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THE MADRAS GEOGRAPHICAL ASSOCIATION,

Gopalapuram,

Cathedral P.O.,

Madras.

THE MADRAS GEOGRAPHICAL ASSOCIATION, MADRAS.

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The Journal of The Madras Geographical Association

Vol. 11

July, 1936

No. 2.

Proceedings of the Sixth Conference of the Madras Geographical Association, Salem Session May 1936.

The Sixth Conference of the Madras Geographical Association was held in the Salem College on the 7th, 8th and 9th May 1936 under the presidency of Mr. B. Rama Rao, M.A., D.I.C., F.G.S., Director of Geology in Mysore.

The opening session of the Conference commenced at 4 P.M. on Thursday the 7th May 1936 at the spacious assembly hall, before a large gathering of members and visitors. Mr. C. R. Viraraghavacharya, Chairman of the Reception Committee welcomed the delegates and visitors to the Conference with an address (printed below). Mr. B. Rama Rao the President-Elect was then formally proposed as President by Prof. V. Rangacharya (Madras); and the proposition was seconded by Mr. Rao Saheb C. M. Ramachandra Chettiar (Coimbatore) and supported by Mr. T. S. Sundaram Iyer (Ambasamudram). After he was installed in the chair, the President delivered his address (printed separately below). After the Presidential Address was over, Mr. N. Subrahmanyam, the Secretary of the Association made a statement regarding its working during the past ten years of its existence, referring to the Summer Schools and Refresher Courses held, excursions conducted, original studies and researches made, the Journal published as its organ, etc. He then appealed for the co-operation of all concerned for the success of the Conference and of the Association. Prof. V. Rangacharya then read a paper on "Salem as the Home of Early Man," after which the Conference rose for the day.

The Second Session began at 4 P.M., on Friday the 8th May, when the following papers were read and discussed:—

- (i) The Salem Magnesite Industry by Mr. H. R. Robinson;

Welcome Address.

By

MR. C. R. VIRARAGHAVACHARYA,
Chairman of the Reception Committee

LADIES AND GENTLEMEN,

By the grace of the Almighty, we, the citizens of this historic place, have this day the rare opportunity of extending our sincere and most cordial welcome to you all, who have come from different and distant educational centres of this Presidency at the heavy sacrifice of your time and energy, especially at this time of the year, when you hope to enjoy rest and recoup your health by resorting to some comfortable sanatorium of your own choice. We take special pride and pleasure in according our whole-hearted reception to so many gentlemen earnestly and actively interested in the advancement of the cause of education.

Indeed, we are fully aware of our defects and drawbacks on account of our meagre means and poor arrangements to meet adequately even the ordinary and essential needs for your comfortable stay here. But you will be immensely pleased to learn that we are second to none in our earnestness and enthusiasm and in our utmost endeavour to give you our very respected friends all the amenities that will serve to make your stay here a happy and cherished memory.

You have—I am conscious of it—very responsible work before you demanding your careful attention and profound study. It is not an ordinary meeting of a routine nature, but it is one of paramount importance in that it has drawn together men of high culture, varied experience, and great influence. And it is an assemblage of gentlemen who are so proficient and so authoritative that their expert knowledge will serve well in arriving at solid resolutions commanding the fullest respect from all quarters. Are we not therefore entitled to lay claim to a special pride, and say it is our good fortune to meet so many eminent scholars in this city of ours?

We are truly grateful to you, and we know it well that you do not mind our short-comings. On the other hand you are reverently looking up to that high and noble cause. I mean the just

purpose of proper education and the right programme for its dissemination among the masses.

It is needless to point out that scientific education is the pride of modern days. The pinnacle of its glory is visible all round. I do not now propose to discuss it. No doubt it is for us all to make the best use of it; and each one of us should eagerly look forward to the times when it will be the only order of the day. But alas! I for one weep over the misuse of the products of scientific inventions for all the miserable havoc perpetrated nowadays under the masquerade of civilization. Still our respect for scientific education is very great, and our admiration for the many-sided activities in the exploration of the virtues imbedded in, and inborn of Nature is ever more increasing.

From day to day are we not progressing in our researches in Physics, Chemistry, Astronomy, and in one and all the departments of human knowledge? It is my belief that we are getting nearer and nearer to Divinity through the medium of science.

You will not be surprised when I proceed to assert that History and Geography have enabled men to learn a great deal about this world of ours. The one is the handmaid of the other. I say emphatically that more importance has to be attached by one and all of us to the Study of Geography in our Schools than at present and that, without it, the study of History or for that matter, of any other subject becomes next to useless. The other day our Director of Public Instruction, Mr. R. M. Statham, in his address at the opening of the Summer School of Geography in the Teachers' College, said that he was sorry to find that even graduates lacked in their powers of observation and general knowledge, because they did not learn Geography in the real sense, and to the full extent they ought to.

It is really deplorable that I have noted in my experience as the Manager of a High School in intimate touch with the progress of the pupils that some of them, even in the higher forms, blundered when they were asked to state where London is, and where Calcutta is; and so on and so forth; and I am aware of quite a large number of such illustrations. Well, last year I went through the Examiners' Report on the S. S. L. C. Examination, and I found therein very amusing specimen howlers. Every one of you connected with the High Schools should have shuddered to go through those answers. The managements, therefore, are bound to make special arrangements for the teaching of geography. General

knowledge can never be satisfactory unless a pupil makes a thorough study of the natural features of every country in this world. To-day you read the news about the Ethiopian War. Unless you know the country in all its geographical aspects you cannot in the least make anything out of those news. The knowledge of Geography helps the belligerents to carry on this warfare—one to defend and the other to invade.

From times of yore Geography was being taught in one way or other. Travel by sea and by land has enabled man to record his achievements for the guidance of others. Travel and excursions are the best methods for widening our knowledge of Geography. Mr. R. M. Statham in his recent address, which I have already alluded to, said that if he had travelled as a Diploma-holder in Geography after a course of training in the Summer School of Geography he could have come back with a far better knowledge of the countries he travelled through.

And to you, the members of the Geographical Association, I am proud of telling that you have a lovely and useful time to spend here. This district, it will interest you to learn, originally formed part of what was known in History as the Baramahal of the old Mysore Province. In the year 1792 peace was concluded with Tippu Sultan, and this district being transferred to the Company was then put under the charge of a Captain Read. The 16th March of that year, the date of the treaty, was fixed as the date from which the revenues of the transferred district should be collected by the British Government. All the overland traffic between Malabar and the Eastern Coast once found its way only through Salem. On account of its manufactures as well as from its natural position, Salem has been considered an important town.

Our district is bounded on the South and West by the Cauvery; Mysore is the boundary on the North; and the Eastern limit is marked out by three ranges of mountains—the Jawadi Malai, the Kalrayans and the Kolli Malai. The tract thus enclosed may be roughly stated to have an area of about 8,000 square miles and some portion of this large area, covered by Tiruppathur Taluk, has been taken over to the Vellore District.

The agricultural products are very varied, extending to 20 different kinds. Special mention has to be made of mangoes, which are the most delicious of their kind, and are being exported even to foreign countries. Our Salem District is, in a way, rich in mineral resources. The Chalk Downs which are about five miles

to the north-west of this town abound in magnesite ores, i.e., the carbonate of magnesium. The Salem Magnesite Syndicate purify the ores got from the quarries and export them. When hydro-electric power from Mettur is available, there will then be a wider field for this valuable industry when metallurgical operations will be carried on in Salem itself. The supply of hydro-electric power is very likely to start another industry for the extraction of iron from the iron ores. These ores abound in and around the Siddar Hills which is some 9 miles to the west of this town, and have been declared to be rich in mineral contents.

Our city is on the banks of the Thirumanimuthar, long, long ago famous for the natural production of pearls which are, even now, preserved as heirlooms in some families here.

Our city is very much noted for its textile and weaving industry. Cloths and sarees of very exquisite patterns are manufactured here catering almost to all tastes and vagaries of fashion. Our city enjoys the rare distinction of having a Zamindar of high reputation and of noble lineage, who takes a keen interest in all great and good causes for the common welfare. I may at once say that he is no other than Mr. G. F. F. Foulkes, the Chairman of the Reception Committee of this 27th Provincial Educational Conference. Our City is proud of its Co-operative Banks, and may fairly claim to take a high rank among the foremost cities of India because we do not lag behind any others in our progressive organizations for social, political and economic advancement. The cause of Education especially has had its due recognition in this city of ours. Our district owns 6 Board High Schools and 3 Board incomplete schools besides a private Middle school at Paramathi Velur. Our City alone has 4 High Schools and a Second Grade Municipal College, the distinguishing feature being that no other municipality in the Presidency maintains a college.

I may make mention here of a few of the interesting places in this District. You have at a distance of about 5 miles from this place the Shevaroy Hills the peak of which is at a height of 5,000 ft. above sea-level. Yercaud, the chief place in the Shevaroy, stands at an altitude of nearly 4,500 ft. and can be easily got at by motor bus by a lovely and serpentine *ghaut* road of 14 miles' length. At this time of the year our Yercaud gives shelter and relief to both Europeans and Indians who are in quest of a pleasant retreat. All lovers of nature agree that the charm of the natural scenery and of the shady byeways fringed by lovely hedges

in and around Yercaud, can well compare with that afforded by the finest landscape of the English country-side.

About 25 miles from here you have got the famous seat of Agastya Maharishi—I mean the Kolli Hills, and on the way you have several other spots worth seeing. The water you drink now comes from the lake near Panamarathupatti village nearly 7 miles from here. The lake is surrounded by hills on three sides and on the fourth an artificial embankment has been raised. The rain water flooding down the hill-slope is perennially stored up in the lakes. The purified water is made available at Salem on the simple hydrostatic principle of water flowing from a higher to a lower level. This water supply scheme is maintained by our Municipality at a very heavy cost, and you will be glad to know that we have also been assured of drinking-water from the Cauvery at Mettur where a huge Dam has recently been built up. It is this Dam which to-day stands as the proudest demonstration of Engineering skill, and which attracts the curiosity of innumerable travellers from all parts of India. This wonderful feat of human skill has been achieved at a cost of nearly five crores of rupees. The place can be reached both by bus and by train on a payment of a few annas. I can assure you that your stay there will be very pleasant. Mr. H. F. Saunders when he came there a few months back to preside on the occasion of the Silver Jubilee of the Government Training School, exclaimed expressing his great wonder at the sight of the colossal dam and appreciated the marvellous performance of its engineers. He went on to say that the pupils and teachers, and as for the matter of that every one who visits the place, have much to learn from the dam about regularity, discipline, systematic methods, prudence and caution. The Dam is there to show how man's hand can regulate and discipline Nature to make her yield her full benefits, and how a huge wastage can be turned into a great boon by the proper use of our skill and intelligence. I have given at the end a comparative statement of figures relating to the various celebrated dams in the world, and you find that of all the dams in the world that at Mettur is the biggest; and it has been given to us, Salemites to be proud of it.

I would also draw your attention to a very beautiful waterfall in our district called the Hogainakal Falls which is a little more than 50 miles from here. It is near Pennagaram in the Dharmapuri Taluk, and is to be reached through a long forest

range. There you find that a huge piece of stone has been split up into two, and through a very narrow crevice the entire bulk of the Cauvery water gushes and falls down a considerable depth in a slender, silvery column upon the rocks below, and produces a cloud of spray which, rising to the top, gives the impression of smoke. Hence the name of "Hogainakal" meaning "smoking rock." Legend has it that precisely at this spot Brahma performed his wonderful "Homa," and there is a beautiful shrine near the spot as well as a choultry.

Our district consists of 9 taluks, namely, Salem, Namakkal, Trichengode, Dharmapuri, Krishnagiri, Harur, Attur, Omalur and Hosur. Of these the last named deserves special mention in that, lying as it does on the extreme north-west near the Mysore border, it was once a Capital. It has got the remnants of a fort and possesses a genial climate. At Sankari and Attur we have the relics of ancient fortresses which go to show the unusual prosperity and wealth of those who built them, and ruled over this part of our country in those olden days. You will certainly wonder to see the skilful workmanship of our ancient sculptors in the temples both at Taramangalam and at Ayodyapatnam, the one 12 miles away from this place and the other nearer still, being only 5 miles away.

Of places of pilgrimage we have not many to boast, but a couple of them I can name have been, from time immemorial, regarded with great deal of sanctity. The two notable places are Trichengode and Namakkal. At Trichengode the deity is curious and remarkable. It is that of Ardhanareeswara who is represented as half-male and half-female. Though apparently it may signify nothing, you will be surprised to note, if you reflect upon it, that the deity symbolizes a profound philosophical notion. The female-part stands for custom, and tradition, and the male-part for originality and the creative tendency. The one mechanically adheres to the beaten track, while the other wanders in quest of new grounds and explores new regions. A co-operation of both these two diametrically opposed principles is essential for carrying on our existence. Indeed we have to stick up to tradition, but we should also proceed on a constructive programme for the improvement of human civilization. This idea was very beautifully explained by Mr. S. V. Ramamoorthi, I.C.S., our District Collector, in his own inimitable language, in his address to the students on the occasion of the anniversary of the Literary and Debating Society of the Gokulanatha Hindu Mahajana High School, Salem.

In conclusion, it is my desire to welcome you all for deliberation over the several aspects of the study of Geography in general and, in these sessions I am confidently looking forward to great success, as we are this time specially fortunate in having the able guidance of so great a scholar as Mr. B. Rama Rau. It is needless for me to say that Mr. N. Subrahmanyam, the life-spring of this Geographical Association has not only sacrificed a great deal for the cause of this movement but also has been wholly responsible for the wonderful work of the Geographical Association. I am proud in no small measure to say that we have to-day these two stalwarts amidst us, and I congratulate myself in having had this unique honour to welcome them and to welcome you all on behalf of the Reception Committee of this Geographical conference.

Name of Dam.	Cost in Lakhs.	Masonry contents. Millions. c. ft.	Water storage capacity. (Millions. c. ft.)	Period of constr.
1. Aswan (Egypt)	367	18.8	37,600	4
2. New Croton (America)	212	23.1	5,120	14
3. Sennar Dam (Africa)	847	14.8	22,560	7
4. Krishnaraja Sagara (Mysore)	250	29.9	43,934	16
5. Nizam's Sagar (Hyderabad)	366	30.1	25,556	7
6. Lloyd Dam (India)	172	21.5	24,198	6
7. Mettur Dam (S. India)	478	54.6	93,500	6

Presidential Address.

Geological History of the Indian Peninsula.

By

MR. B. RAMA RAO, M.A., D.I.C., F.G.S.

LADIES AND GENTLEMEN,

When I received in February last, the Secretary's kind invitation to preside over this function, the Sixth Geographical Conference, I very much hesitated to accept it since being almost an alien to academic activities, I could not presume to have any claim to guide the deliberations of a gathering like yours. But on further reflection I agreed to accept the offer not in the belief that I could, in any way, be a worthy successor to the eminent educationists who have preceded me in this office, but with an idea that occasions like these are the best means of furnishing opportunities to bring together, on a common platform votaries of allied subjects of study, to discuss and understand each other's aims and aspirations in the common pursuit of knowledge. So while thankfully accepting the proffered seat of honour, I request your hearty co-operation in leading this Conference to its successful ending.

STATUS OF GEOGRAPHY AMONG OTHER SCIENCES.

Geography, as its name implies, is the systematic description of this earth in all its various aspects and consequently the task which it (geography) sets to itself is of a very great magnitude. The geographer has to ascertain, record, and compare, the arrangement of things on or in relation to the surface of the earth and interpret values. This cannot be done without an adequate knowledge of other borderland branches of learning and without borrowing material therefrom. How much of this heterogeneous storehouse of information should form the nucleus for imparting instruction to students and how best to do it in their scholastic and collegiate courses of studies are certainly matters for discussion and in some of your previous conferences this aspect of the question seems to have been already ably dealt with. I have no intention of going into these details nor do I like to discuss here the precise position which the teaching of geography should occupy among other sciences as an avenue for mental equipment. To elevate geography to the dignity of a science would have been repugnant to the straitened code of understanding of the older school of educationists. In fact, for a

long time geography had to rest content with a secondary position among other sciences and was tolerated only as an adjunct to some other favoured branches of learning. This, in a large measure, was due to the belief that geography has no independent existence as a definite science; that it is mainly synthetic deriving its data largely from other bordering sciences like geology, meteorology, anthropology, oceanography etc., which it co-ordinates and moulds to serve its own purpose.

I should say that this is an underserved accusation. The mere fact of borrowing material from borderland branches of studies need not deter any science from claiming its own independent status so long as it fulfils a definite function. As Lord Meston has argued elsewhere, "the material which geography indents on is already there for the service of human knowledge generally, just as mathematics is at the service of astronomy, or physics and chemistry at the service of geology. Moreover, there is none of the bordering sciences which is prepared to undertake the tasks which Geography has set for itself. The positive claim of geography is that, while always indenting freely on existing sources of knowledge it is building up for itself, sifting and classifying, a body of knowledge which is found nowhere else and which has a unity of its own and a purpose of its own. This purpose is claimed to raise geography to the dignity of a definite science."

With the present day rapid advancement of sciences, the barriers which separated one branch of learning from another are fast breaking down and disappearing. The results of scientific investigation cannot be shoved into pigeon-holed compartments and a seeker after truth cannot rest content with isolated values. A co-ordination and correlation of results of allied sections of study are necessary to get a true perspective of the sum total of human knowledge. When geography sets to do this necessary task, within its own sphere, there is no justification in cavilling at its efforts or in trying to exclude it from the common fold of natural sciences.

In the British Association for the advancement of science, Geography had to share with Geology a single section at the beginning for some 16 years, from 1835-1851, but in the latter year, Sir Roderic Murchison, one of the great geologists of his time, strongly put forth a plea for an independent section for geography and became himself its first president when it was newly constituted. The Indian Science Congress which is modelled after the British Association, had till very recently no place for geography, but from the last session, I am glad to say it has admitted geography as an adjunct

to the geology section. It was rather disappointing to me, as the President of the newly constituted section, to see that there was no representation of your Association therein. Perhaps it was due to the absence of your enthusiastic Secretary from India, and also in no small measure due to the short notice the members of your Association had regarding the reconstitution of the geology section of the Congress.

From next year onwards, I hope your Association will be well represented in the combined section of Geology and Geography of the Science Congress and I dare say that within the course of a few years your activities therein will so multiply as to claim a separate section for geography alone.

TOPIC OF ADDRESS

In spite of the unrestricted privilege of the President of a Science association to choose his own topic of discourse, I have not been without some dilemma to select a subject suitable to this occasion. Philosophers like Kant have classified the geographic studies into Mathematical, Physical, Political, Commercial, Moral and Theological divisions. Amongst these geology's kinship with geography comes very close only on the physical side which again could be broadly divided into (1) General: dealing with the earth and its constituents, land, water, and air: (2) Special, which deals with particular products of the earth—animals, plants and minerals. To address an audience of geographers, a geologist has naturally to choose some topic either from the one or the other of the two broad divisions of physical geography.

For the last 20 years I have been specially interested in the genetic study of a particular section of the earth's oldest series of rocks, the Archæans. The results of these investigations have already formed the topic of my address to the geology section of the last Science Congress and I did not like to inflict on you an address dealing with highly specialised phases which at the best would interest even among geologists only a limited section.

The best thing which I could do under the circumstances was either to give you in broad outlines the history of the vicissitudes which this land of ours has undergone during past ages before it assumed its present form, or to give you an account of the geographical distribution of our mineral wealth as contained in the several rock formations of the Peninsular India.

The first one perhaps has the smack of a bit of staleness about it in having become a sort of common ground for geologists to ex-

exploit for their popular lectures, and the latter labours under the disadvantage of bordering on too many dry and technical details. Between the two, I should think that the subject of the ancient geography of the Indian Peninsula as inferred from a study of its geological formations is likely to be more interesting and despite the fact that the edge of novelty of this subject might have been somewhat blunted by too many handlings, still I think it is a story worth listening to.

As a compromise, I will supplement it while passing over the several geological epochs, by mentioning the various economic minerals which the several rock formations contain. The subject no doubt would have a geological flavour, but I will try to avoid as far as possible superfluous technical details.

SOME GENERAL PRINCIPLES OF GEOLOGY

For the benefit of those who might not be familiar with the general principles of geology, I should like to say a few words regarding the geologists' conception about the age and origin of the earth, and the way in which they reconstruct the past history of the globe.

There are two diametrically-opposed views on the question of the probable mode of origin of the earth. One school of thought have held to the hypothesis that the earth was formed as a result of gradual cooling of a large gaseous globe, a nebula; the other, a more recent one led by Chamberlain and other American geologists, postulate that it was formed from the continued accretion of colder solid particles or planetisimals. The nebular or Laplacian hypothesis regards that the earth was intensely hot at first and by gradual radiation of heat into space condensed later into liquid with the formation of a peripheral solid crust, and further continual loss of heat resulting in the volume shrinkage of the globe. It is clear that according to this view the earth had from its earliest age an enormous envelope of atmosphere. The planetesimal hypothesis on the other hand, regards that the earth started as a nucleus of meteoric matter without any atmospheric envelope, the occluded gases expelled from the interior escaping into space. But when the planet grew in size, the expelled gases formed later into oceans and atmosphere when the gravitational attraction of the growing planet became sufficiently strong to retain them. The interior heat of the globe is regarded to have been developed as a result of central compression, molecular re-arrangement, bombardment of meteoric matter and such other causes.

In whichever of these ways the earth might have originated there is no doubt about its enormous antiquity. Recent investigations by radio-active methods involving the estimation of uranium-lead ratios, and the uranium-helium ratios, have been disclosing that some of the archæan granitic rocks are as much as 1,500 to 3,000 million years old, and as these are found intruding into a series of pre-existing rock formations evidently the age of the earth must date back still considerably further.

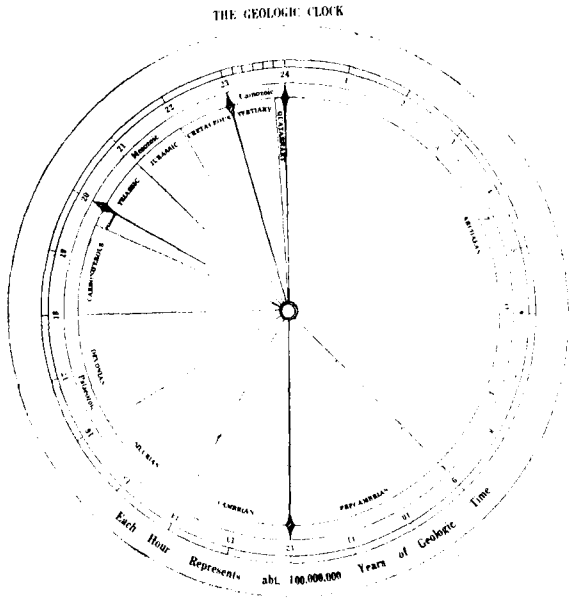
Without troubling ourselves regarding the precise order of evolution of conditions which led to the present formation of the globe with its lithosphere, hydrosphere and atmosphere, we can safely infer that since the time that the constituents of the planet differentiated into solid rocks with fluidal environments, destruction of land masses has set in and the broken debris has been transported and laid down in the adjacent basins of water, layer after layer, like the leaves of a book. It requires but little thought to perceive that in the normal order of superposition of such layers of strata, the lowest formed should naturally be the oldest. But the earth has not been a finished product; and the story of the stone does not end with this single chapter. In every 150 million years or so, it passes through a period of convulsion. Various causes bring about constant changes in the relative levels of land and sea. Portions of land get submerged beneath the sea, and the sea bottom will often be lifted high and dry to form land masses, which again will be worn down to furnish material for a fresh series of sedimentation elsewhere. Such alternate elevations and depressions of land areas beneath the sea will thus be responsible for the formation of sedimentary beds of different periods or ages.

For nearly half the period of its existence the conditions on earth seem to have been unsuited for the support of life. Then we see the gradual incoming of different types of fauna and flora, each playing its part for several generations and disappearing in its time from the stage of this earth's history. Fortunately these ancient denizens of the earth have left their relics in the rocky strata. The geologist has found that a certain order of appearance characterises these organic remains, that each group of rocks is marked by its own special type of life, and that these types can be recognised and recorded and the rocks in which they occur can be correlated as of the same period of formation even though they may be far distant from one another. At one moment he may have to deal with the bones of some large mammal scattered through a deposit of superficial gravel, at another with minute shell or skeletons of foraminifers of

an upraised sea-bottom. Corals and crinoids crowded into a massive limestone, ferns and cycads matted together into a bed of coal where they originally grew, the trails of worms, the footprints of birds and quadrupeds and such other innumerable pieces of evidence enable the geologist to visualise in some measure what the fauna and flora of successive periods have been and the physical conditions under which they flourished. A careful study of this self-written record, though often incomplete and effaced, affords still the clue to the stratigrapher to reconstruct the earth's history during the several stages of its formation. By a comparative study of the arrangement of strata over wide areas, and on the recognition of major breaks in deposition and in the stages of organic evolution, the geologists have classified, for purposes of description, the entire strata of the earth into four major epochs or eras, based on the evolution of life, as noted below :—

Cainozoic or Cenozoic	..	Meaning of the life of Recent period.
Mesozoic	..	Life of the Intermediate period.
Palaeozoic	..	Life of the Old period.
Azoic or Archæozoic	..	Lifeless period or Ancient Life period.

If we conceive of the time taken for the evolution of this globe from the commencement to the present, as a day of 24 hours, it is



believed, that the history of Archæozoic or Azoic period alone has taken away more than 12 hours of the conventional clock, the palæozoic period about 8 hours, the mesozoic period about 3 hours, and the tertiary of about an hour. In the tertiary the recent period from the advent of man forms only the last 10 to 15 minutes of the hour (Pl. 1). The major eras have been divided into a number of systems; and each of these systems has been further sub-divided into formations, stages and so on. The geologists in India following the classification proposed by Sir Thomas Holland, one of the former Directors of the Indian Geological Survey, adopt the following four major groups for their descriptive purposes :

- (1) The Aryan Group ;
- (2) The Dravidian Group ;
- (3) The Purana Group ; and
- (4) The Archæan Group.

Except the Archæan group, the remaining three do not correspond exactly in time-scale to the major eras mentioned before.

