kolam is the Kshetriya Kulakam.
3. Paravur is the Vaisya Kulakam.
4. Ayerani-Kolam is the Sudra Kulakam.

"In this manner there are four Verna-kulakams or assemblies or courts representing the four castes.

"Besides the four *Avaroda Kulakams* or electing assemblies at Parumchellur, Panniur, Chenganiur and Paravur, the Gramams (or villages) of Irungn'yani-koda, Muly-kolam, Paravur, and Ayerani-kolam, determined, in order that nothing might obstruct or interrupt the daily business on that account each of the said four Gramams should have a house in the village of Kodangallur which was the seat of Government. From the village of Paravur, from the houses of Yalam Taroti, and Cadambanad; from these two houses they should keep one man in the *Nitya Tuly* (or chief house or palace) who should be *Tala'yadri* and rule.

"From the village of Ayerani-kolam, from the houses of Caringumpalli and of Churuvulli, among these two they should keep one man in the *Kil Tuly* (or lesser palace) who should be a *Kil-Tala'yadri* (inferior ruler) and rule. ... ...

"In the village of Irungn'yani-koda from the houses of Muddil or of Kodamangalam from these two houses, they should keep one man in the *Maittaly* (or superior palace) who should be Tala'yadri and rule; but no married man was to be appointed to the said situation; and only old men or boys on condition of remaining unmarried might be appointed till their death.

"The sixty-four Gramams assembled thus ordered that the four Talayadrimars should act unanimous and protect and punish.

"Among the sixty-four Gramams, ten and a half villages * having taken the *Samayam* (or oath) and accepted weapons in order to protect the *Vritti* (rites), therefore the said ten and a half villages are denominated *Kulakatil-ullavar* (കുലകത്തിലുള്ളവർ) (or belonging to the Kulakam)."

While the armed Brahmins were ruling the land, it is said disputes arose and injustice ensued. So the Brahmins assembled and appointed a 'Protector' from each of the four villages selected, to hold office for three years and assign to each Protector one-sixth of all the land for the support of himself and his staff. This institution too did not work well and the people were oppressed by the Protectors, who sought to make the most of their opportunities during their short terms of office. So the Brahmins assembled at Tirunavoyy, resolved to appoint a king and empowered the four selected villages to choose a 'King'. Their first choice fell on

* These were :—

1. Paravur, 2. Muly-kolam, 3. Ayerani-kolam, 4. Wuleyanar, 5. Chenganad, 6. Tuluvanad, 7. Adavur, 8. Irangu'yani-koda, 9. Allatur, 10. Yettumanur and the half Chemmundi Gramom—thus making 10½.

"Keya Perumal" of Keyapuram in the country east of the Ghauts. He was brought to Keralam and installed as the first of the 'Perumals' in the year of Kali Era, *Bhuman bhupoyam prapya*, corresponding to A. D. 216. The dates in *Keralolpatti* and other old books are sometimes given in some such phrases generally appropriate in meaning and easy catchwords to be remembered, and which accurately represent in letters the number of the years or days of the Yuga referred to. The Hindu chronologist will read the phrase *Bhuman bhupoyam prapya* thus :—4/Bhu 5/man 4/bhu 1/po 1/yam 2/pra 1/pya, which figure when read from the right to the left gives 1,211,454 days, or divided by 365 days per year, 3,317 years of the Kali Era. Today is 5006 Kali Era. Hence according to the chronogram, the installation of the first Perumal was in A. D. 216.

It was arranged that he should rule for twelve years. The Brahmins also made an agreement with the king thus appointed, to take an oath to the following effect :— "Do that which is beyond our power to do and protect; when complaints happen to arise, we will settle them ar ourselves; you are not to question us on that point. For formality's s you may ask why we deal with affairs ourselves after making you a At this day even when complaints arise, the king says :— "Why deal with them? Why did you not make your complaint This is on account of the original oath. They also assigned la king and poured water and granted that land, which is cal and was the Royal demesne; some estates they granted to hir to the Brahmins themselves and some ... benefices of ten joyed in Keralam.

After the Keya Perumal who ruled only eight years an... nths, came the Chola and Pandya Perumals. Then comes in a tradition of the king Bhutaraya Pandy Perumal, between whom and the Brahmins there arose a bitter enmity. He was supposed to be guarded by tw spirits and the Brahmins not being able to compass his destructio, one of them, it is said, assassinated him by first winning over the services of the guardian spirits. From the Brahmin thus polluted by murder the Nambidi caste arose. There is another version which says that the Perumal thus assassinated was Chola Perumal. The *Mahatmyam* says that the Pandyas invaded Kerala with an army of Bhutathans (spirits) and that Parasurama addressed the Bhutarajan angrily thus :—"Your arrival at my country is in vain. I have given it over to King Aditya Varma." Mr. Logan, the author of the *Malabar Manual*, says that this seems to refer to the Chola king of this name who

according to present knowledge overran a large part of South India about 494 A. D. The Bhuta army was defeated and the boundary of Kerala was fixed at Bhutapandi, where Parasurama is said to have accosted the invaders. This village of Bhutapandi lies in the extreme south of Travancore.