The sub-divisions of the four major groups of India are as far as possible correlated with the several chronological systems of rock

Table of Geological Formations		
Era	Periods or Systems in the Standard Scale of Europe	Equivalent Formations of Peninsular India
Cenozoic	Pliocene and Recent	Recent Alluvial Sand dunes, etc. Karnal Lake Deposits. Older Alluvium
	Pliocene	Late Pleistocene
	Miocene	Quaternary Sand Sheet and Quaternary Series
	Oligocene	
	Eocene	
Mesozoic	Chalk	Deccan Trap
	Triassic	Marine formations of Trilobites, High beds, etc.
	Jurassic	Upper Gondwanas, Marne, etc.
	Triassic	Lower Gondwanas
Palaeozoic	Permian	
	Carboniferous	
	Devonian	
	Silurian	
Archæozoic	Ordovician	
	Cambrian	
	Algonkian	
	Archean	

formations of the standard scale of Europe, as shown in the annexed statement (Table 1).

THE ARCHÆAN PERIOD

The geological record of the oldest period of Southern India, in common with that of similar rock formations of the rest of the world, is highly mutilated and its first few pages are hopelessly singed and scorched. Our book of ancient geography of this land opens at the chapter when the earth as a whole was in throes of intense vulcanism. The oldest recognisable rock groups of this period, the Archæan era, constitute a series of highly crumpled schists and gneisses massed into a confused jumble rendering the task of their separation into recognisable stratigraphic units almost impossible. The earlier view, that on the solid basement of granitic gneisses, believed to constitute, at least in parts, the original crust of the primitive globe, the oldest series of sediments, the Dharwar schists, were laid down, is discredited at present. The detailed work of the geological survey of Mysore during the past forty years has clearly shown that the base on which the schistose sediments first formed is unrecognisable and that the various granites which are lying under them are actually of later ages. The available evidences indicate that the Dharwar period opened with a tremendous igneous activity with the outpouring of vast masses of lava flows of varying composition, mainly basic followed by thin sheets of acidic flows. Their cooling and contraction gave rise locally to numerous fissures through which have welled up wall-like masses of acidic dykes. As I have stated above, the nature of the base on which these lavas were poured out has not been recognised till now, and it has been found to be the same case in every other land where the archæan rocks are exposed.

These consolidated volcanic flows with their associated dykes were later subjected to decay and furnished material to the adjacent basins for the deposition of the oldest series of sediments recognisable. The process of this sedimentation was cut out by the lifting up of the floors of the ancient shallow basins as a result of propulsion of a series of granitic rocks from the interior of the primitive earth. The earlier geologists of the Mysore Survey, postulated four different epochs of such intrusions, but recent work indicates only 2 clearly distinguishable periods. Some of the granites of the older epoch of intrusions are found to be the progenitors

of the valuable auriferous lodes of the Dharwar schists, amongst which those of the Kolar Gold Field have already yielded the noble metal to the tune of 18 million ozs. valued at about 79.5 millions of £. As a digression I might tell you that the magnitude of underground work which has been done till now to wrest this metal from the bowels of the earth amounts to some 435 miles in the shape of horizontal levels or galleries. The shafts and winzes sunk at different spots aggregate to about 30½ miles and the deepest part reached is now some 7,700 ft. or nearly a mile-and-a-half below the field datum.

The various granitic intrusions have eaten away the base of the older rocks and resting beneath them give the appearance of a false basement. But evidences are clearly seen at numerous places to indicate that they have disrupted and torn asunder the overlying schists producing such complex changes in their constitution and appearance that it is now no easy task to recognise the several shattered members torn apart from the same band.

The earlier geologists in Mysore believed that after two of such epochs of intrusion of the granitic rocks into the older schists, there was again another series of intrusion of a peculiar type forming a complex series of rocks, which I daresay, many of you are familiar with. These are the well-known charnockites. Recent investigations disclose that instead of being subsequent in age to the main masses of the granitic rocks of Southern India, they are considerably older than such granites and that they might even represent a highly altered phase of the older section of a mixed assemblage of rocks of the Dharwar period.

The older school of Geologists in Mysore doubted the sedimentary origin of the Dharwar schists, but recent investigations have given us sufficient proofs to believe that though the Dharwar Age represents mainly an era of vulcanism, there were certainly intermittent periods of sedimentation; but it is still not definite how many times the land of this ancient Age had been actually submerged beneath the water.

The exact configuration of land and water of this ancient epoch is difficult to ascertain. Probably during this oldest period of the earth's history, deep seas and oceans had not been developed, and land and water formed a sort of network of shallow disconnected basins and gently sloping mounds throughout. At the end of the period, that is to say, with the formation of the huge masses of

granitic rocks of the two separate epochs of intrusion, the whole of Southern India had become one solid land mass.

The relics of these ancient formations are now found preserved as disconnected patches in several parts of India, for instance, in the Dharwar district and the north-western parts of Mysore, and also in the Aravalli region, in the neighbourhood of Champaner in Gujerat, in the Central Provinces and in the neighbourhood of Darjeeling, in the Himalayan region.

In spite of all the recent advances of geological studies, the task of arranging in logical sequence the detached bits of evidences, skilfully extracted from the highly-defaced pages of the history of these ancient rocks, is still left incomplete and uncertain. Therefore a piece of evidence here and a bit of clue there which might occur as the connecting links in the severed chain of events of this ancient era, when freshly discovered give the students of Archæan geology, a greater thrill than what Sherlock Holmes could ever have experienced in hitting on the right trail of the most elusive of his criminal characters.

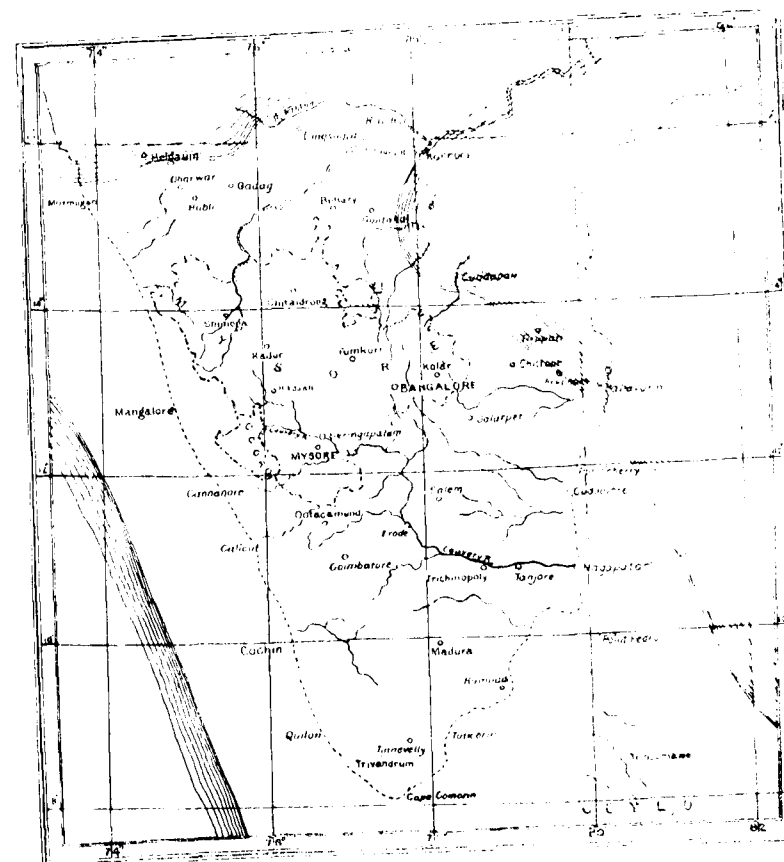
It is not merely in furnishing ample scope for the abstruse disquisitions of the learned few that the interest of this ancient period lies. The various igneous intrusions of this hoary past have been responsible in some way or other for the collection within these ancient rocks of almost all the mineral wealth of India. To mention a few, the gold of Kolar in Mysore; the manganese ores of Central Provinces, Madras, Bombay, Mysore and other parts; the iron ores of Singbhum and Southern India; the chromite deposits of Mysore; the copper ores of Singbhum and the Carnatic; the magnesite deposits of Salem and of Mysore; the graphitic deposits of Travancore; the mica deposits of Bihar and Nellore and the monazite, ilmenite, garnet and zircon sands of Travancore all owe their source to the archæan rocks.

At the closing of the Archæan era there were extensive earth movements which crumpled the Dharwar schists with their associated igneous intrusives into complicated wrinkles resulting in a number of mountain ranges. No such powerful crustal deformation of an equal degree of magnitude has ever occurred since then in the peninsula and from the close of the Dharwar period, the Mysore plateau and all but the marginal fringes of Southern India have remained as a solid mass of land subjected only to sub-aerial decay. The various denuding agencies since then have been gradu-

ally carving the central portion of Southern India into its present physiographic features.

THE CUDDAPAH PERIOD

After a vast interval, extending perhaps over a thousand million years, during which time the mountains and plateaux of the ancient Dharwar land had been cut down to the base level of erosion, a part of the land area was submerged beneath the sea to receive the next succeeding series of sediments of the Cuddapah system. In the ancient Cuddapah sea, the deposition went on undisturbed for



a long time giving rise to an accumulation of sediments of very great thickness, amounting to some 20,000 ft. This huge accumulation of sediments forming a series of parallel strata, is capable of being split up into two stratigraphic groups—a lower and an upper. During the formation of the lower group, the Papaghni series, there were still intermittent stages of igneous activity giving rise to a

number of volcanic flows, and intrusive dykes and sills. The large number of dolerite and dioritic dykes which cut across the Archæan tracts in Mysore and in Southern India are believed to be of this period of vulcanism.

In Southern India, the rock formations of this period are exposed in the Cuddapah and Kurnool districts forming an irregular crescent. The concave part of the crescent faces the coast and the convex part abuts against the granitic gneisses on the west.

The remnants of the upper division of the Cuddapah formations are found scattered widely further north, in other parts of Peninsular India : in the Bijawar, Cheyair and Gwalior areas. There has been considerable indications of volcanic activity in all these series of rocks, and the dykes associated with the basic flows in the Bijawars are believed to have been responsible for the formation of the Indian diamonds.

The conditions of the Cuddapah times seem to have been quite suitable for supporting organic life, but still the whole system of this thick pile of marine sediments has failed to disclose any reliable relics of recognisable organisms.

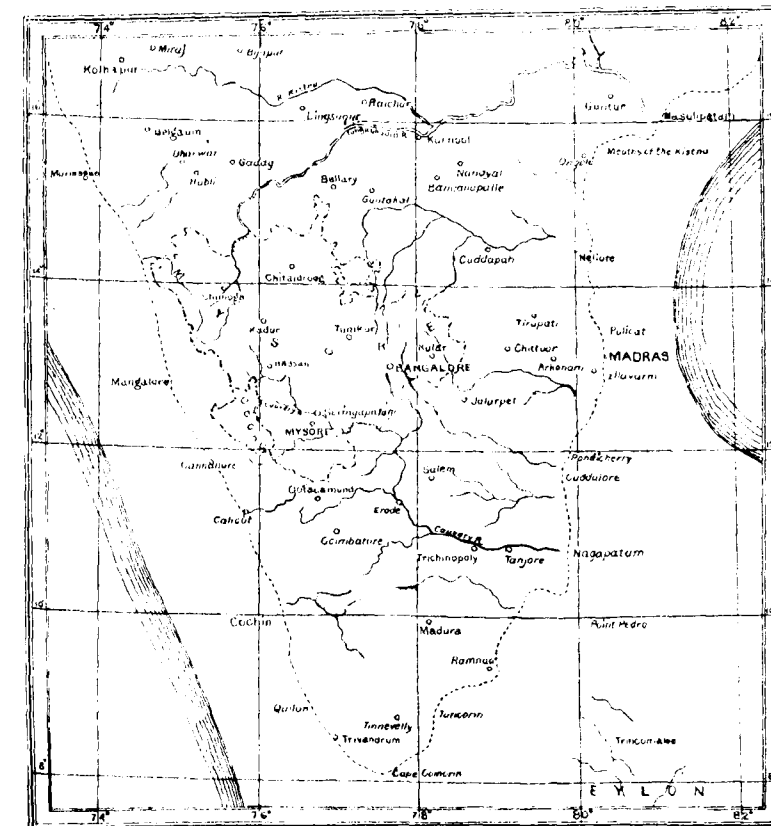
THE KURNUL PERIOD

The Cuddapah sea, retreating from its basin exposed the series of rock formations to atmospheric denudation for a fairly long time after which the partly-denuded land got submerged again, to receive another series of sediments, remnants of which are now exposed in the Kurnul District. Along with the Kurnul rocks, were forming further north in the basin, near Chattisgarh and the Bhima valley, some shales and limestones. These different deposits have been classed as the lower division of the next important rock formations, viz., the Vindhyan. The rock exposures of both the lower and the upper divisions of the Vindhyan system, form the conspicuous series of escarpments of the Vindhyan range in Central India.

The depositions in the Vindhyan basins took place under different conditions. During the early period the Vindhyan sea was fairly deep and got gradually shallower later. After the deposition of the lower Vindhyan sediments, the zone was disturbed by earth movements which elevated the bottom of the shallow sea high and dry above the water. When after a time the land got submerged again to receive the debris of the upper Vindhyan period, the high-

lands which had furnished material for the deposition of earlier sediments had changed entirely.

Towards the close of the period of formation of the Vindhyan sediments, there was again a large-scale upheaval which lifted these deposits to form a continental land area. This has been the last of the serious earth movements recorded in the history of the peninsula ; and since then there has been no other disturbance of a similar nature in this part of India, during the long series of subsequent geological ages. The Peninsula has remained as a solid block or buttress of land unassailed by any movements which convulsed the northern part of India during the later geological periods.



Except for a few obscure traces of indeterminable animal and vegetable life, this vast series of Vindhyan sediments also are again totally devoid of recognisable organic remains. These several unfossiliferous formations till now mentioned, are classed under the Azoic or Archæozoic era which in India, as I have already stated,

has been divided into two groups, viz., the Archæan comprising the Dharwar schists, granites and gneisses and the Purana consisting of the Cuddapahs and the Vindhya. During the whole of this period of about two thousand million years, preceding the great fossiliferous system, the Cambrian which forms the dawn of geological history, the earth must have been a very uninviting place, its entire surface being made up of monotonous, serrated and jagged peaks and buttresses unrelieved by the pleasing contrasts of colours of vegetation. The pre-Cambrian land must have been oppressively silent without any animals to make their peculiar noises.

ABSENCE OF PALÆOZOIC SEDIMENTS IN SOUTHERN INDIA

Subsequent to the formation of the Kurnul series, there is an enormous blank in the geological history of Southern India, extending perhaps over many millions of years, during which interval the great fossiliferous sediments, ranging from Cambrian to Carboniferous were being accumulated in the Extra-Peninsular area and also in other parts of the world. Of these great formations in which the history of the earlier evolutionary record of organisms is preserved, there is no trace in Southern India, which as I have already stated remained unsubmerged beneath the sea through all these ages.

GEO-MORPHIC CHANGES AT THE END OF THE CARBONIFEROUS PERIOD

The end of the Carboniferous period was the precursor of profound changes in the relative distribution of land and sea. The *purana* sea which had receded northwards by various previous earth movements was now mingled with the sea which invading from the west overspread North India, Tibet and a great part of China. At this time Southern India formed part of a great Continental area which extended through Madagascar and South Africa to South America on the one side and through Malay Archipelago to Australia on the other. This old continent called by the geologists the Gondwana land, formed a barrier between a southern ocean and the newly-extended great, Central Eurasian sea (The Tethys) of which the modern Mediterranean forms a shrunken relic.

Denudation had been slowly wearing down the Archæan and the Pre-Cambrian rocks of Southern India during the whole of the

palæozoic era : and the larger rivers had gradually worn their valleys down to their base-level of erosion with the result that their sluggish movements had been developing swamps and marshes.

As a release of tension of the upper-Carboniferous movements a series of parallel fissures or rifts were developed in various parts of the Peninsula. The ground gradually sank along these lines of weakness giving rise to a number of basin-shaped depressions in the older gneissic land. This modified topography determined afresh the drainage areas, and the debris of land decay including the remains of abundant vegetation transported by the larger rivers were discharged into these basins. With the accumulation of sediments, the loaded basins sunk still deeper making room for further deposition. Continued subsidence and sedimentation marched apace resulting in thick deposits of a series of fresh water sediments which now form the Coal measures of India.

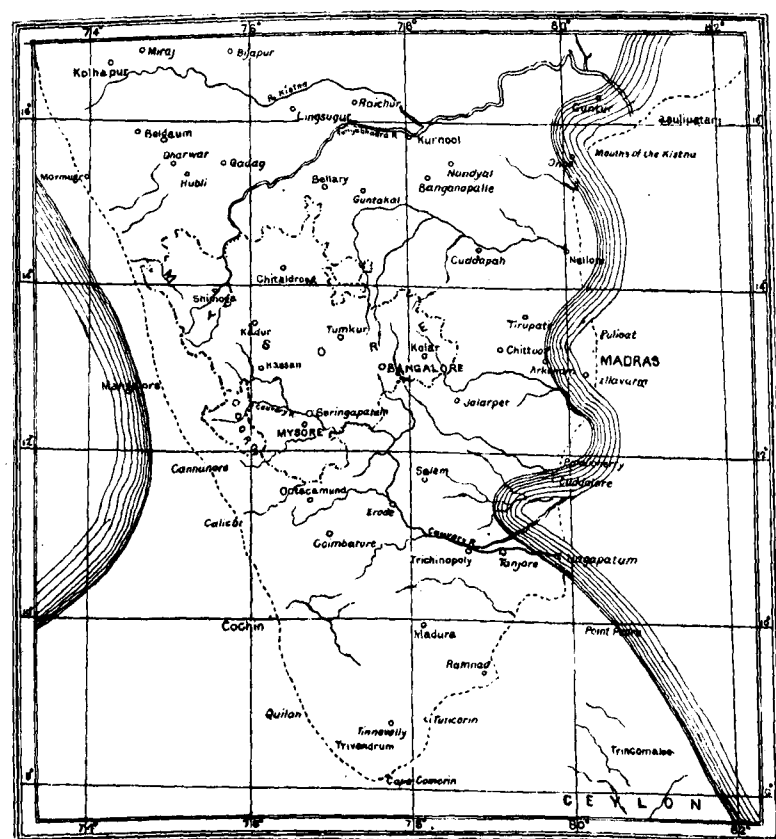
GONDWANA PERIOD

The process of accumulation of these sediments continued for a very long time, possibly for some 150 million years, ranging from the Permo-Carboniferous to the end of Jurassic or to the beginning of the Cretaceous period, and resulted in the formation of a considerable thickness of sediments, known to the Indian Geologists, as Gondwana Formations. They contain nearly all the workable coal seams of India.

Climatic changes : The Gondwana period started with an intense cold, most of the land being covered with a mantle of snow and ice with the formation of glaciers on the tops of the mountain chains. This was succeeded by a much warmer climate which was conducive to an abundant growth of vegetation consisting of not very highly evolved ferns, cycads, conifers and other flowerless plants, the remains of which are found well preserved in the Coal seams of the lower formation. A cold climate seems to have followed again, giving place later to dry and arid climate which was followed subsequently by warm and moist climate when once again the ferns and cycads of an advanced stage of evolution flourished and luxuriously grew on the land.

Distribution. The various exposures of the Gondwana formations are found scattered in a number of isolated basins which follow approximately the linear trend of some of the existing rivers of the Peninsula, i.e., along the valleys of the Damodar, Mahanadi and Godavari.

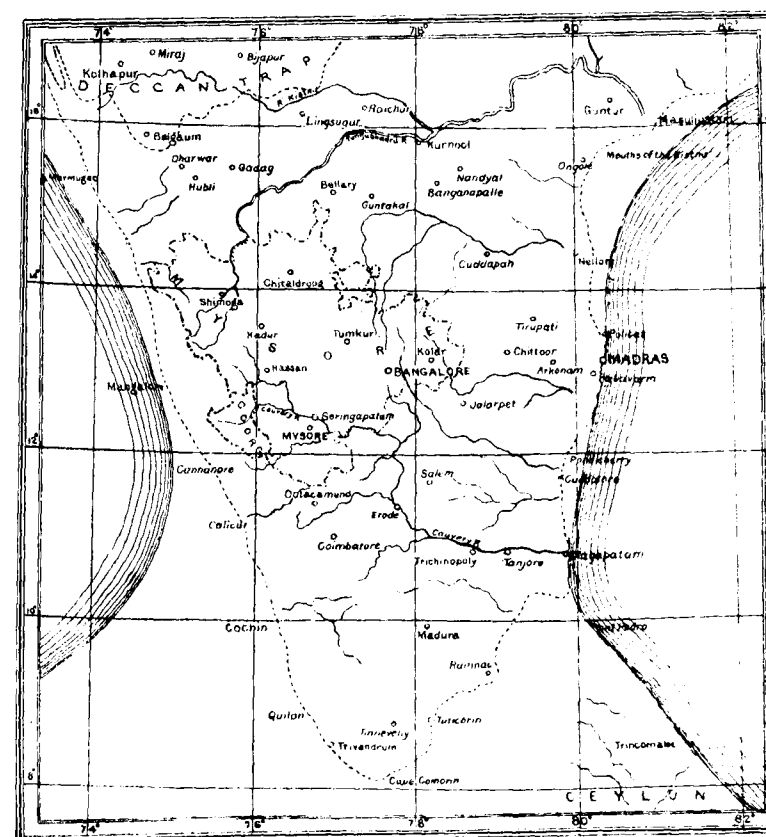
There has been a difference of opinion on the classification of the Gondwana system. Some geologists have classified it into three divisions : Upper, Middle and Lower corresponding in a general way to the Jurassic, Triassic and Permian of Europe. Others recognise only two divisions, an upper and a lower. All the workable and important coal seams are found in the Damuda series of the Lower Gondwanas, while a few are of upper Gondwana age, the Singheri Coalfield of Hyderabad being one such of the latter period.



Gondwana Formations of East Coast : During the upper Gondwana times the southern sea encroached slightly on the Coromandel coast receiving detritus of the adjacent land area including the remains of plants and animals that lived near the shore. The relics of the rock formations of this period are now found as isolated small patches between Vizagapatnam and Tanjore, along a narrow strip between the gneissic country and the coast line. The principal ex-

posures are found near Rajahmundry, Ongole and near Madras at Sriperamatur and Sattiavedu, and further south near Utatur in the Trichinopoly district.

Fauna and Flora : During the Gondwana times, uncouth reptiles with gigantic bodies and ridiculously small heads were roaming on the land amidst forests of huge ferns, cycads and other varieties of flowerless plants, the stronger preying upon the weaker. They were the giants of creation, but still on account of their incapacity to adapt themselves to the surroundings they, in their turn, had to make room for the more agile forms best fitted to survive.



CRETACEOUS PERIOD

During the next succeeding period, the cretaceous or the Chalk formations of Europe, the physical conditions in India were very diversified. The Peninsular area still formed an integral part of the great Gondwana continent. A deep gulf of the Tethys or the

mid-Eurasian sea occupied the present area of Salt range and Sind and at one time it even penetrated into the present valley of Narbada by a narrow inlet.

On the southern side the sea encroached again on the Coromandel coast. This marine transgression or encroachment has left its records in the small but extremely interesting patches of sediments in the Coromandel coast. The rock formations of this period occur as a number of small patches, the most southerly of which in the Trichinopoly district, covering an area of about two to three hundred square miles. This contains very well preserved relics of an abundant fauna of the period, forming in fact a little museum of palaeontology.

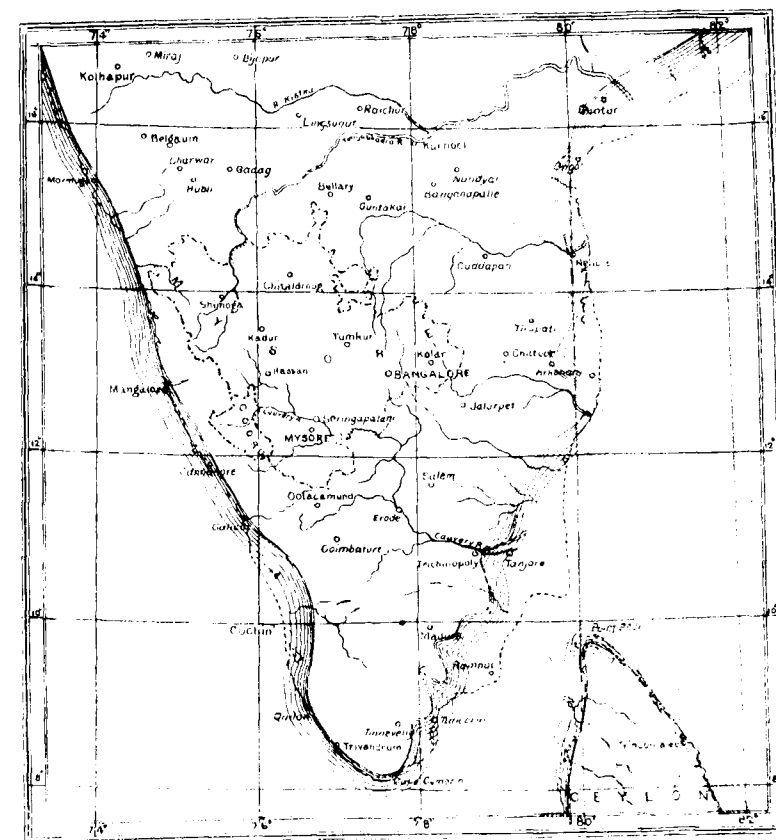
Three or four stages of successive encroachments of the southern sea are noticeable during this cretaceous period. The earliest of such encroachments over the worn-down surface of the archæan gneisses, seems to have given rise to a shallow sea or lagoon the waters of which were clear enough to support colonies of corals whose skeletons have now been turned into the massive limestone found near Utatur. On the top of this limestone were deposited in order, some clays, shales and sandstones, the products of decay of the adjacent land areas.

The periods of these several transgressions correspond in age approximately to the different horizons of the upper cretaceous times, the formation of the Utatur, Trichinopoly and Ariyalur rocks being of Cenomanian period and that of the Niniyur rocks being slightly later corresponding to the Danian period, which represent the different stages in the upper cretaceous of Europe.

In Central India, along the Narbada valley are found a few detached outcrops from Bagh in Gwalior, to Baroda and further west. These also represent the relics of the marine transgression, not of the southern sea, but of the northern Tethys. The fossils contained in these beds bear a closer affinity to the cretaceous fossils of eastern Europe which is far distant, than to those of the cretaceous of Trichinopoly, indicating thereby that these two seas, the Trichinopoly sea and the Bagh sea were separated from each other by a barrier of land, the Gondwana land, which prevented the migration of marine organisms from one sea to the other.

Lametas: Overlying at some places the Bagh beds, and at others resting directly on the crystalline rocks are found in Central

India, Central Provinces, and in many parts of the Deccan, a series of sediments, the Lametas which were formed along the mouths of rivers and estuaries, subsequent to the period of the Bagh formations. Their interest lies in the doubtful mode of origin of some of its constituent members, especially the limestones, to which a sedimentary origin has been denied. However, definite fossils have been found in some beds indicating that there are true sediments in the series.



DECCAN TRAP PERIOD

As a contrast to this peaceful history, the end of the cretaceous witnessed a stupendous outburst of volcanic energy. Towards the very end of the era, the Gondwana land began to break up. Numerous fissures and cracks were formed in the north-western part of the Peninsula through which welled out enormous quantities of liquid lava, intermittently till a thickness of some thousands of feet of horizontally bedded flows accumulated. These immense

masses covered everything beneath them, obliterating all the pre-existed topography of the country. This great volcanic formation covering at present an area of about 200,000 sq. miles is known in Indian Geology, as the Deccan Trap. When originally poured out it must have covered an area of 4 to 5 millions of square miles. It consists of a number of flows, the thickness of each varying from 15 to 50 feet. The aggregate thickness of the Trap formations reaches to about 10,000 feet along the coast of Bombay; but further inland and eastwards at places it dwindles to about 100 to 300 feet. The successive flows are separated by thin partings of ash, scoriæ and other material characteristic of cone eruptions, and also in very many cases by true sedimentary beds.

There has been some doubt regarding the precise age of eruption of the Deccan Traps. A late cretaceous has been generally assigned. Palæo-botanical and other evidences indicate however an early Tertiary age.

THE CAINOZOIC OR TERTIARY ERA

With the close of the Cretaceous we enter into the next, the Tertiary period. Though there has been a pronounced break between the upper limits of the cretaceous and the lower limit of the Eocene in Europe, in India there is not any sharply marked stratigraphic break. With the beginning of the Tertiary, an era of earth movement set in which broke up in the south the Gondwana land, blocks of which sunk beneath the present Arabian sea in the west and also eastwards in the arms of the Indian Ocean. North and south faults developed on the west, along the line of the present Western Ghats, which determined the subsequent western outline of the Indian Peninsula. In the north, these powerful crustal movements started to crumple and lift up the enormous accumulation of sediments formed in the Tethys, to give rise to the magnificent mountain chains which constitute the present Himalayas. The warping of the sea bottom broke up the Tethys into a number of isolated lakes and lagoons. One after another there were three such successive uplifts which raised the Himalayan range to stupendous heights, many times more than what they are at present. As a result of these uplifts the mid-Eurasian sea was entirely driven back from this area to the present boundaries of the Mediterranean. Thus, what was once a sea bottom is now represented by one of the youngest and highest mountain ranges of the world.

In southern India the Tertiary era has not been in any way of striking events. The Tertiary seas have left their mark in the

occurrence of a few insignificant thin outcrops of rock formations amongst which the small outcrop forming the Quilon limestone in Travancore, and the Ratnagiri rocks on the Malabar Coast may be mentioned as those of the middle Tertiary period. On the east coast are found a series of outcrops extending from Vizagapatam to Tinnevely whose principal component is a mottled and variously coloured loose textured sandstone. The rocks of this formation are grouped under the general name the Cuddalore sandstone series and are believed to be of Pliocene or Pleistocene age.

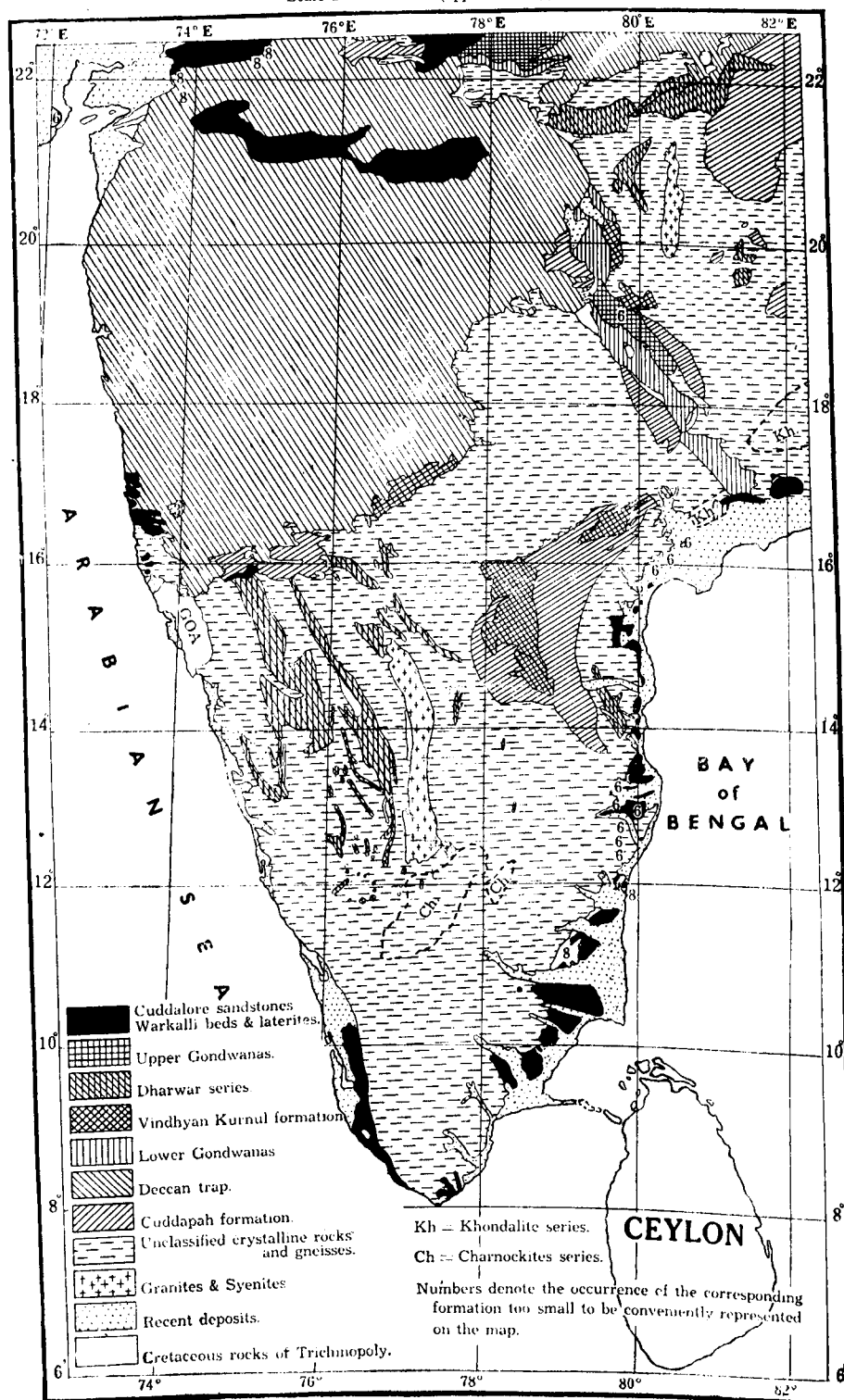
Laterite.—The only other extensive formation which needs a mention here is the laterite which is found all along the west coast and in many other parts of the Peninsula. This is a kind of vesicular clayey rock which is soft enough to be cut easily, but hardens considerably on exposure. It occurs capping the basaltic hills and plateaus of the Deccan, Central India and Central Provinces. It is resting in other places, on the Archaean gneisses, the Dharwar schists and even on the Gondwana clays. The mode of origin of the laterite is still controversial. It was for sometime believed to be an ordinary sedimentary formation deposited either in running water, or lakes; and later views regard it as the sub-aerial decomposition of the rocks *in situ*. Bacterial action has also been evoked in certain stages of the formation of Laterite. It is doubtful if any single theory will actually answer the mode of its formation at different places.

The age of its formation also is uncertain. Its formation may range from early Tertiary (Eocene) to post-Tertiary or Pleistocene.

Few changes of geography have occurred in India since the Pleistocene. The present period seems to be an era of geological repose. The only changes which are perceptible during recent times, are the accumulation of blown sands forming sand dunes on the Malabar coast, in the valleys of the Kristna and the Godavari and other parts; formation of alluvium and soil along the banks of large rivers and coastal strips; the slight subsidences of land beneath the sea as in the eastern part of the Bombay Island; the modification of shore-lines as witnessed by the encroachment of sea at certain places for instance, at San Thome near Madras and at Tranquebar, and its recession at others as at Karkoi in Tinnevely coast; some changes in the course of rivers; the silting up of the Rann of Cutch, a few catastrophic earthquakes producing minor changes in the topography of the regions where they occurred such as those of Cutch in 1819, and the recent ones of Bihar and Quetta, etc. These are all that the geologist has to notice since the advent of man.

GEOLOGICAL MAP OF SOUTH INDIA

Scale 1" = 66 miles (approximately).



PRESIDENTIAL ADDRESS

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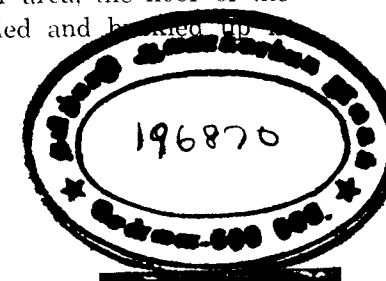
SUMMARY

Recapitulating the main geographical changes which have occurred in the past in the Indian peninsula, you will notice that the records of the earliest stages of the geological history do not clearly indicate the exact delimitations of land and water. With the commencement of the Cuddappah epoch definite indications of the distribution of land and sea are discernible. At that time the main portion of Southern India was dry land, whereas the present Cuddappah and Kurnul districts, the Kaladgi region of the Southern Mahratta country, the Nizam's Dominions and parts of Central Provinces and Chota Nagpur were all beneath water. The exact limits of this sea cannot be defined with any great accuracy. After the final uplift of these non-fossiliferous ancient sediments (Purana formations) the peninsular portion of India was never again submerged beneath the sea except at the coastal fringes, and as such presents an enormous blank extending over many millions of years, in its Geological history. At about the close of the Palaeozoic period, earth movements caused a series of parallel rifts in the Peninsula, along the courses of the major rivers, the Damodar, the Mahanadi, and the Godavari through which the land sank forming deep basins. In these depressions were deposited the debris of land decay and vegetation of the period to form later the coal measures of India. During this period, extending over some 150 million years, there were slight encroachments of the southern sea on the Coromandel Coast which in the main assumed its present outline at the end of the Jurassic times.

But throughout the mesozoic period the western side of the Peninsula formed part of a land mass continuous with South Africa on the south-west, and stretching north-east through the present Gangetic delta and the southern side of the Assam hills with Australia on the south-east. This barrier or bridge of land mass, separated the southern sea from the northern one which extended over the north-western part of India, and the Himalayas. The end of the Cretaceous period witnessed the breaking up of this ancient continental land mass, the Gondwana land, parts of which sank beneath the present Arabian Sea in the west and parts beneath the Bay of Bengal in the east. Simultaneously with this or very early in the next Tertiary period gigantic fissures were formed in the north-west part of the peninsula through which welled out the enormous masses of liquid lava, the remnants of which form the Deccan Traps. In the Extra-peninsular area, the floor of the mid-Eurasian Sea, the Tethys was crumpled and broken up.

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successive stages to form the magnificent mountain chains of the Himalayas, driving back the northern sea to the limits of the present Mediterranean. Concurrent with these earth movements a series of north-and-south parallel faults might have developed along the present Western Ghats, determining the main western outline of the Peninsula which has been modified to its present form by subsequent denuding agencies.

The present easterly trend of the drainage of the Peninsula is believed to be an ancient one probably dating back to the period of these crustal disturbances. It is probable that a big river flowed westwards through the present Palghat gap, but the earth movements which raised the Western Ghats reversed this drainage, diverting it to the east.

Glancing back, we see that while the East Coast of India was mainly formed during the end of the Jurassic period, the West Coast did not take its present shape for a very long time after, till the early part of the Tertiary period.

Ladies and Gentlemen, in an address like this aiming mainly to suit the needs of a lay audience, it is difficult to treat it with a technical precision. But still, I hope that this brief and rapid survey of the ancient geological history of our Peninsula will be sufficient to create in you a desire to go more deeply into the study of the interesting subject from the proper sources.



The Physiography of the Salem District

By

MR. K. S. CHANDRASEKHARAN, B.A. (HONS.) L.T.

The district of Salem is now one of the most important districts in the Presidency of Madras. In recent years it has come into great prominence as it holds the key to the irrigation system of the Cauvery delta. The conception of a dam across the Cauvery at Mettur by Col. Ellis in 1910, and the successful execution of the project quite recently has assured Salem district a permanent and justifiable position of importance.

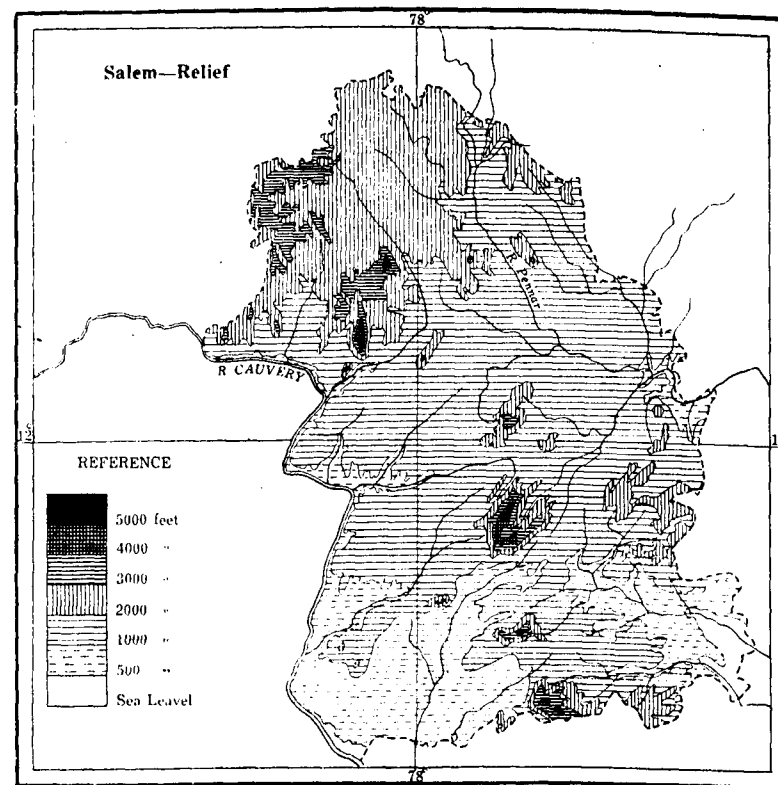
The district has had a very chequered history. It was never an independent political entity. It came under the influence of several kingdoms until about 1652 it came under the sway of the Mysore Kings. With the downfall of Haidar the British annexed portions of it; and during Tippu's reign all parts of the district except Hosur came under the British government. With the fall of Seringapatam and death of Tippu in 1799, Hosur too was absorbed by the English.

In shape the district of Salem is irregular, very roughly resembling a rectangle. On the west the district is bounded by longitude $77^{\circ} 28' 40''$ E. and on the east by $78^{\circ} 50' 40''$ E. On the south it is limited by latitude $11^{\circ} 0' 38''$ N. and on the North by $12^{\circ} 53' 14''$ N. The district is bounded on the north by portions of the Mysore State and North Arcot district, on the east by North and South Arcot districts, on the South by Coimbatore and Trichinopoly districts and on the west by the Coimbatore district and Mysore State.

The district comprises the taluks of Salem, Omalur, Rasipuram, Tiruchengode, Attur and Namakkal, in the south, and Dharmapuri, Harur, Krishnagiri and Hosur in the north. In area it is about 7,500 square miles.

The district may be considered to be a continuation of the Mysore plateau (the highest part of the Deccan) gradually sloping down to the Carnatic plains. The general slope of the country is towards the south and the east. The larger rivers of the district therefore flow south, or east. Hosur in the north-western part of

the district attains a height of over 3000 ft. Krishnagiri in the north central portion slopes from 2000 ft to 1000 ft. Salem descends from a maximum height of about 1200 ft to the plains. Attur is somewhat lower than Salem, while Tiruchengode is still lower. Namakkal on the borderland of Trichinopoly is about 250 ft.



The district falls into three distinct terraces. (1) The Bālāghāt, (2) The Bāramahāl and (3) The Tālāghāt. The Bālāghāt is over 3000 ft. in height above the sea-level and comprises the Hosur taluk. The taluks of Krishnagiri, Dharmapuri, Tirupattur (of the North Arcot district) and Harur are included in the tract of Bāramahāl. Its height varies from 2000 ft. to 1000 ft. The Bāramahāl is separated from the next tract of Tālāghāt by an almost unbroken chain of hills running East-South-East to West-North-West. The taluks of Salem, Attur, Namakkal and Tiruchengode below the Eastern Ghats are included in this tract which descends down to the Carnatic plains to the east and the south. The southern Tālāghāt is characterised by three masses of rock—Namakkal, Tiruchengode, and Sankaridrug. The northern Tālāghāt is studded with numerous hills of varying elevations.

The River Systems. As has been mentioned in a previous paragraph, the main drainage of the district is towards the south and the east due to the natural slope of the ground. The main rivers that drain the district are (1) the Cauvery, (2) the Vellar and (3) the Ponnaiyar (Pennar). These have numerous tributaries that dissect the interior of the district and carry off their drainage.

The Cauvery which rises in the Western Ghats near Mercara in Coorg at an elevation of 4400 ft. flows through the Mysore State and enters the Salem district at the South-western corner of the Hosur taluk. It runs along a deep and rocky bed and is joined by several mountain streams. To the left of the Cauvery here are the Melagiris which are drained by five big basins, the biggest being called the Doddahalla. A few miles downstream, the Cauvery is narrowed down to a few yards by the hills on either side.

This point is called the Mēka datu (=Goat's leap). Twenty miles further down is the waterfall of Hogainakal. A little onwards the Cauvery takes a southerly bend and at this point is joined by the Sanad Kumaranadi draining the South Hosur and Dharmapuri. The Cauvery then changes its course a little and flows due south and south-east until it leaves the district to enter Trichinopoly. The river forms a natural boundary between Salem district and the neighbouring districts of Coimbatore and Trichinopoly. At Mettur where it enters the plains through a gorge, has been built the most gigantic dam in the world, a detailed account of which has been given in the Journal of the Madras Geographical Association, Vol. 9 No. 2, pp. 78—118.

The other noteworthy tributaries of the Cauvery are the Sarabanganadi, Tirumanimuthar, Karuvettar, Thoppur river or Veppadiar and Palai. These drain the taluks of Tiruchengode, Namakkal and Salem. Tirumanimuthar is of particular interest as it rises in the Shevaroys and flows through Salem. The tributaries have in general a southern or south-westerly course. Besides these, there is a number of minor tributaries to the Cauvery which are in floods only during the monsoon: on the banks of the Cauvery lie several villages particularly in the latter half of its course.

The Vellar proper flows mainly in the taluk of Attur and then enters the adjoining eastern district of South Arcot. Between Attur and Salem taluks there is a water-shed, clearly noticeable near Godumalai. Here, two rivers, the Vasishtanadi and the Swetanadi originate and drain two parallel

valleys lying almost due east-to-west between the Kalrayans and the Pachimalai and Kollimalai. They unite outside the Salem district proper to form the true Vellar which is of importance in the irrigation of S. Arcot district. Another river that has its water-shed in the elevated region of the eastern slopes of the Shevaroy's unites with them later on and swells their flow. This is the Mani-Mukthanadi.

The third main river system is situated in the northern half of the district. This is the *Pennaiyar* (Pennar) and its tributaries. The Pennaiyar rises outside the district in the Mysore plateau and enters the district at the north-western corner of the Hosur taluk. It takes a very sinuous course and flows through the taluks of Hosur, Krishnagiri and Harur. It has a general south-eastern trend and receives several tributaries. The most important of them are the Chinnar in Hosur, Markandanadi in Krishnagiri and Vaniyar in Harur; Sandūr, Mattūr and Bargūr rivers as well as the Pambar from the Tirupattur taluk of the North Arcot district also join it. The Vaniyar rises in the north-eastern slopes of the Shevaroy's, and is joined by several mountain streams. It has a general north-easterly course and flows through open country.

It is noteworthy that the various rivers and streams feed a number of tanks some of which are considered to be holy. There are a number of tanks and wells scattered throughout the district and intended for irrigation purposes by storing rainwater.

Orography. There are a number of hills in the district. As mentioned previously, an almost unbroken chain of hills extends from E. S. E. to W. N. W. The spurs extend from N. E. to S. W. The general level of the country in this direction is high especially at the centre. The hills have been given several local names. Bruce-Foote is of opinion that the district has suffered double crushing, once in the E. W. direction and a second time in the N. S. direction approximately; and he recognises seven ranges arising therefrom. A brief account of the important hills in the district is enough for our purpose.

The Shevaroy's are the most important of them. They are situated almost in the centre of the district (between $11^{\circ} 43'N$ & $11^{\circ} 53'N$ latitude approximately and between $78^{\circ} 13'$ & $78^{\circ} 25'E$ longitude). They occupy a total base area of about 150 square miles with the high plateau of Yercaud on the southern portion of the eastern block (about 10 square miles). On the north-west it is continued as the Thoppur hills. The average elevation is 4,500 ft.

the highest point being about 5,410 ft. Owing to its elevation, the Shevaroy's enjoy a mild climate and form a summer resort. Plantations are carried on to a great extent on its slopes.

The Kollimalais are in the south-eastern corner of the district. They cover the south-east and north-east corners of the Rasipuram and Namakkal taluks. They are separated from the Pachai Malais of the Attur taluk by the Turaiyur valley and the pass leading from thence to Thammanpatti and from the Bodamalais by the Ayilpatti Ghat. They measure about 18 miles in a north-to-south direction and 12 miles east-to-west. They rise abruptly from the plains in the south and east, reaching a height of about 4,000 ft. There are several ravines on the northern slopes cut *en echelon* in a N. E. by West direction. The descent to the plains is made by a number of long and gently-sloping spurs. The portion on the Namakkal side appears flat-topped, when viewed from the plains; and hence is called the Saduragiri. As a matter of fact, this is made up of five basin-shaped depressions covered with terraced cultivation. A splendid view of the plains and the hills could be had from the path which leads to the heads of these ravines. The Shevaroy's, the Tennandemalais, and the Kalrayans are seen towering in the north. The highest peak in this area is the Vēttakaramalai (4,663 ft.). In the Namakkal portion the highest point is 4,200 ft. (in Selurnad). There is a famous Siva temple (Arappaleeswaran Koil) at the head of the ravine leading to the Turaiyur valley; and two miles below it is a pretty waterfall called the Akasa Gangai.

The Bōdamalais are in the Rasipuram taluk. They measure about five miles in the north-south direction and eleven miles east to west. The Alwais in the Rasipuram taluk belong to this group; it is also called Siddhamalai.

The Kalroyans are in the eastern border of the district adjoining the boundary of the South Arcot district. They are continued from the south-eastern end of the Shevaroy's in a north-east direction. At their extreme north-eastern end is the holy hill of Thirthamalai, attaining a height of about 3,500 ft. Several peaks are situated on this hill range.

In the north-west of the district is the broad, irregular and lofty range of the Melagiris in southern Hosur. They are in the Bālāghāt tract and attain a height of 4,500 feet at their southern extremity. They are covered with thick jungle producing sandalwood and valuable timber, as at Denkanikota jungle. Numerous streams

that are torrential in the rainy season flow along several gorges carved out between the hills. The Sanad Kumaranadi has cut its way at the south-eastern extremity of the range and flows over a rocky bed, and joins the Cauvery.

Among the several isolated hills in the district may be mentioned the following :—

(1) The Tallamalais, 14 miles south-east of Namakkal. This is a small range of hills, one of the peaks of which rises to 2,785 feet. There is a survey station here.

(2) In the same taluk is the Nainarmalai; it is an isolated rock attaining a height of 2,460 feet.

(3) Kapilamalai 15 miles S.W. of Namakkal and 6 miles west of Paramatti. It is said to be so named on account of the Sage Kapila having lived there according to legend.

(4) Sankaridrug: in the main road from Salem to Bhavani near the town of the same name is a great, white, square mass of rock. The prospect from the plateau of the top of the hill is most pleasing. Its height is about 2,350 ft.

(5) Kanjamalai lies south-west of Salem. Its height is nearly 3,300 ft. It is important on account of the iron ore bands found there. The iron ores of Salem are famous, and are found in several parts of the district. The Kanjamalais have striking serrated ridges which are outlined sharply against the south-western sky. To the east of this can be seen the peaks of the Godumalai rising boldly towards the Attur valley.

(6) The crescent-topped hill of Tiruchengode.

There are four passes leading through the great mountain screen giving access from the Tālāghāt to the Bārāmāhāl plateau. They are the Kottapatti Pass (easternmost) leading to the historic and lovely valley of Chengam and thence to the ancient holy and market centre of Tiruvannamalai; this pass separates the Tennandemalai from the Kalrayans. On either side of the Shevaroy's is a ghat leading to the two great land marks of the Bārāmāhāl country. The trunk road over the eastern or Manjavadi Pass runs to the left of the Chitteri hills and winds round Harur towards the sacred Thirthmalais (3,500 ft.) in the north-east; on the west the railway toiling up the Morū-patti ghat keeps the Vattala-malai to the left and runs past the sharp peak of Mukkanūr (4,000 ft.). The westernmost is the Toppūr Pass. This leads to the rolling downs of Dharmapuri.

The Kottapatti, the Manjavadi, and the Mallapuram Passes are excellent examples of strike valleys in the district.

No attempt has been made to describe the rocks of the district; that topic is dealt with in detail in the paper on the geology of the district. It may be said in passing, however, that the rocks in this district all belong to the ancient Archæan system of gneisses and schists and their associated rock types.

A list of the higher peaks in the district is herewith appended.