To prevent the king from becoming despotic, he was subordinated to the authority of the heads of four villages of Ernakulam, Irinjalacode, Mushikakode and Parur. About this time, the northern thirty-two gramams seceded from the southern group and under the orders of the king, the southern gramams were re-arranged. The northern group living north of the Perumpuzha river formed the Tulu Nambis.

Some time after, for what reasons and under what circumstances it is not stated, the Nambudiris brought a new king, Bana Perumal, from Banapuram in the east and installed him at Kodungalur (Cranganore). During his reign the Mahomedan missionaries came to his kingdom and ained to him the doctrines of the *Bauddha-Sastram* and were able to ade him that it was the true faith. It is said the Perumal himself nverted. The Brahmins being much perplexed at this went to where they remained for some time. Then by the grace of shi called Jangama came there to whom they declared The Maharishi taught them the form of purification o place lamps after sunset and to make *Pradakshi-* o worship, dressed in the *Tarru* and the *Mel-* ...g the *Muruvu-dulu*, a kind of ...em the principal hymn in the *Sama Veda*, adams; when in this manner they daily prayed, ...n Paradesam, who were given an opportunity to discuss with the Mahomedan missionaries. It is said that these scholars were so successful in their disputations that, according to the terms agreed upon, the tongues of the discomfited Mahomedans were cut off and they were banished from the country. The apostate Perumal who was called Pallibana Perumal was set aside and was granted a separate estate to live in; and another Perumal being appointed in his place after a reign of four years, it is said, he (Bana Perumal) went to Mecca. This Perumal was most probably a convert to Buddhism, not Mahomedanism, as the vernacular word *Bauddha-matam* may mean either Mahomedanism or Buddhism. The conversion here referred to must have been to Buddhism.

"The ... Perumal was Kulasekhara Perumal from the Pandya country. He built his palace in the Mushika province, introduced Kshatriya families, and

organised the country, it is said, into small chieftainships to protect it against the Mappilas. He is also credited with having introduced the study of sciences into the Malayali country, for the Malayali Brahmins were, it is said, ignorant of sciences up to this time.....Kulasekhara Perumal reigned for eighteen years and went to heaven with his body *in the Purudismasragata* year of the Kaliyuga, or in A. D. 333, so it is said." *

This Kulasekhara Perumal was probably the king of Kerala, who lived in the Eraniel Palace in South Travancore, where exists a local tradition that he went *Kuttodu Swargam*, i. e., to heaven with his mortal coil. A royal bedroom with daily *Puja* and lights burning before a stone cot in the Eraniel Palace attest this fact to this day. The sovereigns of Travancore are to this day known as Kulasekhara Perumals. The Bhagavati temple at Tiruvanchikulam is said to have come into existence in the same year. This Kulasekhara, it is also said, is the "Kulasekhara Alwar", one of the Vaishnava Saints, who is said to have composed a portion of the *Nalayira Prabandham* or *Tiruvoy-mozhi* in Tamil and the celebrated *Mukunda Mala* in praise of God Padmanabha in Sanskrit.

After the reign of this Kulasekhara Perumal, the Brahmins again organised themselves into an arms-bearing guild in order to protect the country. In 428 A. D. they sent a deputation to Anagunte Krishna Rayar† requesting him to send them a king for twelve years. But this new king was suffered to reign for thirty-six years and the Brahmins were so pleased with his rule that they wished to have a race of good Kshatriyas from him. Another Kshatriya, a woman, was sent for, and her two sons were given the kingdoms of Mushika and Tulu. About this time three women, one Kshatriya and two Sudras, were stranded in a boat off Mount Deli. The Perumal took them all to wife. This tradition relates undoubtedly to the northern Kolattiri family, the most ancient seat of this family having been at this particular king's house under Mount Deli. The *Keralolpatti* relates a matrimonial alliance having been formed between a prince of Kolattiri and a lady of the Zamorin's house.

Mr. Logan observes:—

"The more powerful the family of the lady was, the more likelihood there was of the provision for leading to the founding of a dynasty and to its semi-independence of the main-parent stock. It is not at all improbable therefore that the northern Kolattiris are descended from a matrimonial alliance between the last of the Kerala Perumals and a lady of the stock of the great southern feudatory,

* The Malabar Manual, Vol. I. Page 230.

† This reference to Krishna Raya, a king of the Vijayanagar dynasty who flourished 1508-1530 A. D., is clearly an anachronism; it is accounts like this that tend to greatly mar the otherwise valuable historical truths contained in traditions.

the Travancore (South Kolattiri) Rajas. The two families have always observed pollution, when deaths occurred in their respective houses, and as a matter of fact the southern family would have ceased to exist long ago but for the adoption of heirs on several occasions from the northern family".*

After this king (Krishna Rayar's Viceroy) had reigned for thirty-six years, the country was invaded by Krishna Rayar himself or according to another account by a Pandya king. The last of such Perumals divided his kingdom among his friends and relatives.

Such is the account given by the *Keralolpatti*,—a treatise, the statements in which however should be taken *cum grano salis*, for it is only, after all, a collection of the best available materials known to the people of Malabar more than a century ago. It is not a document therefore which could be subjected to a severe critical scrutiny. The main incidents may however be relied upon.

We find there were twenty-five Perumals in all, who ruled for two hundred and twelve years, i. e., from 216 A. D. to 428 A. D. During this period, the country was ruled at short intervals by Viceroys from the Chera, Pandya and Chola kingdoms, appointed by turns by whichever power was most influential at the time of the appointment. The first and last Perumals bear one common name, Cheraman Perumal, though they are also specifically known as Cheraman Keralan and Bhaskara Ravi Varma. According to other accounts, Cheraman Perumal was more a title than a name, and was applied to all the Perumals alike.

No clear indentification of the Perumals or of their dates seems to be possible. The Perumals are spoken of in certain places as viceroys and in others as independent kings. Shungoonny Menon, the historian of Travancore, makes the two sets of Perumals co-exist. He says that Vira Kerala Varma, who was crowned in 311 A. D., as the first Emperor of Keralam, closed his earthly career during the viceroyalty of Cheraman Perumal. According to the *Keralolpatti*, Keya Perumal began to rule in 21 A. D., and the last Perumal died in 428 A. D. Thus in the middle of the so-called Perumal period (216—428 A. D.), comes this "Emperor of Keralam" who performed *Tulapurushadanam* and *Hiranyagarbham* and obtained the title of Kulasekhara Perumal. If there were two Perumals all along, it is not clear whose viceroys were the superior Perumals and whose the inferior Perumals. Mr. Logan does not believe in the two sets of Perumals.

* The Malabar Manual, Vol. I. Page 235.

Mr. Logan assuming that the Perumal period lasted till 825 A. D., makes a Cheraman Perumal (the last) a Mahomedan, and gives the inscription on his tomb in Arabia where he is said to have died while returning from Mecca. In support of this statement he writes:—"It is a noteworthy circumstance in this connection that even now-a-days that Travancore Maharajas on receiving the sword at their coronations have still to declare:—"I will keep this sword until the uncle who has gone to Mecca returns". This statement, founded as it is on Mateer's *Native life in Travancore*, is clearly incorrect. The Travancore Maharajahs have never made any such declaration at their coronations, when they received the sword of State from God Sri Padmanabha. The Valia Koil Tampuran (M. R. Ry. Kerala Varma Avl., C. S. I.) writing to His Highness the present Maharajah some years ago received the following reply dated 10th April 1891:—"I do not know where Mr. Logan got this information; but no such declaration as mentioned in the *Malabar Manual* was made by me when I received the State Sword at Sri Padmanabha Swamy's Pagoda. I have not heard of any such declaration having been made by former Maharajahs."

Mr. K. P. Padmanabha Menon in a recent article in the *Malabar Quarterly Review*, denies the statement that the last of the Cheraman Perumals became a convert to Islam or undertook a pilgrimage to Mecca, but believes that he lived and died a devout Hindu. The legend is evidently the result of the mixing up of the early Buddhistic conversion of Bana, one of the Perumals, and of the much later Mahomedan conversion of one of the Zamorin Rajahs of Calicut, who claimed to have derived his authority from the last Perumal. The Hindu account simply states that Cheraman Perumal after the distribution of the Empire among his friends, vassals and dependants, went to Mecca on a pilgrimage and died there a Mahomedan saint. The Mahomedan account embodied in the *Keralolpatti* narrates that after the distribution of his kingdom, the Perumal secretly embarked on board a Moorish vessel from Cranganore, and cleverly eluding his pursuers landed at Sahar Mukhal in the Arabian coast, that he had an interview with the Prophet then in his 57th year, and was ordained by him under the name of *Thia-uj-uddien*—'the crown of the faith', that he married Regiat the sister of the Arabian king and after having lived happily for five years, undertook a journey to Malabar for the spread of Islam, but died of ague at Sahar Mukhal where his remains were interred in a mosque he had himself erected. The history of Zeiruddeen Mukkadom, an Arab Egyptian and a subject of the Turkish Empire of the 15th Century, says that certain dervishes from Arabia on

their way from Adam's Peak in Ceylon touched at Cranganore and imparted to the Emperor the then recent miracle of Mahomed having divided the moon, that the Emperor was so affected by that instance of supernatural power and captivated by the fervid representations of those enthusiasts that he abandoned all, for the sake of proceeding with them to Arabia to have an opportunity of conversing with the Prophet, that the latter dignified him with the title of Sultan or *Tauje ul Herid* and that after sojourning with the Prophet for some time and addressing recommendatory letters to the Chiefs of Malabar in favour of his Mussalman brethren, he died on his way to his own land on the first day of the 5th year of the Hejira (16th July 622 A. D.). *