List of a few Peaks over 3,000 feet: Kannapadi 3,020'; Nāgu-
ir 4,144'; Sholaikaradu 5,410'; Shevaroy's 5,314'; Prospect Point
,759'; Bear's Hill 4,828'; Pagoda Point 4,507'; Twins Peak 4,858';
Alwaymalai 3,121'; Kanjamalai 3,236'; Bodamalai 3,774'; Cauvery
Peak 5,049'; Sannudrakad 4,457'; Vellaikalmalai 3,625'; Janda-
attimedi 4,015'; Periyamalai 3,216'; Keddimalai 4,018'; Kolli-
malai 4,240'; Gutturayan Hill 4,575'; Mariyalam 3,446'; Thirtha-
malai 3,500'.

The Geology of Salem District

By

MR. P. SRIDHARA RAO, M.A., L.T.,

The geological structure of Salem district is a very simple one. A very large part is made up of rocks of the Archæan system of South India mostly metamorphic gneisses and a part eruptive rocks, and the remaining part of the district is covered by the alluvia of the different rivers. The Archæan rocks can be divided into four groups: (1) older gneisses, (2) thinly foliated schists, (3) the Charnockites and (4) eruptives and dykes cutting through the older rocks.

The older gneisses constitute the bottom rocks of the country, no older formation having been discovered. It consists of various members differing in the degree of contortion and in mineral composition. They are prominent in the hills of the eastern part of the district, while they underlie and are cut into by igneous rocks which form the hill masses in the western and northern parts of the District. The old biotite gneisses have the composition of granite rocks, but no direct evidence as to the nature of their origin can be had. They are regarded as the members of the older division of the Archæan gneisses. As they underlie all other rocks of the Presidency, they are also known as the fundamental complex. In the complexity of their structure, these rocks resemble the Archæan rocks of other regions of the world. The gneiss shows well-developed foliation in the Nagaramalai north-west of Salem, and in many places near and west of the Namakkal Road. The general direction of foliation is east-north-east to west-south-west; but it varies in some places to east-west, always dipping northwards at very high angles. These rocks are not quite fresh, the evident crushing being accompanied by the formation of epidote in distinct crystals and the development of other secondary minerals such as *sphene*, and *muscovite*. Quantitatively the quartz, felspar and ferromagnesian constituents are generally in the same proportion as in granites. Inter-growth of different kinds of felspar is common. The relationship which these gneisses bear to the Charnockites clearly show that the former are older in age. One of the more important rock varieties of these gneisses are beds of magnetic iron ore which are dispersed over almost the whole district. Many of the iron ore

beds fall into five major groups, and a few single beds are not referable to any of the groups. The five groups are:—

1. The Kanjamalai group,
2. The Godumalai group,
3. The Singipatti group,
4. The Thalaimalai-Kollimalai group; and
5. The Tirtamalai group.

1. *The Kanjamalai group* is named after the hill of that name 6 miles to the west-south-west of Salem. Latitude $11^{\circ}36'$ N and longitude $78^{\circ}7'E$. The hill is about a thousand feet above the plain, and about 4 miles long in an east-west direction. The thick jungle and the debris make it difficult to count the number of beds of magnetic iron ore. The beds form ellipses in plan, with the major axis in an east-west direction. The number of beds are five, two of them being visible only on the western extremity of the ridge. The two lowest beds are very conspicuous even when seen from a distance of a few miles. Where not too much weathered, the beds stand out prominently coloured dark purplish grey. The thickness of these beds is very difficult to estimate. The beds are so broken near the surface that debris rolled down from the upper beds are not distinguishable from the blocks separated from the broken beds in situ. But, their thickness may not be below 50 feet on the average. Two more beds are estimated at 20 feet thick each, but the amount of ore contained in the first two beds only is almost inexhaustible. On the southern side of the hill the talus mainly consists of the ore. For a distance of a mile or two from the foot of the hill the fields are thickly strewn with the ore. Thousands of tons of the ore can be gathered up without any mining. In the beds the ores are not in the same quantity in the rock. The mineral magnetite occurs in grains of various sizes, making up from half the rock to about seven-eighths. The rest of the rock is always made up of quartz. Till about the middle of the last century smelting operations were being carried on by the natives of the surrounding villages. The non-availability of fuel put a stop to this industry. A company which was doing this business finally closed down about 1860. If fuel could be got cheap at that place, it is quite certain that the ore of Kanjamalai can be exploited for an indefinite time; flux in the form of limestone can be got from Sankaridrug, which is on the railway line.

2. *The Godumalai Group*. 9 miles east of salem. The Godumalai is a very fine bold mass about 1,500 feet or more above the

Salem and Attur Valley. It is about 4 miles long west to east, the maximum breadth is about 3 miles. When seen from the south the chief beds of magnetic iron which runs up the ridge from west to east reaches the summit at the eastern extreme end. On the northern side of the summit it is precipitous, and the fall from the cliff is several hundred feet. At the western end of this ridge the quantity of the magnetic iron is good; and small native furnaces used to work in the villages in the neighbourhood. The rock here has iron ore making up from $\frac{3}{4}$ to $\frac{5}{6}$ of the mass. The iron ore beds get poorer and poorer in quality as we proceed to the east but when ascending the *Valoor* hill it again becomes richer. The course of the beds, the width of the outcrops and the thickness of the beds are all difficult to estimate as the hills are covered by a thick jungle and the compass becomes practically useless in determining the directions.

3. *The Singipatti Group.* The beds forming this group occupy a position about 4 miles south of the Godumalai peak. They appear to form a synclinal fold, having, if followed from west to east along the strike from Vullala Cardam, a course ranging from west and east to north-east by east and then trending to east-north-east and east by north. In length they extend for about 10 miles.

There are three principal beds, separated from each other by intervening beds of hornblendic and quartzo-felspathic gneiss of very considerable thickness. By far the greatest visible development of the beds is along the northern side of the synclinal fold, the greatest length of which is stated above. On the south side the three beds can be traced only for much shorter distances to the village of Singipooram. At that village five beds of iron ore appear on the western slope of the small hill, bearing the same name as the village; only three of these appear to the west on the slope of Ponnarampatty hill, and here two are apparently cut off by a fault, the line of which is occupied by a small dyke, having a north-north-east course. To the east of the village the iron beds are almost immediately lost sight of under thick soil, and do not reappear again, while the beds on the northern out-crop die away gradually both in size and richness, and disappear on crossing the Vellaur river a mile-and-a-half to the south-west of Yaetapur pagoda. Indication of magnetic iron beds are met with in the great spur of the Kalrayanmalai, north of Yaetapur, and are in all probability representatives of this Singipatti series. In point of richness the beds of this series are not very remarkable the richest being part of the northern or lowest bed lying south-south-east of Walapandy

bungalow. The thickness of the bed cannot be less than 50 ft. which may probably represent the general thickness of the three beds cropping out on the north side of the synclinal fold. To this series belongs in all probability a small bed of magnetic iron occurring on the flank of Kalrayanmalai, rather more than a mile south of Toombul.

4. *Tallamalai-Kollimallai group.* This group is included in a vast curve formed by a large number of strata constituting the gneissic system, and present in the southern part of Salem district. The curving of the overlying iron beds is remarkably perfect especially some of the numerous hornblendic beds east of Namakkal. The heart of the curve appears to be at Kollimallais. The beds dip at a very high angle of 60° to the north. The number of iron beds belonging to this series are mainly three; there are a number of other beds which are not continuous but die out very soon after they become observed by the overlying soil. The principal beds occur about half way up through the series, and have been traced from a little north of Mathensenapetta (Thathangarpettai) westward to the most northerly ridge, outlying from the Tallamalai and all along that ridge. They get covered by the alluvium till they appear again to the south of Keerambur, 6 miles west-south-west from Namakkal, at Ramagiripetta and other villages in the Rasi-pur Taluk.

5. *The Teertamalai group.* This group consists of only two great beds running parallel and close together along the crest of the Teertamalai ridge. They form also the peak of the Teertamalai, which is a very fine and almost isolated mountain mass, about 8 miles north-east by east of Haroor. To the east the side of the magnetic iron bed forms a tremendous and apparently perpendicular precipice of many hundred feet in height, which gives the peak a very fine bold outline when seen from any position except from the east or west. The beds show a large dip about 82° to west at the foot of the mountain on the north-western side, close to the temple at Teertamalai. To the south of the Teertamalai the beds are lost in the jungle under thick soil at about a mile-and-a-half south-south-west of the peak. No estimate is possible of the thickness, etc. being covered by the talus, etc. There are more than twenty other beds here, but they are not very important in thickness or extent.

Crystalline limestone. Near Shattambur 7 miles south-west of Namakkal are a number of beds of crystalline limestone whose

total thickness is several hundred feet. They are mainly greyish white in colour, while a few are greenish and pink. They outcrop on the surface for 2 miles east of the village while further east they are covered by thick soil. Another occurrence of limestone in this district is near Sankagiridrug. The quantity of limestone available here is far less compared to the other place. But the several beds cross the railway line, and, if there is much demand, they can be quarried and transported with greater ease. If smelting of ore is done at Kanjamalai on a large scale these limestones can be used for flux.

Steatite. There are talcose and chloritic schists widely distributed in the district. The schists are in some places very hard bluish-green rocks. The greatest development of the schists is seen along the north banks of the Ponnaiyar river. They continue to form the Javadi hills just outside the district. Associated with the schists in some places are small beds of steatite or potstone, an impure variety of talc. This mineral is very widely distributed throughout India. Steatite is used for manufacture of refractory furnaces and is exported for that purpose. Locally they are used for the manufacture of pots, dishes and other cooking utensils. They are much in demand by Brahmins. The vessels are cut by means of various well-shaped tools, when resting either on a pad of straw or rags; the stone easily breaks during chiselling due to numerous impurities like pyrite, etc. Though potstone is available in numerous places the three principal localities where they occur in large quantity and are worked are Tandagoundanpalaiyam 17 miles east-south-east of Salem, Kampur 6 miles north-west of Salem; and Yerumaipatti near Namakkal. Salem is one of those three areas in India from which steatite is exported in large quantities.

Corundum. Certain beds belonging to the old gneisses have been worked for corundum from time to time in this district. Corundum is used by the lapidary as an abrasive. But competition is very keen. Cheaper forms of garnet, artificial forms of corundum manufactured from bauxite, and artificial abrasives like carborundum and crushed steel prevent not only the export of this mineral but are also imported into India. Still now and then mining leases are obtained in Salem especially in Palakod and Paparapatti. Corundum is being now produced from about 1926 and a fresh lease for a period of 30 years has been obtained in the year 1934.

Igneous rocks. The rest of the district not covered by the gneisses so far described are made up of rocks belonging to the

'charnockite' series. The charnockite series of igneous rocks vary from acid rocks like hypersthene granites to ultrabasic pyroxenites and amphibolites, through augite, norites, hypersthene norites, etc. (These rocks whenever they meet the biotite gneisses show a younger age). Though it is possible all types of this series can be met with in the district the most abundant is a rock of 'intermediate' composition. In the neighbourhood of the intermediate rock it is possible to meet with small pieces of acid or basic rock. The charnockite hills stand out prominently as lenticular hills from the plains of the gneisses. By far the largest exposure is the Shevaroy hills which cover an area of about 100 square miles and form a mass 16 miles long north-east to south-west and 10 miles wide from south-east to north-west. The rocks are even grained, blue-grey or greenish grey in colour. It is difficult in fresh hand specimens to distinguish the quartz from the felspar both of them being of the same blue colour. The colour is due to minute hair-like inclusions in both the minerals. The minerals present in the charnockites, are pale blue green augite, highly pleochroic hypersthene, hornblend, a strongly pleochroic brown-green variety, and the accessory minerals are opaque iron ores, zircon, apatite and biotite. The smaller hillocks in the Salem-Attur valley are all related to the Shevaroy hills but are a little basic. The rocks of Nagaramalai are garnetiferous varieties of the charnockite.

In the neighbourhood of basic varieties it is possible to find lenses, bands and small dyke-like formations of the charnockites devoid of felspar. In the majority of these ultra-basic rocks pyroxene is in excess and the rock can be named pyroxenite. Such pyroxenites have been described as occurring in the Nagaramalai. About half-way up the south-western slopes of the Shevaroy hills there are large masses of these rocks in which hornblende exceeds the pyroxene in quantity. They resemble closely the pyroxenites of Pallavaram near Madras.

Younger intrusions. Younger to the charnockite series there are igneous rocks which are quite independent of foliation and are intruded into the gneisses and the charnockites. There are distinguishable three such independent groups which do not come into contact with one another so that their relative ages cannot be determined. The three groups are:—

1. Augite-diorite dykes with micropegmatite;
2. Magnesian series of the Chalk hills; and
3. The "White Elephant Rocks."

1. *Augite-diorite dykes.* Running in a north-west-south-east direction across the Shevaroy mass is the most prominent dyke about 50 yards in width. It marks the direction of a depression instead of standing up above the rocks. While the dyke can be traced from one edge of the Shevaroy to the other, it is not known beyond the limits of the hills. A second dyke is seen near Kavipatti running south-eastwards. The third dyke is found much further to the westward. The direction and extent is difficult to determine as the edges are covered with talus material. The rocks of all these dykes are augite-diorites with micropegmatite. They are generally regarded as the dyke representatives of the Cuddapah lava flows and are met with in numerous places in Chingleput and South Arcot districts also cutting through the charnockites or the gneisses. Apart from the three main dykes there are found numerous narrow dykes running parallel to the large ones, but they show the usual differences in structure due to more rapid cooling. They show rapid transition from the black opaque, probably glossy matrix to a porphyritic rock with crystals of pyroxene and basic felspar imbedded in a pilotaxitic ground-mass.

2. *Magnesian rocks.* There occur magnesite veins in a few places in the district. The most important of these are seen in the so-called 'Chalk hills,' a few miles north-west of Salem. The area over which these veins cut through is about 10 square miles of ground. The veins continue in an east-north-east direction to within half-a-mile of the western base of the Nagaramalai, a conspicuous hill lying due north of Salem town at a distance of about 3 miles. The magnetite veins occur in innumerable quantities, running in every possible direction; the more important veins, however, follow certain definite directions. Associated with the magnesite are minute veins of fibrous serpentine of pale green colour. Compact serpentine in the form of pebbles are found very rare. Chalcedony or jasper occurs as thin crust over the surface of the magnesite. *Chromite* or chromate of iron is found in very thin veinlets lying either among the magnesite or between the magnesite and the wall of the magnesite vein. A vein 4 inches thick occurs in the Kanjamalai hill.

Of the quantity of magnesite present in the Chalk hills no estimate has been given. Practically we can regard the reserves as unlimited, especially as the formation is not due to any superficial phenomena but due to the alteration of magnesium silicate of the ultra-basic rocks by carbonic acid to form carbonate of magnesia and free silica. The small quantities of serpentine have been form-

ed by hydration of portions of the olivine which escaped the action of the carbonic acid. Salem produced in 1934, 11,859 tons of magnesite valued at Rs. 71,208. Further details about the ore, its uses, etc. is separately dealt in another paper.

3. '*The White Elephant Rocks.*' There are two masses of white quartz, on either side of the southern spur of the Shevaroy hills. On the east the huge mass of pure white quartz rises to a height of 100 or 120 feet from an irregular base the diameter of which is estimated at 200 feet. The whole mass is much cut up by large vertical joints. This rock is very conspicuous, visible on clear days even from a distance of about 35 miles. A corresponding but rather smaller mass of white quartz stands on the west side of the spur overlooking the magnesite veins of the Chalk hills. The quartz here is much different from the blue quartz of the charnockites; there are not found any minute needles in quartz crystals. The liquid inclusions present in the quartz crystals and the absence of any signs of elastic structure such as are found in a quartzite are evidences of the igneous origin of this quartz. "There is no direct evidence for connecting these masses of quartz with any particular eruption in the neighbourhood. But the nearest eruptives are the peridotites of the Chalk hills, and as every peridotite intrusion in South India seems to be accompanied by masses of pure white quartz, it is not unlikely that those masses belonging to the Chalk hills province represent the end product of that eruption."

Soils. Next to the Archæan gneisses and the rocks of plutonic origin and a few dykes described above the rest of the geological formations are all recent in origin. Of these are the laterites which cap a few hills on the western boundary of the district, the greyish white kankar occurring commonly all over the plains of the district, and the black cotton soil. A discussion about the age of the laterite or the kankar is not entered into here.

The black cotton soil is found to the south of the Pachamalais, west of Namakkal, east and north of the Tallamalai, and in the eastern part of the Attur valley. The soil is of a very dark brownish-black colour with occasionally greyish or bluish shades. The composition varies with the region, some regions even containing a considerable portion of sand. In dry weather the cracks in the soil extend to a depth of 3 to 4 feet. The black soil is used for the cultivation of cotton and other dry crops.

The decomposition of metamorphic gneisses gives rise to a red arenaceous soil. This soil is found around each of the mountain ranges. It is generally 4 or 5 feet deep but sometimes goes to a depth of even 15 feet *in situ*. Accumulations of red soil are found in the great valley running into the Tennandemalai range, especially on the north side of the hills, and also on the east side of the Kalrayanmalai. The river alluvia of the Cauvery, the Vellaur and the streams flowing into it form a class by themselves.

The Salem Magnesite Deposit

A DESCRIPTION OF THE WORKING PROCESSES AND SOME OF THE USES OF THE MAGNESIA PRODUCTS.

By

MR. H. R. ROBINSON, B.Sc.

The Salem Magnesite area consists of masses of olivine-chromite rock, which belong to the peridotite or ultra-basic group such as Dunite etc. In process of time, the rock has undergone enormous mineral change, whereby the Dunite became serpentinised. After this further changes took place, resulting in the formation of Chalcedony, Silica and Magnesite.

The Magnesite is visible in the form of out-crop, on the surface of the low-lying hills in which the deposit is contained, thus indicating Magnesite-bearing land below the surface.

Excavations have been proceeding for many years in the form of open quarry work and owing to the abundance of the mineral, it has so far been unnecessary to work below water level.

The Crude material is excavated by manual labour and because of its natural high chemical purity, being over 95% MgCO_3 , it merely requires superficial cleaning on the surface, which is carried out by small chipping hammers. The Crude Magnesite is then conveyed to the Kilns, where it is calcined to the oxide of Magnesia (MgO).

The Kilns which operate continuously, are of the vertical shaft-type and fired by producer gas, generated from coal in an external producer. The Crude material is fed in at the top of the Kiln and gradually falls down through the combustion zone, as calcined material is withdrawn from the bottom. The producer gas is admitted through gas ports into the combustion zone, where a temperature of the order of 1250-1300° Centigrade is obtained. The products of combustion are drawn off at the top of the kiln by natural draught, along with the gases expelled from the crude material, which consist largely of carbon dioxide. This process occupies an over-all time of about 70 hours, from crude material entering the Kiln to leaving as Calcined Magnesia.

The calcined material is allowed to cool and is subsequently sorted into various grades and size specifications according to requirements, and is finally packed in gunnies for export. The lightly-calcined oxide of Magnesia is also marketed in the finely-ground form, and when required, can be ground to pass 200-mesh.

A further grade of Magnesia is obtained by carrying the calcination process to a higher temperature, when refractory Magnesia is obtained. This Grade is of great value as a refractory material in many industrial processes.

One of the highest forms of refractory material known is fused Magnesia. This is obtained by the electrical fusion of Magnesia at a temperature of the order of 2,600° Centigrade. During fusion, the Magnesia undergoes a complete physical change and becomes a clear crystalline substance, capable of withstanding the highest temperatures used in industry at the present time.

THE USES OF MAGNESIA PRODUCTS.

Crude Magnesite:—This material on the addition of sulphuric Acid forms Magnesium Sulphate, commonly known as Epsom Salts.

Lightly-Calcined Magnesia:—This material possesses cementitious properties of a high order and its principal use therefore is in building construction, where it is incorporated in many flooring compositions, plaster and stucco work and in a variety of asbestos and other similar compositions for various uses in interior work in buildings, where lightness is required to be combined with strength.

When mixed with Magnesium Chloride solution or water, it forms an oxychloride cement, which will accommodate up to 20 times its weight of sand or their aggregate.

Magnesia Cement possesses a tensile strength of 800 lbs. per square inch after 10 days, thus being much stronger in this respect than Portland Cement.

Magnesia composition flooring as well as being strong and permanent, is light and resilient and may be laid over either concrete or wood foundation equally well. Any colouring matter may be incorporated in the mix, thus facilitating the introduction of coloured designs in a perfectly jointless flooring.

Lightly-calcined Magnesia and light Carbonate of Magnesia are also incorporated with asbestos in boiler lagging compositions, producing a permanent and efficient covering which greatly improves the thermal efficiency of any steam-raising plant to which it is applied.

Lightly-calcined Magnesia is used in the manufacture of paper pulp from wood and bamboo in the sulphite process. The Magnesia assists in the digestion of the pulp and improves the strength of the paper obtained, thus forming an important constituent in the manufacture of high quality paper.

Lightly-calcined Magnesia is rapidly coming into prominence in the manufacture of glass. By virtue of its chemical purity, and particularly its extremely low iron content, Indian Magnesia is specially suitable for the manufacture of colourless and scientific glassware. The introduction of Magnesia facilitates easier working of the glass in the molten state and enables annealing to be carried out at a lower temperature than otherwise. It also improves the chemical resistance of the finished product.

Another industrial use for Magnesia is in the manufacture of rubber, where it proves a powerful accelerator in the vulcanisation process, particularly in the case of resinous or tacky rubbers and those which would otherwise vulcanise extremely slowly. Light Carbonate of Magnesia is also used as a filler in the manufacture of rubber products.

The value of Magnesium alloys in preference to Aluminium for lightness and strength, has recently been demonstrated and calcined Magnesia is being reduced to the metal, by an electro-chemical process and the Magnesium alloys subsequently produced, are being increasingly used in the manufacture of aeroplane parts.

In India and Burma and other rice-producing countries, Magnesia Cement is supplied to Rice Mills, where it is used in conjunction with emery powder for hulling and polishing the rice.

Magnesia is also widely used in a number of medical preparations, such as Magnesia Ponderosa (Heavy) and Magnesia Levis (Light) and Milk of Magnesia. It is also used in the preparation of certain cosmetics.

A recent specification describes the use of Magnesia as an ingredient of cigarette paper. The benefit is twofold in that Magnesia readily gives up Oxygen thus promoting combustion and also leaves a white ash, such as one finds in Egyptian cigarettes.

Refractory Magnesia:—The properties of this Grade of Magnesia are quite different from the lightly-calcined variety, in that it is no longer a cement, but the chief characteristic is its extreme re-

fractoriness. Magnesia is a basic refractory and is therefore most suited for use in industrial processes where an acidic reaction is undesirable.

Dead-burnt Magnesia is very widely used in the hearths and linings of basic open-hearth steel furnaces, copper reverberatories and converters, bullion and other metallurgical furnaces, where it resists the action of the high temperatures employed in such operations, successfully.

In this form, refractory Magnesia is also made up into magnesia bricks, which are well-known as high-class refractories in industrial furnaces. Magnesia bricks of good quality are being made from Indian Magnesite and have proved most successful when incorporated in steel manufacturing processes, in India and elsewhere.

Another variety of Refractory Magnesia which is manufactured at Salem, is Assay material and Magnesia Cupels for Gold and Silver Assay work. Large quantities of Assay material and Cupels are sold to various Government Mints, Gold Assayers and Gold Mining Companies, for Assaying Gold metal and ores.

In conclusion, it will be realised that an abundant supply of such an important mineral constitutes a valuable national asset in India, especially in view of the fact that Magnesite deposits in other parts of the Empire are relatively rare and small in character.

The Chemistry of Magnesia is advancing rapidly as research work is being carried out in various countries and more uses are being found for Magnesia products.

It is also certain that as India proceeds further with internal industrialisation as she undoubtedly will, the Magnesite industry will take its place in the country's industrial sphere as a key industry.

Meteorology of the Salem District.

By

MR. C. K. ANANTASUBRAHMANYAM, B.A.,

Kodaikanal Observatory.

The district of Salem is divided into three tracts which differ very much physically. Balaghat is a part of the Mysore table-land; to the north and east an uneven plateau with poor vegetation; to the south and west with dense forests. The average elevation is about 3000 feet above sea-level. Baramahal is a wide basin, between the Mysore tableland and the plains, with a general elevation of 1300 feet above sea-level. It is bounded on the north and west by the Mysore plateau and on the south and east by a second line of ghats. Talaghat is the country below the ghats and resembles in general aspect the adjoining districts of Trichinopoly and Coimbatore. The town of Salem is 900 feet above sea-level.

The hot weather in Salem begins early in March. April and May are the hottest months. From June onwards the temperature steadily comes down. The highest recorded temperature was 108° on May 9, 1900 and the lowest $55^{\circ}2'$ on January 30, 1902. The average maximum in January is higher than in December; but the nights are much cooler. The difference between maximum and minimum in March is nearly 27° and in October and November 18° . Owing to the calm atmosphere in September and October, the weather is more trying than in February or March, though the maximum is higher in the latter months.

AVERAGE MAXIMUM AND MINIMUM TEMPERATURES

	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Maximum.	88.1	93.4	98.4	100.8	99.6	95.3	93.3	92.3	91.4	89.9	87.1	86.3
Minimum	64.1	66.6	71.3	76.2	76.5	74.5	73.6	72.9	72.5	71.7	69.1	65.7

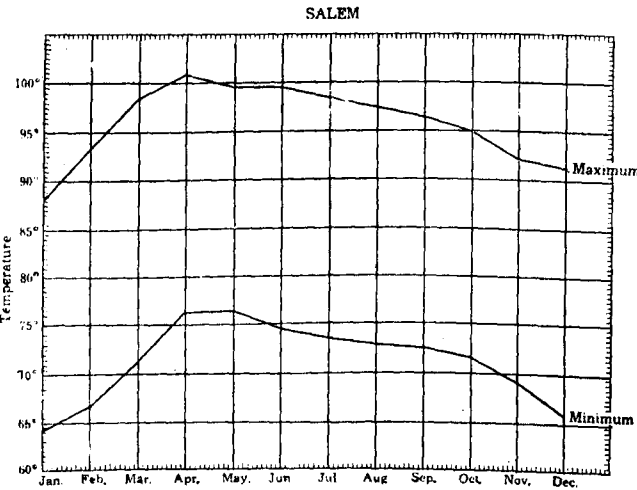
The average humidity varies from 70 to 80, being 72 in April and 81 in October. The dryness of the atmosphere, the comparatively cool nights and the drop in temperature from June onwards when the southwest monsoon sets in, render the climate of Salem pleasanter than that of the eastern and the southern districts.