Sheikh Zinuddin, the author of the *Tahafat-ul-Mujahidin*, says that there is but little truth in the account of the Perumal's conversion to Islam. The Arab merchant, Suliman (851 A. D.), "who wrote with knowledge as he evidently visited the countries he wrote about", says expressly that in Malabar he did not know any one of either nation (Chinese or Indian) that had embraced Mahomedanism or spoken Arabic. None of the early travellers or geographers whether Mahomedan, Christian or Jew have left us any record or the legend. Abdur Razzak who was sent in 1442 A. D. by the Shah of Persia failed in his mission of converting the Zamorin. He too does not mention the legend at all. Mr. Logan says:—"At Zaphar in the Arabian Coast lies buried Abdul Rahiman Samuri, a king of Malabar. The inscription on his tombstone says that he arrived at the place in 212 A. H. and there died 216 A. H. (828 A. D.)". This statement is founded upon news given by an Arab merchant and Mr. Logan seems to believe that this may be the last Cheraman Perumal. As Mr. Padmanabha Menon observes, "it is not correct to accept the unverified statement of an irresponsible Arab merchant to prove the existence of the Perumal's tomb and the alleged inscription on it". The Mahomedan historian Ferishta has no doubt as to the Malabar king who embraced Islamism and says that a Zamorin turned Mahomedan and undertook a pilgrimage to Mecca. The Zamorins have frequently been confounded with the Perumals. Other accounts go to show that the Perumal turned a Buddhist, a Jaina or Saivite. Shungoonny Menon says:—"The last Cheraman Perumal closed his worldly career at Tiruvanchikulam; the traditional account is that he disappeared suddenly from his residence". In the 'Vellanai Sargam', *Periya Puranam*,

* Asiatic Researches, Vol. V Art. 1. But in the Madras journal of Literature and Science, O. S. No. 20 Page 35, it is stated that Zeinuddeen Makhadum denounces the story of the pilgrimage to Mecca as unfounded.

e last of the legends refers to the mysterious disappearance of a Chera ince from the Capital. It is stated that the Saiva saint Sundarar arted from the earth, ascended the celestial elephant which waited n him and started on his travels to the abode of the celestials, without taking leave of his Royal friend. Tha latter unable to bear the ration mounted on his steed and uttered a mantra in its ears, which led it to ascend in the air and overtake the Paradisiacal pachyderm. minister and generals beholding the miraculous scene shook off their l coils and followed the king. *

cording to one account, Cheraman Perumal had three wives and had nd nephews seventeen in number, and is said to have handed over ge of Travancore to his eldest son by his third wife, one Vira Kerala who was installed as king in Kali year 3412 ‡ or 311 A. D., and er places up to Gokarnam to his other sons and nephews. This Vira Kerala Varma had an only sister, whose sons succeeded to the musnud of Travancore after him. Vira Kerala Varma was the first sovereign of Travancore who celebrated the *Tulapurushadanam* ceremony or the weighing against gold, which gold was subsequently distributed among Brahmins. Pachu Muthatha, another writer on Travancore, says that the kingdom of Travancore was established under the auspices of Cheraman Perumal, which kingdom was bounded on the north by Edawa, east by the Pannivoykal and on the south and west by sea. But evidence exists to show that Travancore was under a ruling Prince at the time of the advent of the Perumals and that Cheraman Perumal was the name of the Viceroy sent out to Keralam or South Chera by the King of Chera himself. It will be found from the *Keralolpatti* that the Travancore and Kolathunad dynasties were in existence during the rule of these Cheramans and that they had recognised them. The ancient copper-plate grants to the Christians and Jews, which were made by three of the Cheraman Perumals, including the last Perumal, Bhaskara Ravi Varma, show that the Perumals considered the King of Travancore the first sovereign in Keralam so much so that he was mentioned as the first power to witness their deeds. One of them, Stanu Ravi Gupta, even goes the length of saying that the deed was executed with the sanction of the Travancore king. One of these deeds was executed in Kali 3331, corresponding to A. D. 230, i. e., fourteen years after the commencement of the Perumal period. Hence the statement regarding the division of Kerala by the last Perumal is without foundation. As Dr. Gundert remarks:—

* Prof. Sundaram Pillay in the Indian Antiquary for May 1897.

‡ The chronogram gives *Rajya bhogam* which is transliterated into Kali year 3412.

"That whole part of the Keralolpatti in which the present dynasties of M
yalam are represented as dating their origin from the last Perumal's distribu
of the country is fully disproved by this and the Jewish document; and the
tion of the Kerala Mahatmyam, according to which several families were p
here and there by Parasurama for the purpose of protecting certain temple
Brahmin villages, comes much nearer the truth if we understand by Paras
the old time of Brahminical rule."

From the conflicting accounts of Cheraman Perumals and sekhara Perumals appearing simultaneously in all the authorities ancient history of Kerala, one fact may be certainly inferred viz the Kulasekhara Perumals, whose modern representatives the T core Maharajahs are, did not owe their kingdom to the last Ch Perumal who died in 428 A. D., and who is said to have par his kingdom among his sons, nephews and dependants. The of evidence goes to prove that the Kulasekhara Perumals wh the southern portion of Kerala existed, if not from the first day installation of the first Cheraman Perumal, at any rate as soon rule of the Cheraman Perumals was established in Keralam. The Kulasekhara Perumals rose to such importance during the Perumal period in Malabar that they were asked to attest documents and grants made by the Cheramans themselves, and on one occasion the Cheraman Perumal of the day was invited as a guest to witness the *Hiranyagarbham* and *Tulapurushadanam* ceremonies of one of the Kulasekhara Perumals in South Kerala. It is quite possible that in the never-ending wars of those days between neighbouring powers, Chera, Chola and Pandya Kings might have by turns appointed Viceroys of their own to rule over the different divisions of Chera, one of whom might have stuck to the southernmost portion, called differently at different times, by the names of Mushika-Khandom, Kupa-Khandom, Venad, Tiruppapur, Tiru-adidesam or Tiruvitancode, at first as an ally or tributary of the senior Cheraman Perumal—titular emperor of the whole of Chera—but subsequently as an independent ruler himself. This is the history of the whole of India during the time of the early Hindu kings or under the Moghul Empire. The history of every district in Southern India bears testimony to a similar state of affairs. The Nawab of Tinnevelly was nominally the agent of the Nawab of Arcot, who was himself ruling the Carnatic in the name of the Delhi Padisha; but beyond a mere name there was nothing in the relationship showing real obedience to a graded or central Imperial authority. The Nawab of Tinnevelly himself coexisted with scores of independent Poligars all over the District, collecting their own taxes, building their own forts, levying and drilling their own

troops of war, their chief recreation consisting in the plundering of innocent ryots all over the country or molesting their neighbouring Poligars. The same story was repeated throughout all the States under the Great Moghul. In fact never before in the history of India has there been one dominion for the whole of the Indian continent from the Himalayas to the Cape, guided by one policy, owing allegiance to one sovereign-power and animated by one feeling of patriotism to a common country, as has been seen since the consolidation of the British power in India a hundred years ago. "It is the power of the British sword," as has been well observed, "which secures to the people of India the great blessings of peace and order which were unknown through many weary centuries of turmoil, bloodshed and pillage before the advent of the Briton in India" Neither according to tradition nor in recorded history has such a phenomenon been known before. The ancient epics of India often speak of the kings of fifty-six *Rajyams* * (States) having been invited for the *Swayamvara* marriages of Kshatriya ladies or to witness the great sacrifices such as the *Rajasuyam* or the *Aswamedha-yagam* of Yudhishtira. These fifty-six rulers evidently were the Rajahs of note in those days; but to my mind there must have been at the time at least two thousand Princes ‡ throughout the Indian continent more or less independent of each other and ruling over small States aggregating in the main the area embraced by the British Indian Empire of today. In this wise, the existence of a race of Kulasekhara Perumals in independent sway over South Kerala may be taken as an undoubted historical fact.

The antiquity of Keralam. Keralam was known to the Aryans from very ancient days. The age of Kerala is difficult to determine, but that it is as old as any of the Puranic kingdoms referred to in t Indian epics is undoubtedly established. After Rama and Sugr monkey king) became friends, the latter sent his emissaries in quest

* These 56 Kingdoms were:—

1. Cashmira. 2. Nepala. 3. Kosala. 4. Cambeja. 5. Panchala. 6. Sinhala. 7. Anga. 8. Kalinga. 9. Kamarupa. 10. Saurira. 11. Kuroo. 12. Bhoja. 13. Videha. 14. Valmika. 15. Kekaya. 16. Vanga. 17. Saurashtra. 18. Punnadhra. 19. Parpara. 20. Kulanthu. 21. Sutasoma. 22. Dangana. 23. Martha. 24. Saindhava. 25. Parashara. 26. Pandhava. 27. Saliva. 28. Kudoka. 29. Nishadha. 30. Thoorka. 31. Durga. 32. Marda. 33. Poundra. 34. Magaiha. 35. Chedi. 36. Maharashtra. 37. Gandhara. 38. Karnataka. 39. Dravida. 40. Kukkada. 41. Lata. 42. Malava. 43. Mayura. 44. Dasarna. 45. Ottiya. 46. Bachu. 47. Yavana. 48. Bazuvano. 49. Konkana. 50. Kashyya. 51. Dangana. 52. Latcha. 53. Chola. 54. Pandya. 55. Chera. 56. Kerala

‡ Mr. M. M. Kunte in his admirable Essay on 'The vicissitudes of Aryan civilization in India' remarks, "The general tendency of the Kshatriyas was to develop into princes, whose right to the throne was hereditary. But a prince might own only a castle, some land for pasturage, a number of cattle, and some followers, and might rule over a few miles only. Every Kshatriya was a Raja".

of Sita, Rama's lost queen, to search all over India and Ceylon. Keralam or Chera, as it was then called, was one of the kingdoms included in that search. Sugriva commanded his messengers, says Valmiki,

"Seek and search the southern regions, rock and ravine, wood and tree.