AVERAGE HUMIDITY

Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
76	76	73	72	72	76	78	80	80	81	79	77

During the hot weather, occasionally hailstorms occur in the town of Salem.

There seems to be no official record of the meteorology of the Shevaroy's. The temperature there is very equable. The records kept at the Grange shows a maximum of 82° on May 23, 1906 and a minimum of 65°. In any one year the difference between the highest and the lowest recorded temperatures has never exceeded 17°. It is very rare that the maximum rises above 80°. The maximum during the hot weather does not often exceed 77° and in December the usual maximum is 67°. It frequently happens that the four readings on a single day show no variation at all. During winter, occasionally there is frost on the grass in the valleys.



The mountainous character of the district causes sharp variations in the rainfall of different localities. The annual average for Salem town is 39·30. This is higher than at any other station in the district except Yercaud. Most of the rain is received in the months August, September and October. February is the driest month.

The connection between wind and rainfall is noteworthy. The heaviest falls of rain occur when the wind is weakest. The rain stops as soon as the wind freshens. From October to March a northeast wind prevails. In April the wind is towards the south and from May to September the general direction is southeast or southwest. February and March have high winds.

AVERAGE WIND VELOCITY AND MONTHLY RAINFALL

	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Wind velocity in miles.	115	127	127	110	98	120	113	96	82	60	74	91
Rainfall in inches.	0.31	0.27	0.48	1.79	4.72	3.02	3.82	6.84	6.59	6.74	3.74	0.98

At Yercaud the annual rainfall exceeds that of Salem city by an amount varying from 20 inches in a dry year to nearly 40 inches in a year of heavy rainfall. The annual rainfall in the north of the Shevaroy's is about 10 or 12 inches less than at Yercaud and naturally the southwest monsoon is more active on the southern slopes.

Tiruchengode is the driest taluk with an annual fall of only 27·33 inches.

AVERAGE YEARLY RAINFALL IN DIFFERENT TALUKS.

Hosur : 31·27 Krishnagiri : 31·58 Salem : 39·30 Tiruchengode : 27·33 Omalur : 32·35 Attur : 36·16 Dharmapuri : 31·83 Uttangarai : 31·98 Yercaud : 63·14.

AVERAGE MONTHLY PRESSURE

Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
29.125	.096	.051	28.985	.931	.898	.908	.933	.965	29.006	.050	.105

Alambady Cattle.

By

MR. R. W. LITTLEWOOD, N.D.A.,
Deputy Director of Agriculture, Livestock, Hosur Farm.

This is the chief breed of cattle in the North Salem District. The type is "Malai-Madu" or hill cattle, though certain variations are recognised, which are largely due to environment and different conditions of breeding and rearing. Formerly, the cattle of these hills wandered throughout the tract, at the will of the graziers, wherever most suitable pasture was found and there was frequent interchange of breeding bulls. It is a mixture of Mysore blood. The cattle north of Denkanikota in the Hosur Taluk are also known as an allied breed.

It derives its name from the village of Alambady on the banks of the Cauvery; this village no longer exists and Alambady is just the penning place for cattle.

The reason for the North Salem regions teeming with great herds of cattle is the wild expanse of forest land which is scarcely fit, or has not yet been taken up, for cultivation and with only patches of tillage in favoured places and affording herds of cattle, abundant pasture and wide and unrestricted roaming ground. The tracts are stony in elevation with humus in the valleys. The forest growth is deciduous; and the pasture lands are thoroughly baked in the hot weather by the heat of the sun so peculiarly intense in the valleys, in the low hilly regions. Another reason, though of a secondary importance, is the noble river Cauvery whose waters are utilised for irrigation higher up in Mysore and fertilize some of the richest tracts in Southern India lower down and which runs in these regions through scenery of wild grandeur on a bed too deep for irrigation purposes and affords cattle a perennial supply of water in seasons when the country becomes parched up and thirsty.

In the forests of Dharmapuri and Hosur in the North Salem district, which together with Kollegal and North Bhavani of the Coimbatore District, represent the most important area of forest breeding, the cattle which graze in the forests are cows with their calves; except for the breeding bulls which run with the herds,

no other male stock are seen. The male stock are annually sold as yearlings at big fairs such as Mahadeswaramalai, Gettisamudram and Mecheri and find their way into the hands of ryots who rear cattle. Throughout this area, the rearing of bullocks from these forest-bred cattle is a most important industry. It not only forms a profitable method for ryots to realise the value of their available straw, fodder and grass, but it also forms a main supply of heavy draught cattle for Malabar, West and North Coimbatore, Chittoor, North and South Arcot, while the pick of such animals are taken further south to Tanjore, Trichinopoly, Madura and Tinnevely to be used either as coach bullocks or for heavy draught. This breeding is one of the finest object lessons one can see in the Presidency to show the value of not mixing the cattle when grazing. The cows lose condition in the hot weather, but they are all large framed animals; while the bullocks, reared from calves produced from these herds, show still more clearly how valuable it is, even when grazing is limited to select and keep good breeding bulls.

These Alambady cattle are very different from the animals, which come from the Bhadrachalam forests of the Godavari district, which are small, ill-bred animals. In the cattle which come from the latter district, one sees all the evils attending mixed grazing; the surplus male stock are never sold until full grown and fetch very low prices.

The Forest Department make a nominal charge of 8 annas per animal per year and the cattle are permitted to graze over the whole area of about 600 square miles for one yearly payment.

Beyond these forest centres but bordering on them, large herds of this breed are also kept in villages commanding extensive pasture. Cows and bulls of this breed, in small numbers, purchased from the large herds are taken away and reared in these villages. The whole habitat of the breed is favourable to the development of bone.

The cattle north of Denkanikota in the Hosur Taluk are bred by ryots in the villages who often own their private grazing grounds. These are described as "Masti" and "Nundi" dana. The cattle of Pennagaram side are of bigger frame and are mostly black or very dark grey in colour.

In the regular breeding tract, all male calves are sold when young i.e., under one year old and these are taken by dealers to recognised rearing tracts chiefly in North Salem, West Chittoor and the adjoining Mysore territory. Ryots of North Coimbatore

visit the breeding villages on the hills and buy large numbers of calves for rearing. West Coast dealers visit the fairs at Dharmapuri and take away calves to the West Coast for rearing. Thus in the breeding tracts, male stock are seldom seen. Most of the agricultural and draught work is done with cows. It is usually stated that one bull is required for every 50 cows but nowhere were the bulls kept in this proportion, nor are they necessary, since these cows seldom calve more frequently than once in 2 years or so. The breeding herds live on the forests for the greater part of the year, where they are kept in pens at night time. They are brought back to the village at harvest time, when the harvested fields provide grazing for some time, and the cattle supply the necessary manure for the succeeding ragi-crop. After this source of grazing is exhausted, the cattle again return to the forests. Except for this, cows are only brought to the villages, when they are too weak or emaciated to keep with the herd or immediately after calving until the calf is old enough to follow the herd. Occasionally, when the village is located near forest pasturage, animals return to the village every night. The breeders of these cattle, except on the Hosur plateau, cannot be considered as ryots. They certainly grow crops for their own requirements, but by profession, they are breeders of cattle, depending on the sale of their calves for their livelihood.

The number of cows in the breeding villages of the Hosur Taluk have increased, the total number of cows for 16 of the principal breeding villages having risen from 7,809 in Fasli 1314 to 18,875 in Fasli 1319. For the whole of Hosur Taluk it is seen from the 5 year cattle census return that the number of cows has increased from 73,617 in Fasli 1334 to 93,905 in Fasli 1339, an increase of over 20,000.

Almost all the bull calves and a few heifer calves are sold at about a year old; bull calves realise on the average Rs. 15 to Rs. 20 each, heifer Rs. 5 to Rs. 10. The cattle from all the villages around Dharmapuri, Krishnagiri, Palakode, Royakottai, etc., are sent to the forests to graze from July to January each year. The animals chiefly exist on grazing and dry fodder. Bulls 3 years old are given a little concentrated food and are ready for work at 3½ to 4 years. Some breeders state that some of the cows calve every 16 months and others every 2 years; this depends on the season and the monsoon. They are all poor milkers. A good number of breeding bulls are dedicated; the animals live in a semi-wild state and are never tied up and so are uncontrollable.

The breed is not of a fixed type throughout the area. Most of

the cows graze in the forests in North Salem and North Coimbatore and a number of animals of Mysore herds graze there also; and my opinion is that this breed (Alambady) has become mixed with this Mysore blood. Breeders admit this and prefer a grey or fawn coloured breeding bull to the black, also a tight sheath animal.

The cows are compact animals and have not the looseness of build which some of the breeding bulls possess. Some have a fold of skin in the position of the sheath and others have not. The colours are grey, iron grey, fawn, brown and broken colours. Some have flesh coloured skin and others black; some have light coloured muzzle and others a black one.

Tiruchengode Cattle.—In the Tiruchengode taluk of this District, there was a breed of small cattle, the cows of which were very good milkers for their size. Nothing is known of their origin and no care was taken to maintain the breed with the result that to-day the breed is practically extinct, having become mixed up with other breeds. The breed somewhat resembled the small Mysore cattle. The cows gave 8 to 12 lb. milk per day.

The Cattle of South Salem are akin to the Kangayam breed; and there are a few large landowners who breed the Kangayam breed of cattle and purchase bulls of this breed from the Pattagar of Palayakottai.

Cattle fairs and weekly shandies are common in the district; and a lot of petty dealing is carried on. Some of the chief cattle fairs are at Mechcheri, Madakondapalli, Nangavalli, and Nathapatti. The Janappa Chetties of North Arcot and Salem are the biggest traders; and they purchase cattle from the rearing tracts of North Salem and Mysore, they sometimes purchase their animals on credit, giving small advances and paying the balance when they have sold the animals. A few rich Vellala dealers in South Salem who work with a big capital are able to get the very pick of the trade. Some Muhammadan dealers trade large; but they deal in an inferior class of animal.

Forests and Forest Products of the Salem District.

By

MR. S. RAGHUNADHA RAO, I.F.S.,
District Forest Officer, South Salem.

1. I am grateful to the Madras Geographical Association for giving me this opportunity of addressing its members on the subject of the Forests of Salem and its forest products. The Forest Officer is very rarely an accomplished public speaker; and I am afraid I am no exception to this general rule, and I must therefore ask your indulgence for my shortcomings in this respect.

2. As members of the Madras Geographical Association, I am sure you will appreciate the point when I say that Forests are fundamental natural entities in the same sense as mountains and oceans. The face of the globe was formed by various geological upheavals and subsidences of which the geologists tell us. The face of the globe was clothed with vegetation by the play of various natural forces, the study of which forms the fascinating subject of ecology. A forest is Nature's invariable answer to any stretch of exposed soil. It will therefore be well to remember that in dealing with forests we are dealing with one of the first things of the earth and that light-hearted tampering with forests may be fraught with immediately inappreciable but in the long run with far-reaching consequences.

3. What, then, is a forest? To the urban lay mind, especially if it is steeped in the romantic literary tradition, the word conjures up visions of an impenetrable mass of lofty trees, tangled with lianas and creepers, in the gloomy shade of which lurk mysterious dangerous animals, ready to pounce on the unwary man who ventures within. A tropical forest is commonly supposed to be even more lofty, tangled and gloomy and the vegetation is fecund and fast growing. Judged by these romantic standards, there are few forests in India and none in Salem. To the scientist a forest is not necessarily an association of tall trees, any more than the word rock connotes to the geologist only a substance of granite texture. In the scientific sense, a forest is a natural association of one or more woody species, occupying land in more or less close formation, and

functioning together as a composite organism. The denser a forest is and the more unbroken its canopy, the better does it function as a composite organism. An ideal or, as we forest officers call it, a normal forest maintains its own temperature and humidity and almost makes its own soil and air. A group of scattered trees, however lofty and well-grown may make an excellent park, but will not amount to a forest if they are unable to act together as a composite unit. A forest in its ideal state resists invasion by alien species and maintains itself in a state of perennial youth by natural regeneration. To the professional forester, a forest is not merely a congeries of living things, but is itself almost a live thing responding to every stimulus in a definite and recognisable manner. As is well known a description of the flora does not exhaust the contents of a forest; a forest is never complete, at least in the aesthetic sense, unless it is well stocked with game indigenous to the locality. Only then can it be regarded as a truly fundamental natural entity.

4. A forest is the natural resultant of the various factors of the locality, such as the climate (including temperature and rainfall), the soil, the altitude, the aspect, etc. In India the most important factors which determine the distribution of species and the type of forest formation are rainfall, temperature and altitude. Unlike the temperate zone where conditions favour the formation of gregarious forests (*i.e.*, forests with a very limited number of species) forests south of the coniferous region of the Himalayas contain a great wealth of competing species, not all of which are valuable from the economic point of view. In India, as elsewhere, the advance of agriculture (and civilisation) has always been at the expense of the forest, so that at the present date, forests are confined to hill slopes and soils inhospitable to agriculture. Most of the forests in Salem are hill slopes, with the exception of the Hosur Taluk where a large area of land not unfitted for dry agricultural crops is immersed in forest. The forests of Salem range in elevation from 1,000 to 5,000 feet and the rainfall varies from 30 to 50 inches. These factors practically determine the type of forests met with in Salem. At the lower elevations and in the drier localities, the forest is what is known as thorn forest, composed of a large variety of deciduous species, fit only for fuel, with a thorny undergrowth. The trees are stunted and mis-shapen and rather sparsely scattered.

5. The Forests lying within the Revenue District of Salem may be considered to be in three blocks. On the North-Western

side of the District lie the Forests comprised by the North Division. On the North-Eastern side are the Forests of the Central Division; and the Forests lying at the South-Eastern corner belong to the South Division; and these are rather scattered.

6. The importance of Forests, from the point of view of water supply and as sources of rivers and streams and from the point of view of affecting the water level on the plains, is perhaps, not realized by the public to the fullest extent. There are probably people who do not understand the relationship between Forests and the water supply of the country in the plains.

7. The effect of forests on the actual event of water falling as rain is correlated with another and more important one, particularly in tropical countries and that is the mechanical retention and storage of water. The population of India is mainly agricultural and it is of the first importance that one must have all the rainfall, which is often scanty and which occurs in well-marked seasons with intervals of drought.

8. The surface of the land is sloping, and the water falling on it finds its way by a multiplicity of water courses to the main rivers and thus, if not diverted, or held up, ultimately to the sea. I cannot better illustrate this than by referring to the sloping writing desk in a school. Supposing water is poured on a desk of this kind, it will doubtless run off quickly. It is what happens on bare hills and causes flood. Supposing a sheet of blotting paper was put on the sloping desk and then water were poured on it, it will not run off as in the first case, because, the blotting paper would absorb some part of the water and it is only what it cannot hold that will run off. In exactly the same way, if our hills were to be unclothed with trees, water resulting from the precipitation of the clouds will run off the hill slopes. Where there are no forests, or little or no vegetation, the soil exposed to the direct heat of the sun, causes no cooling of the atmosphere and the conditions produced are consequently, as has already been explained averse to conditions of precipitation. Further, the earth is baked to a hard crust which is often covered with a layer of desiccated dust. The rain, when it falls, is thus unable to soak into the soil, and the whole fall runs off rapidly; and directly the sun again appears, enormous evaporation takes place, since there is no screen intervening between the water and the sun. A very different result is seen where the ground is covered with forests. They act like the blotting paper in holding the rain water and in conserving it into the soil. Tree-

clad hills render the conditions favourable for rain-fall. The rain drops fall on the foliage and thence a portion drops on to the undergrowth and soil beneath; another portion falls from leaf, along the twigs and branches and eventually finds its way to the soil by the stems. The portion that reaches the ground will find the loose and permeable surface soil which has not been baked hard by the protection afforded by the trees, and into which the moisture penetrates. Also, the debris of leaves and twigs that are found in the forest floor go to afford a retaining sponge and protection against evaporation.

9. From experiments conducted in Bavaria, it has been learnt that while only two per cent of the fall of rain in the open percolates to a depth of 2 feet into the soil, not less than 60 per cent finds its way to that depth inside a forest.

10. A portion of the rainfall, which has percolated into the soil apparently gets slowly to small springs and streams which are thus regularised in their flow; and water courses issuing from forest-clad slopes are rarely torrential, if not perennial. They at least contain water for the greater part of the year. In the other case, there is a torrent descending down the hills very suddenly instead of percolating into the soil, a furious rush of water for a few hours and then a dry stream bed. In the other, a steady flowing stream, with its flood rising and subsiding slowly, is rarely a danger. Can there be a doubt as to which set of conditions is the more valuable to the community? And is it too much to ask that the people be prevented from irretrievably injuring themselves and their descendants? Everyone who goes about the country knows instances of floods, of mountain torrents bringing with them silt and boulders to destroy the crops and to put fertile fields entirely out of cultivation; of the silting of tanks and irrigation channels; roads and bridges destroyed; of erosions; of the disappearance of springs; of the lowered water level in wells, followed by pathetic efforts to chase the water by digging rather than by tackling the trouble at its source; of rivers becoming of decreasing use for navigation by silting, and in changing their courses for the same reason. By destroying trees, by reducing below the minimum the amount of forest which is essential and by denuding areas, there is a potential danger; man has thus in every climate prepared certain calamity for future generations.

11. The great river of the District, *viz.*, the Cauvery is chiefly fed by the headwaters of the Wynaad forests; but it also gets

its contributions from the headwaters of the forests above Hagainakal of the North Division. The Vasishtanadi of Attur and Swetanadi of Tammampatti side get their contributions from the Forests of the Central and South Divisions respectively.

12. The water-supply of Salem Town is dependent now on a rainfed tank at Panamarathupatti. The hill side on Jarugumalai is rapidly getting denuded. The eventual effect of this would be to reduce the water level of the tank as the rainfall will not be conserved on the hill slopes for the longest period. Boulders of stones brought down by torrential rain will tend to increase the level of the tank bed and thus reduce its volume capacity. According to forestry principles, we would consider the protection of the tree growth of the adjoining hill sides is of paramount importance and do everything in our power to stop the denudation and if possible afforest the banks. We call forests of this kind "Protection Forests" which solely serve the interests of water supply. I can recall to my mind, in this connection a place in Switzerland known as Fribourg which I visited during my probation period. Close to Fribourg are some hills. They were bare at one time. The people living in the plains had to put up with constant destruction by torrential rains which swept their dwellings and all. They had very little choice between living at Fribourg and moving to some safe place away from the hills, until one day a Swiss Forester hit on a brilliant idea. He made up his mind to afforest these bare rocks. There was no soil to put his seed into and make it grow. He literally drilled holes in the rock at different intervals, put in a little soil taken from outside and dibbled seeds of the hazelnut. The hazelnut grew, the roots of the trees spread themselves out and disintegrated the rocks and in due course soil formation set in. Thereafter the Forester introduced other species such as the Silver Fir and the Pines and succeeded in clothing the hill sides. To prevent the downpour of rain water he constructed steps at different intervals in the course of the streams so as to check the velocity of water. This is known as "barraging." Similarly in other places afforestation work has been done in the interests of the plains below; and water supply has been ensured. I must add incidentally that it would be wrong to cut away any tree growth found on the banks of streams as they help to check evaporation and protect them and make them last the longest.

13. The Forests of Salem have a definite place in the economic structure of the District. The hill forests, for example, are the guarantors of water in reservoirs, tanks, etc. Neither the official

world nor the public can afford to look on complacently the disappearance of vegetation on hill sides. Large sums are spent on silt clearance and strengthening of public works. Very little is spent to improve catchment areas (i.e.) on curing the trouble at its source.

14. The first step must be education and persuasion, the spreading of the pertinent knowledge of every possible means among every class of the people.

15. In India, speaking generally, rainfall of the year occurs at two seasons known as the North-East and South-West monsoons. Either a delay in the rainfall or its unseasonal occurrence may, by preventing ploughing or ripening of the harvest, cause widespread disaster amongst the people who have very few resources at their disposal. Therefore the storage of water and of the regulation of its off-flow is of vital importance. Though there are tanks, wells and canals, it is to the forest that we must look for wider results in restraining the surface flow of heavy rain. It is by them that the water level is maintained at such a height that it can be easily reached, that springs are kept supplied and perennial streams are made to flow.

16. The direct benefits from forests are probably more obvious than the indirect. They are divided into major produce including timber and fuel and minor produce including grazing, leaf manure, tanning barks, and various other minor items. In spite of the numerous substitutes for wood in its multifarious uses, the demand for timber per head of population continues to increase. Warning of a timber famine in the near future has been raised.

17. Against an area of 6,912 square miles of Salem District the proportion of the Forests is perhaps 1 to 4. The people living within a radius of five miles from the Reserves are really the ones that are at all affected by Forest problems. To the total population the people that have forest interests apart from water considerations may be about twenty per cent of the whole District population. Their cattle will depend for grazing entirely on the forests and they will depend on the forests for their cultivation in the plains for manure leaf and adequate water supply. Even if the hills do not contribute large volumes of water to any definite rivers or streams, they certainly influence the water level of the springs in the plains, in the proportion in which tree growth on the hill sides are protected or not. Therefore the tendencies on the part of a fraction of the public to cut away trees is fraught with far-

reaching consequences which are not apparent on the surface. I cannot emphasise sufficiently the influence that forests bear to the water supply, and general well-being of the surrounding population.

18. The forests situated in the Revenue District of Salem vary according to the elevation, rainfall and climate which vary somewhat in different parts of the District. For purposes of management, the forests are divided into three divisions known as the Salem North, Salem South and Salem Central Divisions. The headquarters of the North Division is at Hosur, while those of the other two are at Salem. The forests lying in the North Division contain chiefly Sandalwood and grazing ground. The Sandalwood unfortunately has been very much subjected to a disease known as "Spike" which brings about the death of the tree, and thereby does not allow it to put on the maximum amount of scented wood (heartwood). The forests being at the foot hills generally are of a scrub jungle type, containing thorny species such as the Acacias mixed with the Albizzias, etc., which are useful only for fuel. Timber yielding species are few and almost non-existent. Sandalwood is extracted departmentally and sold, while the other kinds of forest products (both major and minor) are worked through the agency of contractors.

19. The products that are made available to the public are the following :—Timber, firewood, bamboos, sandalwood, grazing, minor forest produce and manure leaf, and drift and waifwood.

20. The average Forest Revenue from the District of Salem is five lakhs and twenty thousand Rupees. Of this the biggest item is Sandalwood, worth about two lakhs and thirty thousand Rupees. Of the remaining, ninety seven thousands is grazing, nearly seventeen thousands is timber, forty five thousands is firewood, thirty three thousands is bamboos, fifty thousands is minor produce and leaf manure and forty two thousands is drift and waifwood.

21. The fuel is sold by coupes to contractors who fell and sell the material *in situ* or at the depots located in places where it is in demand.

22. Bamboos. *Dendrocalamus strictus* variety is the one that is largely met with, while *Bamboosa arundanacea* is limited. The latter is particularly good on the Pachamalais of the South Division. The bamboo is sold to contractors by coupes, on a three to five year rotation.

23. Sandalwood areas are divided into felling series, each series consisting of six coupes. Each year before March, all the dead trees in a coupe are enumerated, while the living trees are tended. After the first rains, when the ground is soft, the numbered dead trees are extracted in serial order wholesale. Roots up to the size of half a rupee in thickness are taken out intact. In the Shevaroyes and the Chitteries Sandalwood is plentiful but somewhat young; fortunately it is not yet attacked by "spike." The Sandalwood of the North Salem Division is badly attacked by "Spike," while that of the South Salem Division is partly attacked.

24. The hills falling in the three Divisions vary in their character, altitude and rainfall. These are the Shevaroyes and the Chitteries of the Central Division and the Jowlagiris of the North Division and the Kollimalais and Pachamalais of the South Division. The annual rainfall on these hills varies from 40 to 60 inches.

25. The Shevaroyes reach a maximum altitude of 5,231 feet (Sanyasimalai) and contain the hill station known as Yercaud, where coffee-growing is being done on a large scale. The Kolli hills are from 3,000 to 4,600 feet in elevation and produce excellent plantains, a poor strain of jack-fruit, pine-apples and very fine oranges. The inhabitants of these hills are called Malayalees (hill men). They are not really a hill tribe in the ordinary sense of the word, but only low country people that emigrated to the hills at some remote date. The original inhabitants appear to have been Vedans and Irulas whom the settlers appear to have killed and taken their women folk for their wives. One tradition has it that they are Vellalas who emigrated to these hills from Conjeevaram. Another tradition has it that they were soldiers of the Gangas who were defeated by the Cholas and driven to the hills about the 10th Century.

26. A Tamil poem called Arapoleswara Sathakam of 100 stanzas in praise of the Arapoleswaran God on the Kolli Hills, refers to the Malayali king of the Hills as Kangakala.

27. A third tradition has it that they are the natives of Malabar country and soldiers of a king of that country who, when they invaded the Chera country, and were defeated, had to flee to these hills for safety.

28. The Arapoleswaran temple on the Kollis, judged by the Alphabet of one of the long inscriptions, would suggest that it belongs to the Chola period of the thirteenth century.

29. Agriculture is the only source of livelihood of the Malayali done in the flat valley below the head of springs and streams. The hill slopes are cleared of their growth, and burnt and on the hill-side terraces are made into ploughed fields for the cultivation of dry crops.

30. *The Pachamalais.* The Pachamalais vary in height from 2,800 to 3,600. The hill tribes are known as Malayalees and are similar in character to those of the Kollimalais and the Shevaroy Malayalees. They too live mainly by agriculture and the sale of pine apples, plantains, jack fruits, etc., which they take down to the plains on shandy days and sell. Their origin and history is obscure.

31. All these hills are highly malarial so that the people of the plains hardly ever come up except to the Shevaroy which has Yercaud connected with the plains, by a good metalled road. The other hills have no means of getting up except by footpaths.

32. The rainfall on the plains is only up to 39.65 inches in the year. The mountainous character of the District causes sharp variation in the rainfall of different localities. So capricious are the showers round Salem that an inch may fall at the Collector's office and not a drop at the Club. There is generally in the District, considerable difficulty concerning the water supply, and the day when Mettur water comes to Salem Town would be a great day indeed.