... ...

Search the empire of the Andhras, of the sister nations three,
Cholas, Cheras and the Pandyas dwelling by the southern sea." †

Again Mahendragiri, a lofty peak in the extreme south of Travancore Ghauts is referred to in the Ramayana as the point of the mountain from which Hanuman jumped over to Lanka. The Ramayana is estimated by scholars to be about 3,000 years old, but the exploits of Rama were surely of an earlier date. In popular estimation they are several thousand years older. In the Mahabharata too, which Purana is said to be an earlier * composition than the Ramayana, mention is made of Balarama's (Balabhadrarama or Rama of the plough) tours to the sacred shrines of Cape Comorin and Janardanam (modern Varkala), both situated in modern Travancore. The ruler of Kerala was one of the kings conquered by Sahadeva long before the eighteen days' war of the *Bharata-yudham*; the Mahabharata also refers to the inhabitants of Kerala as "forest-dwellers". In the *Harivamsa*, a section of the Mahabharata, mention is made of the Cholas and Keralas. Another episode related in the Mahabharata is that of Vishaya and Chandrahasa, son of a Kerala king and ruler of Kuntala which is situated in the furthest extremity of the Deccan, in the country where camphor is collected. Again in the fourth book of Kalidasa's *Raghuvamsa* (a book quite as old as the Christian Era), [illegible] made to a conquering tour by Raghu, remote ancestor of [illegible] to have passed from Oudh down the eastern coast to [illegible] the Pandyas and then returned north by Keralam and the [illegible] coast. Keralam is also mentioned in the Vayu, the Matsya and the Markandeya Puranas and in the Bhagavata, the Padma and the Skanda Puranas. Some of the remarkable vegetable and animal productions of the Malabar Coast have been known to the western nations even at so early a period as the time of Solomon (1000 B. C.). In the Old Testament we find the following:—"For the king had at sea a navy of Tarshish bringing gold and silver, ivory and apes and peacocks"; with the exception perhaps of silver, these were all productions of the Malabar Coast and the biblical name for peacock, *tuki*, is evidently the Tamil-Malayalam, *tokai*, the bird of the tail. Again Herodotus mentions that the Red

† Ramayana—R. C. Dutt.

* The common belief is that the Mahabharata is later than the Ramayana, but the opinion of Oriental scholars is otherwise—and that is the one relied upon in the text.

Sea trade in frankincense, myrrh and cinnamon and cassia (the two latter being Malabar products) was in the hands of the Egyptians and the Phœnicians.

Kerala was also known to Katyayana (1st half of the 4th century B. C.) and Patanjali (150 B. C.), though Panini (beginning of the 7th † century B. C.) does not mention it. The second and the thirteenth edicts of Asoka, which were promulgated in the 3rd century B. C., refer to the realms of Keralaputra. Strabo in 20 A. D. gives an account of an embassy sent by the Pandyan ruler probably from the west coast, to the Emperor Augustus. There is no doubt of the fact that Roman gold poured largely into the country at this time. In the coin collection of the Maharajah's palace at Trivandrum, three are 9 Aurei of Augustus' coinage, 28 of Tiberius, 2 of Caligula, 16 of Claudius, and 16 of Nero. Bishop Caldwell writes:—

"The earliest Roman coins found in India are those of the Emperor Augustus. A large number of Roman Imperial *aurei* (gold coins) were found some years ago on the Malabar coast; upwards of thirty types of which, commencing with the earlier coins of Augustus and including some of Nero, were described by me in a paper printed at Trivandrum in 1851 by the Maharaja of Travancore, to whom the coins belonged." *

Pliny (1st century A. D.) refers to the ruler of Kerala as Calabothros, and mentions Muziris (identified by Dr. Caldwell with Cranganore) as his capital. Ptolemy and the author of Periplus also refer to Kerabothros; Periplus refers to the land of Kerobothros as Limurike, and Ptolemy (2nd century A. D.) mentions Karoura as the capital of Limurike, which Dr. Caldwell shows to represent the Tamil-Malayalam country. They also mention a district called Paralia on the west coast of India, which Professor Wilson takes to be probably a wrong rendering of Keralia. Burnell and Yule agree in identifying Paralia with Purali, the old name for Travancore, from which the Travancore kings have got the title *Puralisa* i. e., the lord of Purali. Again towards the end of the 4th century A. D., Kerala is referred to in the famous Gupta inscription on the Allâhabad Lat of Asoka, where Samudragupta is mentioned as capturing and reducing Mantara, King of Kerala. Varaha Mihira, the great Hindu astronomer (who lived about the year 550 A. D.) notices in his *Brihatsamhita* both the country and the people by the names of Kerala and Kairalakas, and mentions Baladevapattanam and Marichipattanam as important towns in Kerala. Kern, Varaha Mihira's translator, identifies these places with

† This is according to Prof. Goldstucker. But Professors Bohtling, Weber and Eggeling assign to Panini the 4th century B. C.

* History of Tinnevelly. Page 22.

the Baliapattana and the Muziris of Ptolemy and other Greek geographers respectively. It is shown from the inscriptions and copper-plate documents of the Western Chalukya dynasty that almost for five hundred years after this, the Chalukyan kings made temporary conquests of Kerala. In the Mahakuta inscription of Mangalesa (567 to 610 A. D.), we are told of the victories of his predecessor Kirti Varma I (489 to 567 A. D.) over the kings of Kerala, Mushaka †&c., which Mushaka is identified by Professor Monier Williams with that part of the Malabar coast lying between Quilon and Cape Comorin. Again Pulakesi II (610-631 A. D.), after conquering Kanchipura, invaded the country of the Cholas, the Pandyas and the Keralas and defeated them. Vinayaditya, grandson of Pulakesi in the 11th and 14th years of his reign, (692—695 A. D), completely subjugated the Keralas in the South. § Vinayaditya's grandson, Vikramaditya II (whose reign according to Dr. Burnell began in A. D. 733), claims to have fought with the Cholas, the Pandyas and the Keralas, and reduced them. By the grant dated 758 A. D. of Kirti Varma II, son of Vikramaditya, we see that he resided at a place called Jayamambha situated on the shore of the southern ocean, after "withering up Pandya, Chola, Kerala, Kalinga and other kings ¶."

A certain king called Govinda VI of the Rashtrakuta dynasty claims to have conquered the Keralas. He reigned about A. D. 803 to 814-15*. Again Bilhana in his *Vikrama Deva Charitam* says, that Vikrama, who reigned between 1008 and 1018 A. D., first marched against the Keralas and conquered them.

Early European and Mahomedan travellers give also accounts of Keralam and its people.

The Phœnicians visited the coast of Malabar in 1000 B. C. in quest of ivory, sandalwood and spices.

The Greek ambassador Megasthenes in his account of ancient India refers to the Nayars of Malabar and the kingdom of Chera. He also speaks of the fact that female sovereigns ruled the southern people.

Eratosthenes, who lived in the 3rd century B. C., is the first foreign writer who mentions Cape Comorin.

St. Thomas one of the Apostles came to preach the Gospel in Malabar in 52 A. D.

† Indian Antiquary, Vol. XIX. Page 7.
§ Ibid Vol. VII. Page 209.
¶ Ibid Vol. VII. Page 23.
* Ibid Vol. II. Page 6h.

Kona Thoma (Thomas Cana) a missionary, is said to have visited the coast in 345 A. D.

Zera Jabus, the Nestorian Patriarch who died in 660 A. D., speaks of Quilon and in 824 A. D., two Nestorian Persians settled in Quilon with a large following.

Omitting details of accounts on the later history of Travancore of which due mention will be made in the next section of this chapter, these references will, I think, suffice to show an almost unbroken chain of authorities proving the antiquity of Kerala.

As regards native chronology, said to be so proverbially inaccurate, it need only be stated that local traditions of the oldest portion of Chera Mandala or South Travancore make the Dravidian dynasty of that country coeval with the origin of the world. Tradition apart, according to Rev. William Taylor, the nearest conjecture that can be formed regarding the age of Parasurama is that he lived some time within the thousandth year after the flood. He thinks that there must have been a great retiring of the mass of waters from the Northern Hemisphere during the period within 500 to 1,000 years after the flood, and a similar retiring of waters must have taken place at the same time in the west coast also, the low lands of which had evidently been raised from beneath the sea-level by subterranean forces. †

The Sanskrit Puranic writers and the Ceylon Buddhists and the local traditions of the west coast, all indicate in different ways a great disturbance on the point of the Peninsula and Ceylon within recent times. The date of Noah's deluge has been given by English theologians as 2348 B. C., and that given by Ceylon Buddhists to the latest submergence in the region of Ceylon is 2387 B. C. The two results could not have been hit at by mutual knowledge. So according to Rev. Taylor, the latest date of Parasurama's reclamation of Kerala will be about 4,200 years ago. Even this of course is too recent a date in the estimation of orthodox Hindu tradition.