33. The Kollimalais which lie in the Salem District are separated from the Pachamalais by the Turaiyur valley, and from the Bodamalais by the Arilpatti ghaut. They form a hill mass measuring 18 miles from North to South and 12 miles from East to West. The Pachamalais lie chiefly in the Trichinopoly District.

34. The average maximum temperature is 93 degrees and the average minimum 70.7 and the average mean 81.7.

35. *Geology.* To a great extent the rocks belong to the great metamorphic or gneissic series of Southern India, known as the Archaean series. The Shevaroy belongs to the Charnockite series and are igneous rocks. Near and about Salem, are the "Chalk Hills" from which magnesite is extracted and exported.

36. As a Forester, I shall be failing in my duty were I to omit a word about the Fauna of the District. It is much to be

deplored that game both big and small has been reduced to the lowest ebb by indiscriminate and continual shooting (poaching) by the hill tribes and others. To-day we are faced with a situation in which the preservation of wild life calls for the utmost consideration. One hardly ever sees an animal in the jungles now-a-days; and the little game that is left is confined to North Salem Division. Public opinion needs to be awakened against destruction of animals. We need to regard our Forests for a long time to come as game sanctuaries and keep our hands off animals. It is sad to have jungles with nothing more than human beings moving in them. I look to the Geographical Association to show their sympathy for spreading the correct ideas.

37. The work of the Forest Department is not probably fully understood by the public. Firstly the Department has to manage the forests in the general interest of the public and not for any individuals or small local communities. Therefore the local villagers are apt to regard the safeguards imposed by the Authorities as an unnecessary restriction on themselves. Secondly, forest areas are situated on difficult country, so that the work that goes on there is not evident to the general public. Thirdly, the practical results of various works are generally evident only after a long time, which may be a generation or more in the life of human beings. Forests exist only as a cause of grievance so long as Government attempts to prevent its destruction and to regulate the utilization of its produce, so that not only the present generation, but the generations to come benefit by it.

38. On 2 main principles underlie the forest practice, namely that of sustained yield and second of harvesting of the produce and its replacement by another as good if not better as that harvested. To secure continuity of working, to regulate the cut, to secure a convenient and orderly arrangement for fellings, to lay down sylvicultural rules to be followed in the regeneration, tending and harvesting of crops, a working plan is made on the basis of assessing, stock-mapping and valuation of the forests.

39. Although I should like to say something about this side of forestry, I feel sure that I have approached the endurance of my listeners and I must not encroach further upon their time.

40. It is in assuring that forests, such as they are, shall be a permanent national asset, that the forester inevitably comes into conflict with the present generation. With people who give no thought to anything but their own immediate needs the forest officer

must for ever be an unpopular person. Small causes operating through long periods of time produce important results and the forest officer who impounds a goat or fines an old woman for collecting twigs from the forest has this in mind. The essence of conservancy is the strictest regulation of the use of the forest for any purpose, the prevention of fire and theft, so that the forest may grow better and denser and confer on our children and our children's children its manifold benefits.

41. I feel grateful to the Secretary of the Association for having given me this opportunity of speaking before this conference.

Public Health of Salem District in Relation to Environment

By

MR. A. J. GEORGE, L.M.S., D.T.M., (CAL.).

District Health Officer, Salem.

MR. PRESIDENT, LADIES AND GENTLEMEN,

Salem District is an inland District with the sea 150 miles to the east and 300 miles to the west. The area is 7057.98 Sq. Miles. population 2,433,972. The physical characteristics vary to such an extent that we may roughly divide the district into 3 natural groups. There are 10 taluks with 1,896 villages.

(1) Hosur Taluk and northern portion of Krishnagiri taluks are situated at 3,000 feet above sea level and comprise one group. Here the climatic conditions, etc., closely approximate to those of Mysore plateau—*Balaghat*.

(2) The south-west portion of Hosur taluk, the southern portion of Krishnagiri Taluk, Dharmapuri and Harur taluks are roughly 1,300 feet above sea-level and constitute another natural grouping—*Baramahal*.

(3) Omalur, Salem, Attur, Tiruchengode and Namakkal taluks comprise the 3rd group and are situated at 1,000 feet above sea level—*Talaghat*.

Mountains. The whole District is scattered with small hillocks and hills all over and is rightly called a District of hills, dales and valleys. The chief mountains are Shevaroys 4,500 feet above sea level in Salem and Harur taluks, Kolli hills and Pachai hills 4,000 feet high in Namakkal taluk, Kalroyan hills 2,700 feet high in Attur taluk. Other hills of minor importance exist in Tiruchengode taluk. They vary from 1,500 to 2,000 feet high.

Rivers. The main rivers of the District are the Cauvery and the Pennar. All the others are tributaries of the above two rivers. The tributaries to the Cauvery are Doddanahalli, Chinnar, Thoppiar, Sarabhanga Muki and Tirumanimuthar. For the Pennar the chief tributaries are Markandeyanadi, Swarnamukhi and Vaniar. In Attur taluk the Vasishtanadi and Swetanadi are the chief rivers.

Besides these there are many rivulets flowing in the District. All these are dried up in summer except the Cauvery and the Pennar.

Forest. The forests are in plenty and forest produce fairly large.

Rain. A greater portion of the district depends for water supply for cultivation purposes as well as for the use of human beings on wells only, on account of the perversity of the rainfall (which is of frequent occurrence). Water scarcity is common more especially in summer months. The average annual rainfall is 30" while the rainfall in Shevaroyis is 60" on an average.

Crops. Dry cultivation prevails chiefly and there is a small amount of wet cultivation. The chief dry crops are cholam, ragi, and cotton, and the wet crops paddy, sugar-cane, plantains and a little of tobacco.

In the *Shevaroyis*, coffee, berikkai and custard apples are grown.

In the *Kolli hills*, dry crops are cultivated in plenty, besides jack fruits, plantains and oranges.

In the *Krishnagiri Taluk*, grapes flourish and are exported.

In the *Salem Taluk*, mangoes are of special importance, these being of graft variety.

Occupation. The main occupation is agriculture. Weaving of dhoties is carried on in Rasipuram, Salem and Tiruchengode taluks; woollen carpets of a coarse kind are made in Dharmapuri, Tiruchengode and Hosur Taluks. Sugarcane is largely cultivated in Rasipuram and Dharmapuri taluks, and jaggery is manufactured.

Having pointed out briefly the geographical peculiarities of the District, I shall now proceed to give an account of the epidemic and endemic diseases commonly prevalent in the District and which can directly be correlated to the geographical peculiarities pointed out above.

1. *Plague.* This disease is now practically confined to Hosur taluk. The climate of the taluk is cool and the starting of the epidemic could be definitely traced to importation of cases from the adjoining Mysore province. Usually it starts in the cold months i.e., November and December when the rat flea-population is distinctly on the increase. If the infection starts rather early i.e., in July or August towards just the close of the hot months, the epi-

demic is likely to become severe; and in the infected villages the nuisance created by the rat fleas is very great. If you just step into a village you will see rat fleas crawling up your legs.

The habits of the people are dirty, and they are economically in bad condition; and the overcrowded habitations favour infestation by rats. But even here, due to the close watch and anti-plague measures adopted by the Public Health staff specially employed, the virulence and extent of the disease is coming down. The following is the quarterly attacks and deaths for the last 5 years:—

Year.	1st.		2nd.		3rd.		4th.		Total.	
	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.
1931	35	13	0	0	1	0	43	22	79	35
1932	148	55	58	25	125	54	105	42	436	176
1933	133	65	56	13	443	178	222	108	854	364
1934	136	48	31	10	61	29	38	21	267	108
1935	22	8	5	2	8	3	0	0	35	13

It is a recognised fact and also well known that rats are the means of communicating the disease from one person to another and the particular agency in the transmission is the rat flea, which lives on the rat, sucking its blood.

So one of the anti-plague measures is that of catching rats and destroying them. The method till now used which is also now being continued in Hosur taluk is by means of rat traps.

Recently a newer and a more efficient method of destroying rats is put in force in Hosur taluk and that is cyanogas fumigation of rat burrows in houses; cyanogas is a deadly poison to all living and it speedily kills the rats, bandicoots, mice, etc., in burrows and what is more important is that it kills at the same time, the rat flea, the chief agent in transmitting Plague. It will be realised that by the destruction of rats caught in rat traps, the rat fleas generally escape destruction and they again infect other rats and transmit the disease. The great advantage of cyanogas fumigation of rat burrows is that rats as well as rat fleas are quickly and efficiently done away with. Further this method of cyanogas fumigation is going to be introduced shortly to disinfect clothing of infected persons and grains. Formerly sun-disinfection was being done for the infected clothing, grains, etc.; and it was very unsatisfactory as the conditions requisite for efficient disinfection were not always available. Anti-Plague inoculation is also being pushed on in infected places where the people do not evacuate the infected houses;

people, especially the agriculturists and cooly folk, are yet to realise the full value of the procedure adopted.

Permanent Anti-plague Measures are not attempted to be done yet in Hosur taluk such as rat proof godowns, removal of overcrowded buildings and opening up new extensions, etc., because it involves financial outlay. But it has been done in Salem Municipality. The number of extensions which we see in Salem city is the result of the sanitary conscience roused up in the minds of the well-to-do citizens after repeated attacks of plague to which the city was subjected in the early part of the century, i.e., between 1910 to 1925.

Malaria. Every year there are on an average about 15,000 deaths due to fever, and a third of this is due to Malaria. Hills and forests being in plenty Malaria is endemic. The worst infected area is the Kolli hills, Pachai hills and a portion of Harur taluk. In Shevaroy the disease is prevalent and at times assumes epidemic proportions. Government after investigation are pleased to extend the distribution of quinine to the villages in Kolli hills and in Uttankarai villages. The quinine is in the tablet form and the number of tablets required for a treatment is given to each patient freely with instructions. Each patient is to take 20 pills of 5 grain tabloids for a full course, each packet contains 20 such pills; and though the quinine is given, patients are generally found to stop the treatment when the fever temporarily subsides. It has been found very difficult in uncontrolled population to efficiently see that the full quantity of the treatment packets are taken by each individual. The chief agents for the distribution of quinine are the Village officers of the Revenue Department, Missionary bodies and teachers.

Besides the free distribution of quinine by Government the District Board purchases quinine every year for free distribution to villages in the rest of the district wherever the disease assumes epidemic proportions. Mention must be made here of Mettur where the disease is brought under complete control. Mettur was stricken with Malaria in former years. The place was carefully surveyed, the breeding places of anopheline mosquitoes were noted, and each one of these water places for a radius of one mile from the town is given antilarval treatment suited to each. Either Paris greening or oiling regularly and systematically and thoroughly was being done by trained staff under efficient supervision. The vegetation in Varis or small channels were systematically removed and oiled by a special method so that a thin layer

of oil was kept up in the surface. Surface drainage and sub-soil drainage were attended to. In fact the measures were so perfect in every particular and the supervision so efficient that we see to-day the complete eradication of Malaria from Mettur, and it is now no longer the scare that it used to be in old days.

Cholera. This district is not endemic for Cholera prevalence, but being introduced from adjoining infected places it assumes epidemic proportions when conditions are favourable for the spread. The disease usually starts with the onset of rains in September or October and assumes very great epidemic proportions especially along the villages situated by the side of the rivers. And in two taluks, Krishnagiri and Attur and more especially in the latter, the disease spreads very rapidly along the rivers, and villages on the banks very soon begin to get infected. Consequently, the eradication of the disease, once it gets a hold in the two taluks noted above is a difficult and laborious task.

Burial of dead bodies on the banks of the river, washing of infected materials in the rivers and indiscriminate defecation on the banks and river-beds are the dangerous causes for the spread of the disease in this area.

Last year (1935) we had 1669 attacks and 849 deaths due to Cholera, and the major portion of these were in Krishnagiri and Attur taluks.

Guinea-worm. This disease is prevalent in the southern taluks especially Rasipuram, Tiruchengode and Namakkal where step wells are numerous and water scarcity is prevalent. Though the remedy from a preventive aspect is to remove the steps of the step wells and conversion of the same into draw wells fitted with pulley and rope, yet from a practical point of view the adoption of the proposal is very slow and progress in this direction is not satisfactory. The enormous cost of conversion of the step wells into draw wells and the habits of the people are the chief stumbling blocks in the way of improving such dangerous sources of water supply. A new remedy is now going to be adopted, and that is the introduction into these wells of a particular kind of fish (*Barbus Puckelli*) which eats away the larva of guinea-worm as well as its host "cyclops quadricornis"; and the results of the new remedy would be watched with interest. Even then it is not desirable to have step wells, since the chances of other contamination occurring is great.

Small pox. This disease is endemic. It usually assumes epidemic proportions especially in the hot months of the year due chiefly to the infected materials such as scabs from the small-pox ulcer being blown about by the wind. The infection subsides gradually with the onset of rains. It is of late prevalent in almost all the taluks of the district. The immunity conferred by primary vaccination in infancy gradually wears away in course of time and it is noted that the incidence of the disease is chiefly among the adult population and also among those who had for some reason or other escaped primary vaccination in infancy. As a remedial measure, primary vaccination and mass revaccination are being pushed on; revaccination among adults once in 7 years is now compulsory as per rules.

Diseases of the hot months. Conjunctivitis (sore eyes) is common. Among the others may be included Dysentery, Diarrhoea and skin affections like boils, etc. As these are not peculiar to this district alone but are also common in other districts, no special remarks are necessary.

Leprosy. A passing note may be made to the prevalence of Leprosy in this district and measures adopted to bring relief to the affected and to prevent the spread. The disease is noticed to prevail particularly among the weaver population. At present there are estimated to be 20,381 leper cases in the district not to speak of the early cases still undiagnosed. Perhaps a host of causes bring about the disease, though it is difficult to point to a particular cause. Bad economic conditions, overcrowding, intemperance, eating of stale fish and a poor state of general health are found to prevail among this class of people. It is also found to be prevalent in the villages situated on the banks of the river where the river beds offer wide expanse of sandy areas.

We have forty part-time clinics attached to hospitals and dispensaries where leper patients receive treatment twice a week and one full time clinic at Peddunaickampalayam where the Medical Officer in charge treats cases, does leprosy survey, i.e. collecting statistics by inspecting house to house in the villages allotted to him. We are also doing intensive work in demonstration centres.

Such in brief is the survey of a great part of the Public Health activities of this district. Much remains to be done yet, e.g., provision of good drinking water wells for villages and improvement of village sanitation. The progress is necessarily slow as funds are required in sufficient amounts; but at the same time, a steady

though slow progress is being made on the onward march towards the desired goal.

Conclusion. In conclusion I thank the Secretary, Mr. Subramania Ayyar for having given me the chance of talking to you regarding the Public Health aspect of this district to such a learned audience and I hope that it has been of some use for the deliberations of the Conference. I also thank the Chairman and the learned audience for having patiently heard all that I had to say.

Population of Salem District

By

MR. K. SRINIVASARAGHAVAN, M.A., DIP. IN GEO.

Salem district, though a political unit, can be divided into four distinct Geographical regions. 1. The Balaghat forming part of Hosur taluk and Krishnagiri taluk, belongs strictly to the Mysore plateau and is above 3000' in elevation. It is peopled mainly by Kanarese people and the population is distributed more along the four river valleys in the area.

2. The Baramahal (the twelve forts) forms part of the taluks of Hosur, Krishnagiri, Dharmapuri, and Harur and lies at an average elevation of 1300'. It forms the main step leading from the Mysore plateau to the Carnatic plains, and has been historically of very great military importance.

3. The Talaghat forms the rest of the district and has an average elevation of less than 1000'. This is the densely peopled area and is the most important region of the district.

4. The scattered and isolated hills of which the most important are the Shevaroyas, Kalroyans and Kollimalais are distributed over the Talaghat region. These are peopled by the hill tribes known as Malayalees and the human settlements and activities are distinctly peculiar to this region.

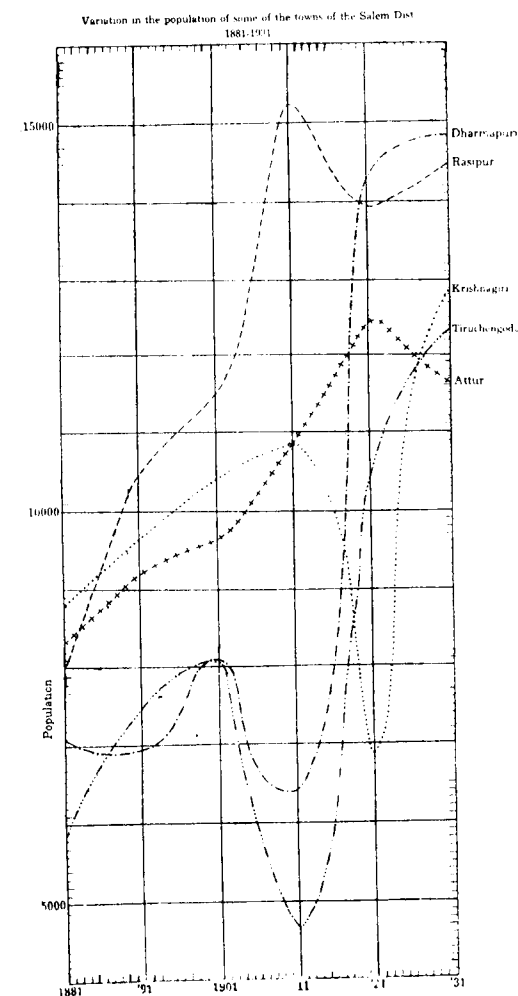
The Northern half of the district has for ages been the cockpit of contending forces from the plateau and the plains, and thus this area has never permitted the growth of a settled population or culture. This is seen from the lack of Siva and Vaishnava temples of importance. But a few towns have begun to grow during the last century and the rail and road have to a certain extent brought more human settlements to this area.

Geographically the district has extremes of relief condition, an excessive range in temperatures and very differing rainfall and soil conditions. Again there are flat plateaus, deep valleys, basins among hills and isolated hills of varying heights. Thus the region has been an uninviting one for human settlements and has to a great extent contributed to the uneven distribution of population,

the southern portion in general being more densely peopled than the northern portion.

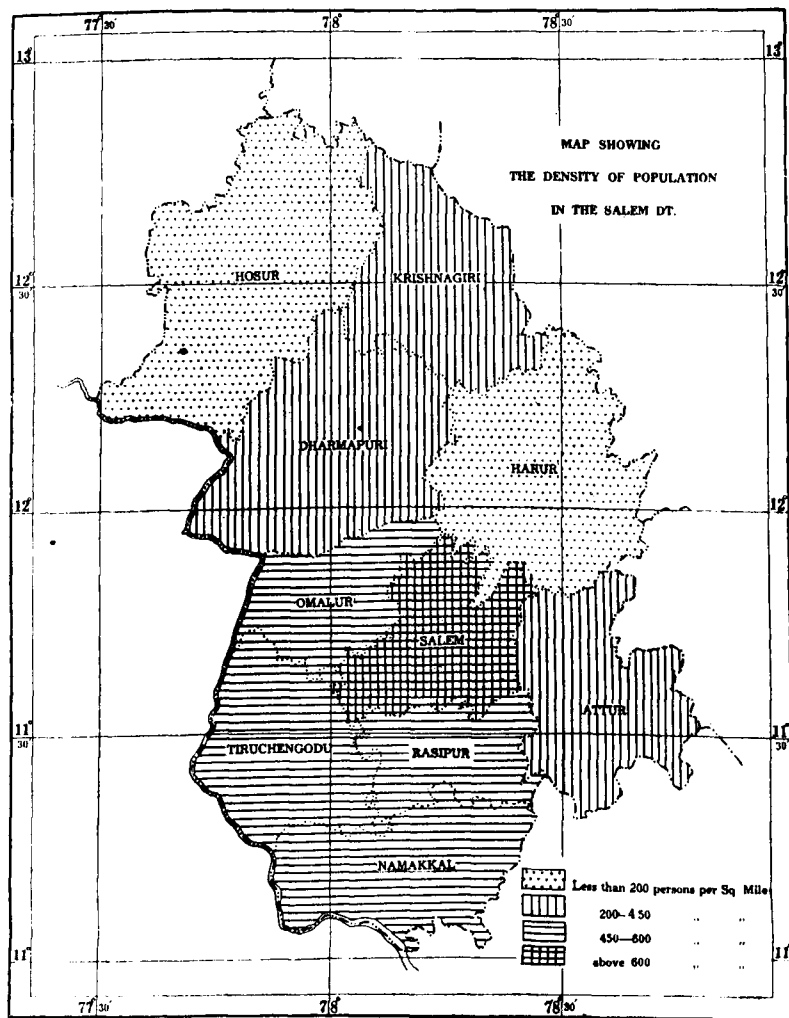
Modern methods of forestation, and plantations and cattle breeding have tended to increase the population of the district and to a certain extent has brought peace and prosperity to the people.

A glance at the table of variation of population in the district shows that there has been fluctuations in the population of the



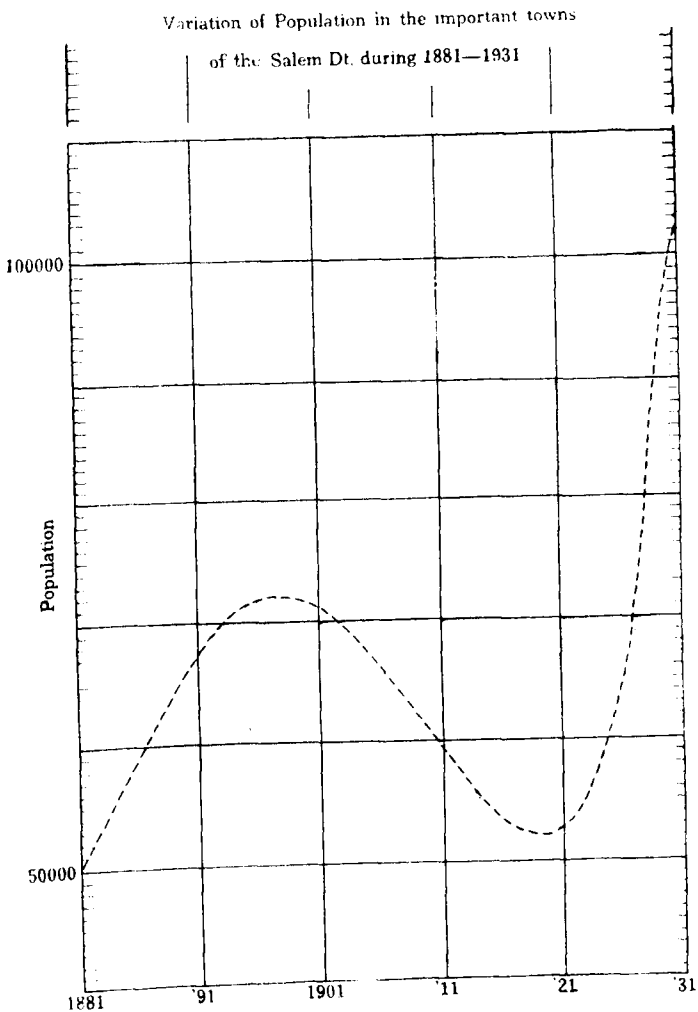
taluks. This has been due to the great number of constantly recurring famines and the epidemic of plague. On the whole the district has been steadily increasing in population during the last 50 years and has increased by 14% during 1921-31. All the taluks have shown a marked rise during 1921-31.

Salem district has an area of 7058 sq. miles and has an average density of 345 per sq. mile. It is not a densely peopled district compared to the other districts of the presidency, though in total population it holds the 5th rank. The distribution between urban and rural (194932 : 2239040) is 1:11.5 nearly, indicating a high urban population. But there is only one town of importance and that is Salem with a population of 102179, holding the 4th rank among the 1st class towns of the presidency. The remaining are all IVth and Vth class towns.



Salem Town has grown 100% strong during the last decade. All the towns show a definite and steady increase during 1921-31. The population of all the towns has been slowly rising from

1881-1901, but every town except Attur has suffered a rapid and effective loss sometime during 1901-1921. This has been due to the constant outbreaks of plague and famines in the district during 1901-1921. Attur alone has not felt such rapid fluctuations: it has had a steady increase and has fallen slightly during the last decade when all the other towns have shot up rapidly. This is because the upper Vellar basin has resisted all famines successfully, though

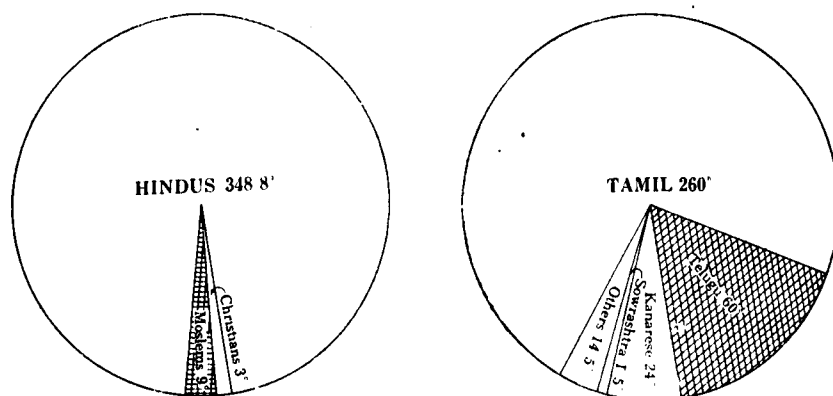


it suffers from cholera and malaria. Better sanitation and economic conditions have favoured the rapid rise of population during 1921-1931 in all the towns and taluks. The densely peopled taluks lie in the level agricultural regions in the South of the district and Salem taluk has a very high density partly due to the concentration

in and around the town of Salem. Of all the towns of the presidency Salem has had the greatest increase in population. It has extended its Municipal limits, has started a number of town extensions and has improved its sanitation and health. Again the Mettur dam, the Salem—Cuddalore Railway, and the numerous motor bus routes converging on the city and the position of Salem town at the convergence of five natural routes have contributed to its rapid rise.

It is usual in all areas in the Madras Presidency to find a greater percentage of female population than male population. This is true of the Salem district (M : 1211743 ; F : 1222229) as a whole and of many of the taluks. Hosur, Mettur and Salem are the exceptions. Mettur and Salem have a greater % of males due to the demand of male labour in those areas and this drawn from all parts of the district. Hosur has an unnaturally predominating male population among the Non-Brahmin Hindus (M : 77286, F : 74656) and Harijans (M : 14228 F : 13454).

Salem district may be considered as representative of the total population of the Tamil districts, considering the proportionate distribution of Tamil, Telugu, Kanarese and Sourashtri. The Balaghat portion of the district is mainly Kanarese while the foot hill region is mainly Telugu. The Telugu population in the Tamil districts is distributed as a wedge or tongue extending along the foot of the plateau in Chittoor, North Arcot, Salem and Coimbatore districts. The Reddis and Kammars who followed in the wake of the



Telugu occupation of the Tamil districts, being specialists in the cultivation of dry crops have settled along this region. The Shevaroyas, Kalroyans, and Kolli Malais are peopled by a civilised hill tribe termed the Malayalees (people of the Mountain land) who have their own peculiar customs and manners. The Sourashtris are

restricted to Salem town and its suburbs. The primitive people of the district, the Kurumbas, speak Tamil, Telugu and Kanareese according to the locality in which they live and they live mainly by sheep rearing and occupy the dry hilly areas, while a few have taken to the cultivation of land. The other castes of the Tamil people occupy most of the district.

The percentage of literates in the district is 5.7 and among the communities it is as follows: Hindus 5.3. Moslems 14.5 and Christians: 18.0. In general the district has a very low percentage of literates compared to the other districts of the Tamil country.

The health of the district is very good except for the epidemics of plague, cholera and malaria; and the percentage of criminals and defectives is low.

POPULATION OF SALEM DISTRICT.

No.	Name of Taluk.	Area in sq. Miles.	Towns.	Villages.	Occupied Houses.	No. of Males.	No. of Females.	Total Population in 1931.	Density per sq. Mile.	Increase 1911-21. % from	Increase 1921-31. % from
1.	Attur	649	1	128	38049	94699	96557	191256	295	5.4	6.8
2.	Dharmapuri	897	1	147	47014	119866	126176	240042	268	4.8	14.8
3.	Harur	910	-	143	37735	90335	90406	180741	199	2.5	18.3
4.	Hosur	1182	1	343	38300	100095	96267	196362	166	4.9	10.4
5.	Krishnagiri	687	1	169	44187	105922	107080	213002	310	7.0	21.7
6.	Namakkal	618	2	195	69313	136144	145897	282041	456	3.8	2.0
7.	{ Mettur	235	-	21	(15450)	34992	33227	68219	290	3.2	73.8
	{ Omalur	367	-	131	39426	97710	98215	195925	534	12.1	20.1
8.	Rasipuram	387	1	84	39327	88784	90228	179012	463	13.4	4.0
9.	Salem	522	1	283	66673	169203	167844	337047	646	3.7	36.7
10.	Tiruchengodu	604	1	174	81889	173993	176332	350325	580	12.9	5.1
Total		7058	9	1818	517363	1211743	1222229	2433972	345	3.4	14.0

VARIATION IN POPULATION OF THE TOWNS OF SALEM DT. FROM 1881-1931.

Name.	Class.	Presidency Rank.	Population in 1931.	1921.	1911.	1901.	1891.	1881.
Salem	I	4	192179	52244	59153	70621	67710	50667
Dharmapuri	IV	111	14815	14393	6458	8102	6939	7090
Rasipur	"	112	14438	13978	15238	11512	10539	7969
Krishnagiri	"	132	12859	6947	10887	10446	9726	8856
Tiruchengodu	"	140	12322	10513	4645	8196	7511	5889
Attur	"	151	11697	12499	10992	9673	9295	8334
Seendamangalam	"	160	11254	12972	9196	13584	13354	12575
Namakkal	V	206	9306	9293	5196	6843	6341	5147
Hosur	"	306	6071	5519	5913	6695	5756	5869
Salem District	"	5	2433972	2135799	2666080	1987532	1758588	

LITERACY IN SALEM DISTRICT.

Religion	Population	Literates	Literates in English.
Hindus	2348325	124991	12982
Moslems	61882	8938	998
Christians	23667	4192	1951
Others	98	34	24
Total	2433972	138155	15955

DISTRIBUTION OF LANGUAGES IN THE SALEM DISTRICT AND MADRAS PRESIDENCY

Language	Salem District	Madras Presidency.
Tamil	1776762	18896718
Telugu	416224	17782898
Kanarese	165254	1685543
Sourashtri	10476	104076
Others	65256	8724367
Total	2433972	47193602

DEFECTIVES IN SALEM DISTRICT AND MADRAS PRESIDENCY.

	Salem District.	Madras Presidency
Total afflicted	4486	134611
Insane	466	15566
Deaf Mutes	1315	33736
Blind	1646	52279
Lepers	1064	33321

Communication Lines and Nodal Centres of Salem District.

By

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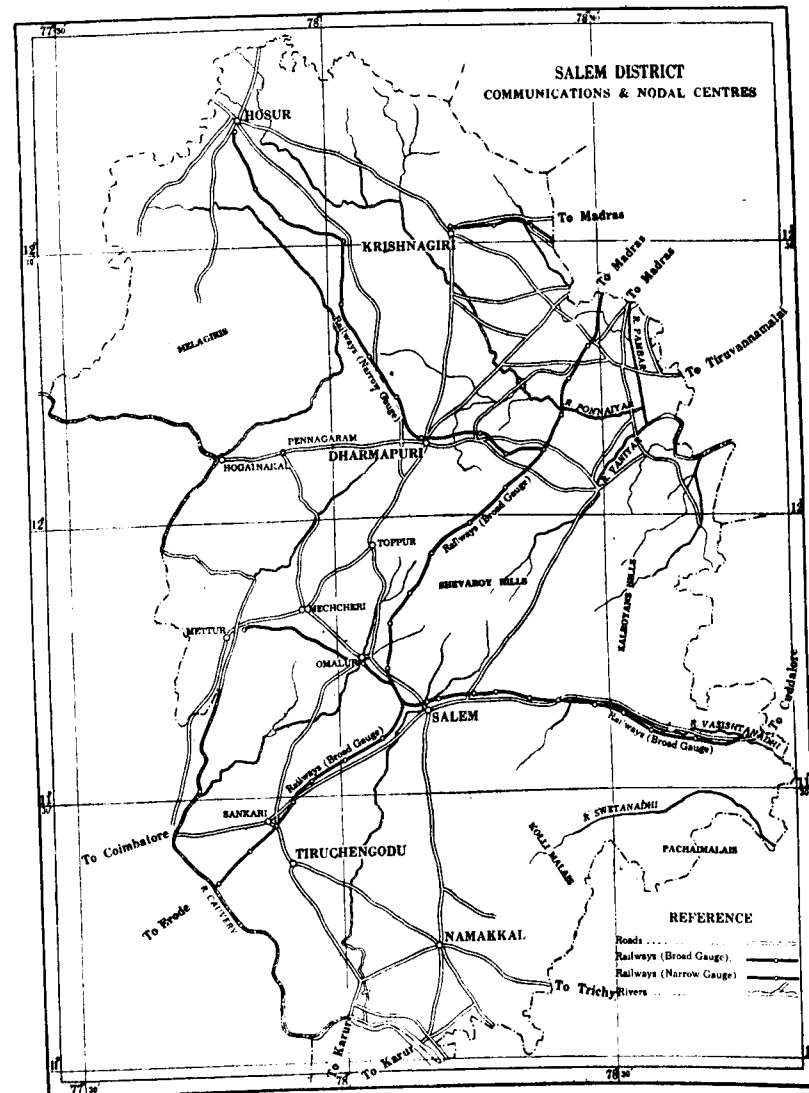
The District of Salem may be looked upon as a very rough elongated oblong with a jagged concavity on the western side, a slight convexity on the eastern side and roughly rounded on the northern and southern sides. It lies between the Mysore plateau and the Carnatic plain nestling itself on, and forming part of, the plateau on its north-western side, and descending from it in two terraces southwards to the plain. Consequently, through it runs the main route from Madras and the Palar valley to the west coast across the Cauvery valley and through the Palghat gap. And through it also runs the route from the Tanjore delta and farther south to the Mysore plateau.

Besides this important location with two main highways crossing each other, *relief* has also played an important part in the *alignment* of these trunk routes as well as of the subsidiary ones in the District. The Melagiris and other hills of the north-west, the Shevaroy and the Chitteris that lie between the Baramahal and Talaghat regions of the District, the Kolli Malais, Pachai Malais and the Kalrayans on the south-eastern and eastern parts—all have had their influence on the communication lines, both rail and road.

The main east-to-west route from Madras to Bangalore and Mysore runs up to Vaniambadi along the Palar valley, which at this point curves away north-westwards up the plateau, while the road and rail at the same time part company. From Jalarpet Junction the railway runs westwards to Bangalore just outside the District, while the corresponding road runs within the District across the north of it, passing through Krishnagiri and Hosur.

The broad guage section of the South Indian Railway starts from Jalarpet, and passing through Tiruppattur in the North Arcot District, runs diagonally across the District of Salem, cutting between the Shevaroy and their western spurs and passing through Salem. After crossing the Cauvery near Erode Junction, it continues thence to the West Coast.

The trunk road from Madras and Bangalore to the West Coast separates from Krishnagiri on the Madras-Bangalore road, and runs southwards through Dharmapuri to Toppur Ghat, beyond which it used to pass through Omalur, Salem and Sankeri to Bhavani by a masonry bridge across the Cauvery. But recently the distance for



through traffic along this route has been reduced by about 30 miles or so, by constructing a cross-cut road from Toppur Ghat to Mettur, which is already linked with Bhavani by means of a pre-existing road along the Cauvery valley.

It is interesting to note that the main route for both road and rail has thus to run the whole length of the District from north to south as the outlet to the West Coast region lies only through the Palghat gap.

Owing to the hilly and rugged nature of the land for the most part in the west of the District, there are few roads on that side; and all roads to Bangalore and Mysore from the East and the South have to converge like a funnel at Hosur, which is the natural nodal centre of the Balaghat region of the District. A bad and neglected road unfit for motor traffic runs through the rugged western parts of Dharmapuri and Hosur Taluks from Mecheri through Perumbalai, Pennagaram and Denkanikota to Hosur. This road appears to be used at present mostly for the transport of hill products.

From Dharmapuri two alternative roads run to Hosur, the more frequented one going through Krishnagiri on the Madras-Bangalore trunk road and the other somewhat steeper one passing through Palakode and Rayakotah. Along the latter runs also the branch railway from Morappur to Dharmapuri and Hosur, which was constructed as a famine feeder line. Owing to the difference in gauge it has not been found worth while to link up by rail the short distance between Hosur and Bangalore.

Two other short branch lines run westwards from the main S. I. R. line—the one from Tiruppattur to Krishnagiri and the other from Salem Junction to Mettur.

Four routes run eastwards from the District to the eastern seaboard along river-valleys or gaps between the hill-groups. The first of these is the Madras-Bangalore route taken by road and rail along the Palar valley, already referred to. The next is the route through the gap between the Jawwadis and the Kalrayans. There is no railway along this route. The road from Bangalore bifurcates at Krishnagiri and runs through Uttangarai, Singarapettai, Chengam and Tiruvannamalai to the Karnatic plain and the eastern coastal region. This was the route taken by the invading armies of Haidar Ali and Tipu Sultan in their wars with the English East India Co. at Madras.

Between the Kalrayans and the Pachai Malai lies the Attur gap through which runs the Vellar valley; and this road is taken by the road and rail that link up Salem with the sea-board in South Arcot District. It is a fertile well-populated ribbon of land, rarely visited by famines.

The fourth and last eastern route is the *Cauvery valley route*. It runs from Salem southwards to Namakkal, and thence south-eastwards between the Kolli Hills and Talaimalai to Musiri on the north bank of the Cauvery. From there it is continued along the Cauvery bank to Trichinopoly and Tanjore. The corresponding railway line runs from Erode to Trichinopoly, lying wholly outside the District in the south as the Jalarpet-Madras line lies wholly outside the District in the north.

The only hill-road in the District runs up to *Yercaud* from *Salem*, and is taken to some of the villages on the Shevaroyes. It is kept in a good condition from the foot of the Hills by the Public Works Department. There is daily bus service from Salem to Yercaud.

Let us next take up for consideration the chief *nodal centres* in the District. Besides Hosur and Krishnagiri, the two nodal centres in the north already mentioned, Dharmapuri, Salem and Namakkal are the other important ones, all lying along the main route.

Dharmapuri, the old Tagadur, is the natural centre of the Baramahahal region; and six important roads radiate from this place in different directions—two to Hosur already referred to, one of them north-westwards through Rayakota and the other northwards through Krishnagiri, one road runs north-eastwards to Tiruppattur in the North Arcot District, one to Harur eastwards, one to Pennagaram westwards and thence to the Hogainakkal Falls, and lastly one to Toppur Ghat which bifurcates there, one branch (the old trunk road) running through Omalur to Salem and the other running through Mecheri to Mettur (the new trunk road).

Salem, being the Headquarters of the District and due also to its location, forms another important nodal centre on the main route both for roads and for railways, which radiate in all directions. Roads run to Dharmapuri in the north, Mettur in the north-west, to Sankeri and Bhavani in the south-west, to Namakkal and Karur in the south, to Attur and Kallakurichi in the east and to Harur, Uttangarai and Tiruppattur in the north-east. The last road runs through Manjavadi Ghat between the Shevaroyes and the Chitteris. The hill-road to Yercaud also starts from Salem. The railway lines meeting at Salem have already been mentioned.

Namakkal is the natural nodal centre of the Talaghat region more than Salem itself, whose position is more marginal than focal. It lies on the highway from Trichinopoly to Bangalore, the

importance of which route is evidenced by the fact that it links up all the chief centres of the District. There is a regular daily bus service along this route all the way. Besides the roads to Salem and Musiri-Trichinopoly in the above route, roads run to Mohanur and Karur in the South, to Paramatti and Pugalur in the south-west and to Trichengode, Sankeri and Bhavani in the north-west.

The Cauvery is crossed by one railway-bridge near Erode, by two road-bridges at Bhavani and Mettur respectively, and by coracles of wicker-work lined by leather at several ferries.

The road-rail competition has been as much in evidence in this district as elsewhere; and quite recently the motor lorry has been seizing the goods traffic from the railway, e.g., in the Bangalore-Trichy route.

The roads of Salem District can easily be improved with a little more attention on the part of the authorities, as the bedrock is hard and gritty road metal is easily available in most parts. Further, there is no fear of rapid erosion by heavy rainfalls as in Malabar. Several of the bridges even on the trunk road such as that on the Pennar near Kaveripatnam and that over the Vepadi Ar near Toppur Ghat are so narrow that no cars or carts coming from opposite directions can pass each other. In this automobile age when every person—the rich man in his car and the poor man by means of the bus—desires to have comfortable and easy access to all parts of the district as well as through the District, it is most harassing to find the roads and bridges in a bad condition. A reasonable and helpful policy of road development and maintenance is badly needed everywhere.

The Shevaroy's Region.

By

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The Shevaroy's. The Shevaroy hills (spelt in Tamil as the "Servarayan hills" form the noblest mountain mass in the Salem District. They are 17 miles long at the greatest length and 12 miles broad at the greatest width. The whole area covers over 100 sq. miles. The southern slopes rise abruptly to a height of about 4,000 ft. The villages of Gundur and Teppakkadu lie here. The Ghat Motor road passes to the west of the villages.

Most of the drainage of the hills is towards the north where the slopes are broken with deep ravines. The Vaniar valley divides the area into two portions. The river Vaniar, a tributary of the Penar, rises near Sengadu (near which place is the Mailapatti Coffee Estate) and flows in a north-easterly direction. The gorge through which it flows is one of the grandest. This is parallel to the Manjavadi pass in the east through which the road from Salem to Harur runs. On both sides of the Vaniar Valley there are villages on the plateau. In the eastern plateau are the villages of Talachchulai, Kottachchedu, Pelakkadu (which lies a little to the east), Maramangalam and Kombutukki. The western portion is more massive and reaches a higher elevation. To the west of this mountain mass is the Kadayampatti river which flows west-north-west, and on the top of this valley are the villages of Nagalur, Muluvi and Karadiyur. The southern half of this mountain mass contains the peaks of the Shervarayan, 5,342 ft. (near which is the Bear's Cave), and Sanyasimalai, 5,231 ft. (to the south of which is the Kudarapanjan Coffee Estate), and further south is the plateau of Yercaud. On the way from Sanyasimalai to Yercaud is Eachangadu, where the revered Doctor Miller of the Madras Christian College, has built a fine mansion called the "Mountain Home," by the side of which is an equally excellent home for students; both of these once served as a summer resort for the Professors and students. These bungalows are now owned by the Zamindar of Kannankurichi, through whose generosity the writer was once able to occupy the "Miller Home" with a party of students, on an excursion trip.

The village of Yercaud is surrounded by a circlet of hills and one of these hills jutting southward affords the place known as the

"Ladies' Seat" from where a picturesque view of the Ghat road with its numerous curves and of the environs of Salem can be had. In the distance can be seen the Mettur reservoir, the blue expanse of water with the hills rising near by.

The northern half of the western plateau consists of the main central backbone of the Shevaroy's. The P. W. D. loop road goes round this mountain mass. Besides Shevaroyan, there are other peaks such as the Branfill 5,410 ft., Balamadies 5,370 ft., and Cauveri Peak 5,086 ft. At Cauveri Peak the plateau forks, the left branch running north to the village of Sengalattuppadi and the right branch following the Vaniar Valley to the village of Solambadi.

The eastern portion of this main mass, known as the Green Hills contain the villages of Puliur, and Vellakkadai. This part of the plateau overlooks the Vaniar Valley. There are some bold cliffs here, chief among them being the Hawthorns 4,899 ft. and the Honeyrock 4,533 ft. Just opposite the Honeyrock (near which place the writer was staying) the Vaniar flows down below at a level of 2,490 ft though only a mile distant. It is a beautiful view down from the precipitous rock.

On the western side is the Nagalur plateau with the neighbouring group of villages. To the south of this is the Kadayampatti valley and to the north is the Veppadi Valley. In the latter is the Thoppur river which rises near Muluvi, and running along the Thoppur Ghat joins the Cauveri at Solappadi. The river, which flows through the Kadayampatti valley, runs past Omalur and combining with another river passes through Edappadi and empties itself into the Cauveri near Kaveripatti.

The temperature on the Shevaroy's is most equable. The hottest months are March, April and May, when the thermometer rises to 87°F in shade. The usual reading in December is 65°F. occasionally going down below 60°F. Though the Shevaroy's get the advantage of both the monsoons, the winter monsoon gives more rain. The following are the average figures in inches for the period 1870-1930 :—

Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
2.38	2.68	1.99	6.37	12.87	11.29	14.16	19.05	19.50	20.36	12.36	5.5

Total 128.36 inches for the year.

It would seem that the heaviest rain occurs when the wind is weakest. When the wind is strong in February and March, there is little rainfall. Sometimes mist covers up the roads and houses.

The general type of the rocks of the hills is said to belong to the great metamorphic or gneissic series. Intrusions are younger igneous ones. The 'white elephant' rocks on the southern and eastern sides are igneous intrusions. Some quartz rocks are visible on the hill spurs in the south.

No systematic survey of the flora and fauna of the Shevaroyis appears to have been attempted. Such an attempt would be highly advantageous both as a means of increasing our knowledge and as a means of increasing the opportunities for utilising the natural wealth of the Shevaroyis. The ferns on the hills are numerous—ferns known as lace, silver royal etc. Tree ferns and palm ferns are abundant. Of the indigenous trees the chief are the blackwood and Selvanji. These are fast disappearing. Daria, Naga, Almond, and fig trees are common. Gallnut and Jack are also found in plenty. Fruit trees are mentioned later on.

The fauna of the region is not as rich as one would have expected. Though the district of Salem is noted for cattle breeding, there is nothing worthy of special mention about the cattle on the Shevaroyis. The Malayalees are engaged in herding—and this very often detracts youngsters from schools. But the cattle appear to be diminutive in size, though their horns are beautifully shaped and are imposing in appearance. Ponies and asses are rare. Sheep and goats are said to be increasing.

There is practically no wild game on the hills. Tigers are not heard of; but panthers are occasionally heard to prowl about. Bears are found here and there—the very name 'Bears' Cave,' suggests the former abode of bears. Hares, rabbits, jungle cats, civet cats are met with. Big game is fast disappearing. Sambar, bison, and spotted deer are said to have almost died out. Wild pigs are common and they often destroy plants. Wolves, red-dogs and foxes are occasionally seen. The common monkey is found on the lower spurs. Small game such as green and blue pigeons, pea-fowls, jungle-fowls and wood-cocks can be seen almost anywhere. Snakes do not appear to be numerous.

The easy way of approach to the Shevaroyis is from the South, i.e., from Salem side, where there is a beautiful Ghat Road for motor traffic. This road maintained by the P.W.D. ascends up from the foot of the hills by means of a number of hairpin turnings. This road is 14 miles; from the foot of the hills, roads go to Salem Junction and to Salem Town which are at a distance of 6 miles

and 5 miles. It was originally proposed to take a road from Danishpet Railway Station to Yercaud, up the Kadayampatti Valley; but this was abandoned later on; and the Salem road has developed. There is a shorter way from the foot of the hills. This is seven miles and this path is used by pedestrians, coolies and pack ponies. The ascent from the north and the west and the east are rather difficult.

Roads are fairly comfortable for motor journey especially in and around Yercaud itself. The P.W.D. loop road starts near the Yercaud lake (Shandy place) passes through Eachangadu, Nagalur, Semmanatham, Nanthanchedu, Vellakkadi, Puliya, Manjakuttai and Kombakkadu; thus circling round the mountain mass which contains the Shevaroy Peak, reaches the starting place again. It is 21 miles long. From Yercaud there is a road to Mettukkadu and south of Nagalur there is a road branching from the loop road to Kadayampatti. These roads are not so comfortable for motor journey. There are a good many private roads maintained by the various Estates. Of course foot-paths and tracks take the traveller to interior villages.

3. *Yercaud*.—Yercaud is the chief town on the Shevaroyis. In 1911 its population was 1322, in 1931 the population has increased to 2398. The town is on the southern part of the plateau; it may be said that it is very near the junction of the eastern plateau and the western plateau. Though there are more beautiful sites, this spot was selected for settlement about the year 1841, when the Rev. J. M. Lechler built the first house. The "Fairlawns" was built by Mr. Brett, District Collector in 1845. The "Grange" was built in 1849. It was planned to make this house, a place of refuge for Europeans during the Mutiny of 1857, in case there was any trouble. The ground floor was stocked with provisions and guns were placed in position and rehearsals of alarm signals and immediate running into shelter were practised. But there was no need for all these, for there was no rising in South India during 1857. The lake in Yercaud gives the name to the place. Yercaud is Yeri (lake) Kadu (forest). This lake may, with advantage, be converted into a boating place. Near the lake is the shandy ground, the weekly market being held on Sunday (on Wednesday also the villagers bring articles for sale in Yercaud). To the north of the lake is a level maidan, which seems to have been used as a parade ground. The Lady's seat to the south of the bazaar street is a place often visited by newcomers. Further away are Prospect Point and Pagoda Point which are notable heights. It is said that on a clear

day the Palanis, the Anamalais and even the Nilgiris are visible from these points.

Yercaud is looked after by a Union Panchayat. The place is considered a fairly good sanatorium.

The imperative need for Yercaud is a protected water supply. This problem seems to have been investigated and has evidently been abandoned for lack of a suitable storage on a sufficiently high level and for lack of sufficient funds. Water is pumped up from the lake by a wind-mill and is supplied to the P.W.D. Bungalow; but this water is not safe for drinking. Electrification has not yet been thought of. Evidently the cost is too much for practical achievement in the near future. The bazaar portion of the town with the hotchpotch huts of tin-sheet roofs and walls, require better drainage. If more social and recreative amenities such as the cinema, the theatre, boating, etc., are provided, Yercaud will very soon compete favourably with the other hill stations, in drawing more visitors from the plains during the hot season.

There are 64 villages including Yercaud on the Shevaroyes with a total population of 16942 (according to the census of 1931).

Of the total, there are 18 Brahmans (all of them in Yercaud), 150 Muslims (of whom about 100 are in Yercaud, and the rest in Kolagur, Mangalam, Muluvi, Nagalur and Vellakkadai, as petty shop keepers), and about 1700 Christians (of whom about 1200 are in Yercaud). There are more Christians in Nagalur, Puliur, Mailappatti and Athiyur than in other villages. Of the total population of 16,942, only 3,814 are classified as depressed classes in the Census Village Statistics.

The majority of the people in the interior villages are Malayalee Goundars and evidently they did not express themselves as belonging to the depressed classes (now called the scheduled classes).

The Malayalees.—The Malayalees are Vellalas by caste and most of them call themselves Goundars, but they don't claim kinship with the Goundars in the plains. They are said to be the descendants of immigrants from Conjeevaram. The story is that 3 brothers came from Conjeevaram and selected their settlements—one on the Kalrayans and the Shevaroyes, the second on the Pachamalais and the third on the Kollimalais. This is said to be the origin of the three classes of Malayalees:—(1) the Peria Malayalees, the descendants of Periannan, living on the Kalrayans, the Shevaroyes and the Chitteries, (2) the Pachai Malayalees and (3)

the Kolli Malayalees. The name Malayalee appears to be similar to the names Malayalee (or the people of Malabar and the west coast, generally called in Tamil, Malayalees); but here the name Malayalee merely denotes the people on the malais (hills) that is hill people (or Malayalees). Though the similarity in name may suggest the possibility of migration of people to these hills from Malabar, yet no such theory has been put forward and supported. There might have been stray instances of such migration.

The Malayalees live in numerous villages, each village consisting of about 20 to 100 conical shaped huts. Their language is Tamil. They are mainly an agricultural people, cultivating different kinds of grain. Cattle forming is a secondary occupation. Hunting and collecting minor forest products are occasional kinds of work.

The people are extremely clannish, as is the general case with all mountain people. However they form a far more homogeneous community than the people on the plains. Some of their old quaint customs are still preserved owing to the isolation of the people, but many of these customs are gradually disappearing now when the tide of "modernism" is rushing up the hills.

The Malayalees are generally divided into Vaguppus and further into groups. Certain groups are dayadis or kinsmen; and intermarriage among these dayadis is forbidden. This custom is observed also among the people on the plains. The nominal head of each vaguppu is the Ur Kavandan who is usually elected from a particular group prescribed by custom; so much so the headship has gradually become hereditary. The Manikaran in each village officiates during ceremonial occasions. There is said to be a guru at Chitteri, who appears to be held in reverence by the Malayalees in general. His hold on the people however seems to have almost disappeared. Brahman Purohits are not usually brought in for any ceremony. The Malayalees believe in Astrology and witchcraft; and some of the wandering astrologers from the plains have an easy means of livelihood as they go from village to village.