Hindu scholars incline to the belief that the Vedic Aryans must have had a wonderful era of peace and security from foreign aggression for about 5,000 * years before the invasion of India by Alexander of Macedon. This gives a period of about 7,600 years to the first Aryan colonisation in the north-west of India. It appears to me that western scholars often

† Translations of Historical Manuscripts, Vol II. Page 65.
* Address by Mr. M. Rangacharya M. A. on 'Indian Loyalty.'

err in their calculations about Hindu dates, relying solely on copper-plate grants and stone-inscriptions, as if the peopling of a kingdom or a continent went only *pari passu* with such symbols of later civilisation as copper-plates or stone-inscriptions. If we note the marvellous progress in the colonisation of America since its discovery by Columbus in 1492 A. D., which period of about 400 years is only a speck of time according to all known calculations of Hindu chronologists, and if we also note how quickly population has pressed and squeezed itself within the last half a century into all available nooks and corners of India in the mad desire to possess land, making one fear that one's grand-children may scarcely have elbow-room to stand upon, it is not a bold statement to make that within a thousand years after the first Aryan set his foot in the Punjab, the whole continent from the Himalayas to the Cape must have been more or less peopled. The fact has nothing to do with the dates when the oldest Indian Epics were written or when the feats of Rama and Krishna recorded therein took place. I would therefore give Kerala an age of about 6,500 † years at least—an inference which should incline one to a greater belief in the oral traditions extant than in the learned deductions of scholars.

Concluding remarks. It is not at present possible to say how much of the foregoing narrative may be relied upon as perfectly authentic. The following facts however are generally accepted.

The land of Kerala was within historic period reclaimed from the sea; probably the upheaval was due to volcanic action. The *Keralolpatti* mentions the quaking and shaking of the land and the quaking is said to have been stopped by Parasurama's divine powers. Apart from the legend that surrounds the great Brahmin hero, Parasurama was undoubtedly the leader of the earliest Aryan colony into South West India.

He created a separate military caste from among his Brahmin colonists and ordained them to rule his new land; when they found they could not, he helped them to secure one or two Kshatriya rulers from the other coast. The necessity for division of labour, which all authorities agree was the main basis of the caste distinctions in India, thus showed itself in ancient Kerala as it did more clearly in later times. There was evidently good authority for Parasurama's Brahmins receiving instruction

† The age of Kerala herein fixed is, if at all, far below the mark, for a Nambudiri friend of mine 76 years old and a well-known Adhyan of Vaikam Taluq in North Travancore tells me that his Illam has stood there for about 2,000 years. They had originally settled near Guruvayur before they came to Vaikam and he cannot say how long they were there. Thus it is clear that the peopling of Kerala could not have been on this side of 6,500 years.

in the arts of war and bearing arms, "if we only remember the fact that both Viswamitra and Jamadagni were Vedic Rishis; and they bore arms and composed hymns, when Kshatriyas and Brahmins, as such, were unknown." As Mr. R. C. Dutt observes, a great historical truth underlies the story of Parasurama killing whole families of Kshatriyas, thus confirming the spirit of rivalry which seems to have existed from times of yore between the priestly and the warrior classes, the first indications of which are observable even in the Upanishads."

After Parasurama, the Brahmin colonists tried several devices at government. At first a form of republic among themselves was adopted, then an oligarchy, then a rule of elected Protectors chosen from four of the premier villages, then a series of foreign princes known as Cheraman Perumals brought to rule over them for cycles of twelve years; and then a permanent ruler was made of the last Cheraman Perumal so brought, before whose time, however, had already come into existence the race of *Kulasekhara* Perumals in Travancore.

The Aryan invaders from the north-west of India had by this time advanced considerably into the interior parts of the Peninsula, migrating into distant Kerala also where they had mingled with the first Dravidian inhabitants of the east coast. But these Dravidians themselves had already come under the influence of the serpent-worshippers of the north.

Then came the Jaina and the Buddhistic waves of evangelisation, that have left lasting traces all over South India. There are Buddhistic temples in Travancore, now converted into Hindu places of worship, Buddhism itself having been entirely absorbed by the Brahmins into their own faith. At a much earlier date the Brahmins had peopled Keralam and acquired sovereign powers there, as they did in all the other places of the continent they had passed through.

Next came the gigantic Saivite movement propagated by the Tamil saints and latterly by Sri Sankaracharya himself. Lastly came the early Christians and the followers of Mahomet. These successive waves of religious colonisation probably account for the different versions given of the conversion of one of the Cheraman Perumals, for every proselytising religion was responsible then, as now, not only for the *quantity* of its conversions but for the *quality* as well of its converts—by which standard was often judged the value of the work done by its propagandists. But

* Ancient India, Vol. I. Page 212.

Hinduism is still the dominant faith in Travancore, in spite of its being the only mass material in the country for the promulgators of the different religious persuasions to work upon.

The law of nepotism, the system of hierarchy well defined, the perfect cleanliness of the places of worship and the rigidity of the caste-scruples observed in them, the peculiar institution of marriage allowing considerable freedom to both parties in the choice and change of partners, the superior educational status of the women, the scrupulous neatness and attention paid to all matters of personal hygiene by the true Malayali population, the proud Jenmi-tenure of the Brahmins, the living in isolated homesteads with extensive premises round them, respect to elders and to authority more formally expressed, less loquaciousness as a race, the front tuft, the wearing of the cloth and the nature of the cloth itself both among men and women, the altered language and scores of different *Acharams*, are all landmarks still distinguishing the colonists of Parasurama from the inhabitants of the old country beyond the Ghauts.