The marriage customs are almost the same as on the plains. The 'Urimai' custom (that is the young man's right to choose his sister's daughter or uncle's daughter) is gradually dying out. It may be mentioned that this custom is still in vogue among some of the castes on the plains.

The children are named usually after the various popular deities held in reverence by the villagers—Kongan, Siddhan, Siran-

gan, Pidaree and others. Recent innovations in dress such as shirt, coat, jacket, etc., are becoming very popular. Meat eating is not forbidden. Men and women appear to be fond of smoking; and tobacco products were usually got in exchange from the plains; but now they are easily purchased.

The Malayalee village looks like a bee-hive—the huts popping up on the plateaus and slopes give a beautiful sight from above. Almost all the huts are circular; the walls are made of clay, with split bamboos put inside to make a sort of frame-work; the conical roof is thickly thatched with grass. Windows are rare and usually there is only one entrance for the hut. There is a loft (paran) in the inner circular room which serves as a store-place. In the outer circular room calves and poultry are also kept. Separate sheds for cattle and poultry are now gradually coming into use. One or two brick-walled and zinc-sheet-roofed (and sometimes tiled) houses are occasionally seen in some villages.

The Malayalees have their own castemen to serve as barber and dhobi. The Adi Dravidas are generally called in to beat the drum on ceremonial occasions such as marriages and deaths. The Adi Dravidas are also sometimes called upon for agricultural work and to serve as beaters and assistants during hunting.

It is said that there were some reputed cow doctors among the Malayalees; but of late they are becoming rare. Cattle farming appears to be declining. It would appear that there is plenty of scope for intensive cattle-farming. That is a problem worthy of investigation.

The Malayalees commonly bury the dead; burning is also occasionally resorted to. They are both Siva and Vishnu worshippers. Their chief god is said to be Kari Raman. Perumal worship is most common. The Malayalee Poojari is a vegetarian. It is noteworthy that there is no blood sacrifice during the Pooja. The village festivals usually occur in March and April.

The hill temple on the Shevaroyas has an inner cave. Legend has it that the cave extends some furlongs into the interior. The story is told of one Ramaswami, a servaikaran (same as a Poligar or local chief) who visited the place. Being a devotee of Vishnu, he built a Perumal temple. And this temple was called afterwards the Servaikaran temple. Hence the name Servarayan. There is another story about the origin of this man, which story I heard from an old man in an interior village. There were two notorious

brigands—Servarayan (otherwise called also Shevarayan or red Rayan as distinguished from his brother black Rayan) and Kallarayan. The two brothers carried on extensive marauding operations on the plains, and on occasions when they were hard pressed, they used to take shelter in these hills (which are now known as Servarayans and Kalrayans). It is possible that, when he was hunted by the troops, Servarayan might have hit upon this very clever plan of hiding himself in this cave, after having popularised the idea that the cave is a holy temple, and that it is a sin to venture far into the inner recesses of the cave. Whatever may be the truth of this story, it gives, however, some fanciful explanation of the names Servarayan and Kalrayan.

The Malayalees grow ragi, cholam, samai, tinai, avarai, mustard, red gram, chillies, coriander, castor and other minor products. They generally mix two or three varieties of seeds and scatter them broadcast. The short crop matures sooner; and after it is reaped, the long crop has time and space to grow well. As on the plains one can see in many fields the scare-crows, the funny grotesque figure with out-stretched arms in order to avert the evil eye. Seeds are generally sown in May and June; the harvesting is done in October and November. When the harvest is gathered, threshing is done by driving the cattle round and round. The corn is stored in granaries. These are usually cylindrically shaped and built of grass and bamboo, on raised stones so that water can run below easily.

It is generally said that the Malayalees on the Shervaroyas are not so enterprising as the Malayalees on the Kollimalais or Pachaimalais. The advent of Coffee estates is supposed to be the cause of the decline of agriculture among the Malayalees on the Shevaroyas. They are more inclined to work as labourers in Coffee estates so that they can get immediate payment of wages in cash, which will be ready for use. During heavy season, the labourer can earn more than six annas a day. Of the economic conditions of the Malayalees, reference is made later on.

There is not so much of rice cultivation on the Shervaroyas as on the Kollis (the rice of the latter is said to be even superior to the rice of the plains). Cultivation on the hills is a difficult process. In the hollows and in the plains on the hill tops the work may be easier than on the slopes where fields have to be properly terraced.

Coffee growing is described separately. Besides coffee, tea and rubber were also tried, but both have not been successful. Tea evidently requires more rain than is obtained on the Shevaroyas.

Rubber as a commercial plant has not been fully developed. There are stray rubber trees here and there. Aloe and Agaves were also attempted but appear to have been abandoned subsequently.

The Shevaroy's yield some sandalwood also. It is said that there is not so much of spike disease on the Shevaroy's as on the Kollis. Other minor products of the forests are timber, charcoal, lac, gall-nuts, barks for dyeing and tanning, some medicinal herbs and plants. I have not heard of Cinchona trees on these hills. Sometime ago, there was an attempt at perfume making, but now I learn this has been a failure.

Coffee Cultivation.—The importance of the Shevaroy's region now lies in the fact that it has taken the field as one of the chief coffee growers of South India. The first person who discovered the possibility of utilising the Shevaroy's for coffee growing was Mr. G. Fisher who made some experiments about the year 1825. Since then Shevaroy's Coffee is on the market. The coffee market is however said to be dull now on account of a fall in the price of coffee. The cost of production of coffee has also increased due to increased wages of labourers, and the necessity of providing more and more manure year after year. Transport has become easier in these days of motor lorries. At the same time coffee pests have become numerous. Thus efforts at increasing the output have to be coupled with remedies to meet the new difficulties.

Coffee growing is now an art, requiring great skill and expert handling. The plants are pruned and they are topped when they are about 3 years old—the top being cut at a height of about 4 feet from the ground. This prevents branches shooting upwards and helps the branches to grow sideways. The whole plant with outstretched branches looks like a sort of small dome. This is convenient for the labourers to pluck the berries easily and collect them in baskets. After the crop is collected, the plants are pruned well; the shoots that have borne fruits are removed, thus making it easy for the younger shoots to develop well and bear good yield for the next year.

The young plants are now systematically placed in convenient spacings so that there is no overcrowding. By this method, plants have each a greater space for full growth. These plants though less in number give better yield than the overcrowded plants which may be more in number but give less yield. These efforts have helped to decrease the spread of diseases among plants. Diseases destroy more in overcrowded areas. Trenching is done

to protect the surface soil on the terrace from erosion and to preserve the oxygen in the layer near the plant roots. The Oxygen brought in by showers of rain, are preserved in the surface soil by various means such as bunding, terracing and pitting. The coffee plants now grow under shade. This has been found effective to protect the plants from the disease known as leaf blight. Silver oak trees are symmetrically planted and the coffee plants grow in the shade of these trees. These trees shed their leaves periodically and these leaves form a bedding of dead leaves which protects surface erosion. Weeds are cut and heaped up along with the dead leaves. Manuring is also done. Thus coffee cultivation is not an easy affair. The planter does not sit at ease and get money. He has to work hard and that at the proper time. From 1870 onwards coffee pests began to appear and the planters have always been attempting to clear their estates of these pests.

Ripe coffee fruit is called berry. The outer coat is the pulp and the inner adhesive layer is the parchment. The seed coat within the parchment is the silverskin. Usually the planters remove the pulp in their own estates and send coffee in parchment.

The coffee plant blossoms about June. Fruits begin to ripen about October and continue till January. The fruit is hand-picked by coolies as soon as it shows a dark reddish tinge: pulping is next done. After the pulp is removed, the parchment is washed and cleaned; and they are then put to dry on specially prepared platforms. Then they are bagged and sent.

Fruit Farming.—It would appear that fruit farming has not been systematically attempted on the Shevaroy's. Salem has become famous for mangoes and this is due to the systematic efforts of some mango growers. No such thing has yet been successfully done regarding oranges and fruits, on the Shevaroy's. Oranges thrive very well and also the common pear. During the season cartloads are sent down the Ghat Road, the slow moving train of carts giving immense trouble to the fast running motor riders. Of the oranges the common variety is the tight-skinned ones; they require little work, but give good crops. The trees take about 8 years time to give full yield. Grafting and intense cultivation has not yet been well developed. The loose-skinned oranges are now becoming more popular and the cultivation of these trees is extending. Other varieties of oranges are grown in stray places.

Of the other kinds of fruits, lemons, common pears, loquats, plums and peaches grow commonly. Pomeloes, apples, common pine-apples, strawberries, papaws, butterfruits, figs, guavas, jack

and pomegranates are also found. Vine growing has not been attempted.

It seems that more extensive and systematic fruit farming can be attempted with possibilities of success as a commercial concern. A jam factory may be thought of, and plenty more of fruits for transport to the towns may be made or grown. Recently it was brought to the notice of the public, that a big city like Bombay is not having enough fruits for its large population. It will be the same case in most of the towns. Fruits are now becoming more and more a part of the daily food of many persons. An increase in the use of fruits is being advocated in order to improve the health of the people. Hence it may be worth while to investigate the possibilities of scientific and successful fruit farming on the Shevaroyes.

The Condition of the Malayalees.—Now about the condition of the Malayalees. It is generally remarked that the prosperity of the people is gradually declining. It is not possible to assess exactly the advantages or the disadvantages of 'Modernism' that is gradually enveloping the Malayalees on the hills. Their poverty, their indebtedness to debtors, the increased cost of cultivation, the strict forest laws, the heavy land assessment, all these are usually heaped up as causes for the deterioration of the people. It will be safer not to indulge in vague generalisations, and to get into the labyrinth of the little understood complexity of forces that go to make or mar the progress of a people.

Firstly it is doubtful, if it is to be accepted as a fact that the Malayalees have deteriorated, this will lead to the general question of whether the plains people themselves have progressed or deteriorated. It appears to be something like the towns-people now going about lecturing on village improvement, while the village people want to talk of town improvement. The Malayalee appears to be as happy as of old. The simple innocent happiness they enjoy, must be a thing to be envied at, by many a man on the plains. It does not appear that the Malayalees are gradually dying out, but modernism, it would appear, has helped to quicken the death of some of the happy traits of the communal economic life of these people. Their wants are now increasing. When a new thing is purchased for use, at first it is a mere love of something new, but gradually the new things are becoming necessary things. In fact the slowly devouring octopus of modernism, having swallowed up the plains, has now ascended up to catch the hill people. True money was rare in old days, but now the hill people have learnt to use money freely. The disasters of the weather are now more

keenly felt, and a mere blanket thrown across the shoulders as of old, does not suffice now. Their simple and cheap huts are now considered out of time; brick and tile cottages are slowly coming in.

Somehow the people think that diseases are not only increasing in variety but are also growing more virile. And this is in spite of the enormous progress made in modern medicine and surgery. It looks as if the people are amazed to find that their favourite deities, who were appealed to, in times of serious illness, now appear to be indifferent or powerless. The old village doctors have almost disappeared and their fame is dying out. The modern doctor has not yet penetrated into the interior villages. It would be a good thing therefore if some itinerant dispensaries are organised.

The people are not obsessed with the fear of over-population. Birth control, which has of late, become a common topic in cities and towns, is not heard of. The Malayalees do not look upon their children as a burden. The children, when once they are able to wander about, become workers along with the elders of the family. Just at the age when one would expect the parents to send their children to school, when they are 7 or 8 years they are sent to look after the cattle. The boys and girls also help the elders in weeding, sowing, harvesting or threshing. I came across many boys and girls, in the course of my wanderings, who were chatting and playing in the meadows and shrubs after driving the cattle to pasture. They were indifferent about attending school. This is equally true of the villages in the plains. The Malayalee children are as sensible as the children on the plains. They are more hardy, better walkers and load carriers. They are clever in their own way. It is therefore a hard task indeed to wean away these children from this kind of apparent natural work, and put them in school where they have to spend at least 4 or 5 hours a day and not take in the mere literary education—that of teaching of the three R's which probably appears to be quite natural with urban-minded people.

Conclusion.—I may conclude by summing up the chief points. It does not appear that the Shevaroyes have been utilised to its fullest possible extent. Cattle farming and fruit farming may be investigated. The economic condition of the people may be improved by the starting of more Co-operative Societies. Itinerant dispensary may be of great help to the people.

The Place Names in Salem District

By

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The present district of Salem is not a natural division. It came into existence from political and administrative exigencies. According to geographical, historical and natural basis it has been divided into three divisions.

I. *Balaghat* (Uplands):—Forming part of Mysore plateau and having the same features as Mysore with a general level of 3,000 ft. above the mean sea-level and having mostly Kanarese and Telugu as its principal languages. It contains portions of Hosur and Krishnagiri taluks. In ancient days it formed part of Ganga-vadi which had its capital at Talakkad on the Cauveri.

II. *Baramahal* (12 palaces or divisions):—Forming the intermediate basin between the Mysore plateau and the plains and having a general height of 1,500 ft. It has Tamil, Telugu and Kanarese as languages. The taluks of Dharmapuri, Harur and portions of Krishnagiri and Hosur are in this division.

III. *Talaghat* (below ghat or plains):—Being the lowlands and having more or less the same level as the neighbouring districts of Coimbatore and Trichinopoly. This formed part of the ancient Kongu country, being North and East Kongu, with the capital once at Tagadur or modern Dharmapuri. Tamil is the language. The taluks of Salem, Omalur, Trichengode, Namakkal and Attur are in this region. (Attur could be taken more to the Carnatic country than to the Kongu). The average height is 550 ft.

A study of the place-names in this district proves the existence of these natural divisions. In Balaghat, the names of villages are Kanarese and Telugu, in Baramahals the names come from the three languages spoken there and in Talaghat they come from a purely Tamil origin, similar to those found in the other parts of Kongu Nadu, viz., Coimbatore District. We find, for example, that Hosur contains 56 Telugu and 16 Kanarese names of villages with 19 Tamil names only; Dharmapuri taluk contains 63 Tamil, 5 Telugu, 214 Kanarese and 3 Hindustani names; while Namakkal has 167 Tamil names and Attur 126 with neither Telugu nor Kanarese names. The other taluks of Kongu portion have also pure Tamil names.

An analysis of the nature of the names of the villages is also interesting.

Hosur Taluk.					
Kanarese.	Telugu		Tamil		
Suffix	No.	Suffix.	No.	Suffix.	No.
Atti	3	Palli	29	Ur	8
Halli	3	Ur	1	Kottai	3
Puram	1	Mangalam	4	Mangalam	2
Karē	1	Kota	2	Durgam	1
Ur	1	Puram	2	Kal	1
Giri	1	Vadi	2	Puram	1
Nattam	1	Durgam	1	Giri	1
		Giri	1		
		Palayam	1		
Dharmapuri Taluk.					
Kanarese	Telugu		Tamil		
Halli	172	Palli	1	Patti	16
Puram	7	Ur	1	Ur	7
Ur	6	Puram	1	Padi	5
Malai	2	—		Nattam	4
Betta	1	—		Puram	3
Giri	1			Mangalam	3
Karai	2			Palayam	2
				Kodu	2
				Kulam	2
				Etc.	
Namakkal Taluk.					
All Tamil Names.					
Patti	42	Kulam	4	Eri	1
Ur	25	Samudram	3	Kottai	1
Palayam	25	Mangalam	3	Pundi	1
Puram	7	Malai	2	Karai	1
Nadu	7	Mahadevi	2	Koil	1
Palli	6	Parai	2	Anai	1
Kombai	5	Padi	2		
Agraharam	4	Seri	1		
Kurichi	3	Kal	1		
		Vadi	1		
Attur Taluk.					
(All Tamil names.)					
Ur	25	Samudram	6	Vādi	3
Patti	23	Pādi	6	Karai	2
Palayam	15	Nattam	4	Eri	2
Puram	11	Agraharam	8	Vasal	2
Malai	7	Kurichi	3		
				Valli, Giri, Kottai, Panai, Seri, Kombai, Pundi, Mūlai, Parai, Puri, Thurai, Madai, Kadu, Palli—all one each.	

Salem Taluk.

The prevailing names are:—Patti, Ur, Palayam, Mangalam, Eri, Padi, Malai, Pattanam, Valasai, Giri, Puram, Maduvu, Kombai, Nattam, etc.

It is significant to find that the Kanarese *Halli* and the Telugu *Palli* are predominant in Hosur and Dharmapuri taluks (Gangavadi), while we get down to Namakkal (Kongu) the Tamil names of *Patti*, *Ur* and *Palayam* are found, and as we go eastwards to Attur which forms the marchland between Kongu and Chola country, the Tamil names of *Ur* and then *Patti* and then *Palayam* come in. There is a historical explanation for such distribution of names. All the names given have the same meaning, viz., a town or village, yet the form prevalent in various places relate to various periods of political influence. The Gangas and the later dynasties of the Mysore plateau had exercised complete influence over the Talaghat. Hence we find *Halli* and *Atti* prevalent there. In the Baramahals (Dharmapuri and Krishnagiri), which lie between Mysore and Tamil countries the Kanarese *Halli*, Telugu *Palli* and Tamil *Patti* are all found, while *Puram* and *Ur* are slowly getting in. This tract had often been changing hands, the Gangas, Pallavas and Cholas laying claim to it off and on. At Namakkal which is a purely Kongu country, *Patti* is predominant, *Ur* comes next and *Palayam* third. The oft-quoted stanza attributed to the poetess Avvayar “கங்கொல்லாந் பட்டித் தொட்டி உண்பதோ கம்பத் சொறு” about Kongu Nadu is significant with meaning in such an analysis. Curiously enough we find the name *Palayam* competing with *Ur* in this taluk. *Palayam* originally meant a cantonment. *Palayagar* was once the head of a battalion. He became the feudal chief during the Naick kings of Madura. The great Tirumalai Naick established 72 palayapats in his kingdom on purely feudal basis. In later days, *Palayam* began to mean merely a town. Any new village newly-formed in Kongu country is called *Palayam* to which suffix the name of the builder is added. The Tamils call it as *Palayam* while the Telugus *Palla* in the common parlance (for example, Tamil Pappanaicken-palayam—Pappanaicken + palayam = Telugu Papayya Palla—Papayya + Palla). The existence of the name *Palayam* in Namakkal taluk proves Madura influence. History says that Ramachandra Naick of Senthamangalam was an important feudal chief during the days of Madura Naicks who exercised much influence over Namakkal taluk. As we go eastwards towards Attur which had a mixture of Kongu and Chola civilisations, we find that the suffix *Ur* becomes prominent while *Patti* comes next and *Palayam* occupies the third place. *Ur* is a purely Chola term and hence its prominence is not without meaning. So

we find that even the simple names of villages have their own tale to tell us how they came into existence and what influences they felt from political exigencies.

II

Ancient Tamilians had classified land into five natural divisions according to geographical conditions. The nature of land was carefully studied and analysed; and distinctive names were given according to their nature and conditions. A particular name of a division always carries with it a particular set of ideas, regarding for instance, the inhabitants, the flora, the fauna and the occupations, customs and manners of the inhabitants. In later days, the poets developed particular conventions regarding such divisions. When the poet describes a particular place he was generally carried away by the conventional ideas of the land he dealt with and never cared to ascertain if the particular objects and notions he described existed there or not. The conventional divisions are:—

1. Hilly regions known as Kurinji (குறிஞ்சி)
2. Pastoral tracts known as Mullai (மூலை)
3. River valleys known as Marudam (மருதம்)
4. Desert country known as Palai (பாலை)
5. Sea-side region known as Neithal (நெய்தல்)

It may be noted in this connection that these names are those of the plants which are said to be prevalent in the respective tracts, purely poetic and imaginative ideas.

The people inhabiting each division and their occupation, trade, customs and manners were given distinctive names and even the villages inhabited by them were distinguished by different epithets. Hence it is easy to distinguish a particular region from others by their mere place-names. From an analysis of the place-names in Salem district we can easily say to what natural division a particular tract belonged. This district contains the first four divisions, viz., the hilly, pastoral, river-side and waste. The district has not got sea-coast and hence the fifth region cannot be found in it. But yet it is curious to note that a few villages have been named after the sea, viz., Samudram. Perhaps the name is purely euphemistic. Religious fervour could lift its votaries to hyperbolic heights. A small tank when it becomes sacred in the eyes of the devoted, easily becomes a sea or an ocean. Hence we find the name *Samudram* in the purely inland district of Salem, just as small earthly mounds and terraces in Tanjore district become huge mountains with dales and forests and water-falls in the eyes of devotees and the authors of their Sthala puranams.

Now we give a classification of the place-names according to the conventional divisions :

1. **Hilly-regions :** (Kurinji):

Suffix.	Full name example.
Kurichi	Belu Kurichi
Malai	Naina Malai
Giri	Elagiri
Kôdu	Trichengodu
Pārai	Kuttupparai
Kal	Namakkal

2. **Pastoral tracts :** (Mullai):

Patti	Palapatti
Halli	Ajjanahalli
Ur	Velur
Pādi	Thalampadi
Vādi	Laddivadi
Kādu	Erkadu

3. **River-valleys :** (Marudam):

Palayam	Kumarapalayam
Puram	Varadarajapuram
Nadu	Ariyurnadu
Agraharam	Vengarai Agraharam
Mangalam	Tharamangalam
Aru	Edayaru
Eri	Ponneri

4. **Waste-lands :** (Palai):

Pālai	Perumpalai
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5. **Sea-Coast :** (Neithal):

Samudram	Bommasamudram
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It will be seen that the abovesaid classification is purely the outcome of Tamilian poetical brain and hence we find the idea current chiefly in the Talaghat division which formed part of the Kongu country. Such natural divisions can also be traced even in the Balaghat and the Baramahal regions, for during the time of the imperial Cholas they came under Tamil influence. But the existence of the large number of Kanarese and Telugu names may resist submission to the Tamil classification there on all fours.

The intermediate division of Baramahals came to be named after the Musalman influence over the Mysore plateau as its very name signifies. *Mahal* means Palace, but the name would have been a corruption of the word *Mohalla* which means a division. For the purpose of administration and defence, the country was fortified and twelve impregnable hillocks were fortified and converted into 12 fortresses. The imperial Vijayanagar had the ingenuity to plan the scheme, whose utility was fully taken advantage of and availed by the successive Mysore dynasties including

the Musalman interregnum. The fortresses became the scenes of much activity during the Anglo-Mysore War. After their subjugation their importance has fallen into the background. A visit to these fortresses is worth the trouble and will remind us of the military ingenuity of our ancients. It is worth mentioning that in the pre-mediaeval days these hills had been the resorts of ancient Tamil chiefs known as *Velirs*. Tagadur, the modern Dharmapuri was the capital of Adigaman, a chief mentioned in the ancient Sangam poetry. The name Adaman-kottai signifies his connection to it. We know that Namakkal came under his influence, as is signified by the name of the temple in the rock *Adiyendra Vinnagaram* as evidenced by the epigraphical records. Other hill fortresses had their own *Velir* chiefs. They were always at constant warfare with themselves as well as with their neighbours, the Cholas and the Cheras. Hence this tract had been always the bone of contention between various kingdoms and was therefore completely fortified from the earliest times.

The place-names of Balaghat do not give place to much speculation or thought, as the tract was always under the Mysore dynasties and its history coincides with that of Mysore and of Kanarese civilisation. The Musalman interregnum is commemorated in the names of a handful of villages. Examples : Jērtalāv—Talāv means a lake. Daulatābād—Abād means a city (part of Krishnagiri town), Āmarāyī (Harur taluk).

What strategic position Salem district held during military activities is clearly evidenced by the following names of fortresses and fortified Durgams :—

Hill side forts.	Durgam.	Giri.	Stray forts in the plains.
Adamankottai	Sankagiri	Krishnagiri	Dharmapuri
Bagalur	Hudai	Sankagiri	Namakkal
Berikkai	Nilagiri	Kanakagiri	Salem
Hosur	Ratna	Ankusagiri	Omalur
Rayakotta	Gettarva	Nilagiri	Jagadevpalayam
Denkani	Anchetti	Sulagiri	Dhali
Tengari	Tattakkal		Cauveripatnam
	Veerabadra		Maharajakadai
	Balakundarayan		Perumpalai
			Pennagaram
			Cholappadi
			Toppur
			Harur
			Kambainallur
			Attur

It should be noted that most of the forts on the plains have been destroyed. The existence of the names of Kottai as opposed to Pettai (town portion) in these places proves their historicity. There are remnants of ramparts and other fortifications in the hill forts still existing and they are worth the preservation to show their ancient grandeur and usefulness in martial days.

III

For purposes of administration the country had been divided into revenue villages. The boundaries of the villages had been fixed long ago, and on the British advent they have been adapted without much alteration; but in the cases of a few big villages, they had to be divided into two or three smaller ones to facilitate easy handling. Such division necessitated distinguishing nomenclature given to them and appropriate epithets were adopted. The very epithets signify the intention. We give herein a few examples which are generally in doublets:

Namakkal Taluk.

- | | |
|---------------------------|---|
| 1. Mel Vs. Kil | Signifying east and west. Ex. Melpatti-Melmugam and Kilmugam.
Ex. Sathambur—Mel and Kil. |
| 2. Nanjai Vs. Punjai | Signifying wet and dry. Ex. Edayar-Nanjai and Punjai. |
| 3. Sarcar Vs. Agraharam | Signifying ryotwari and Inam. Ex. Ven-garai. |
| 4. Vadakarai Vs. Tenkarai | Signifying north bank and south bank of a river. Ex. Attur. |
| 5. Jodi Vs. Sarvamanyam | Signifying different kinds of Inam. Ex. Aaiaru. |
| 6. Japthi Vs. Sircar | Signifying attached and enfranchised. Ex. Serukkalai. |

Attur Taluk.

- | | |
|------------------------|--|
| 1. Attavanai Vs. Jari | (these names found in Coimbatore Dt also). Ex. Kottambadi. |
| 2. Kil Vs. Mel | East and west. Ex. Rajapalayam. |
| 3. Ten Vs. Vada | South and North. Ex. Ten Kumarai. |
| 4. Periya Vs. Chinna | Big and small. Ex. Kalrayan. |
| 5. Kilnadu Vs. Melnadu | Lowlands and highlands. Ex. Periyakal-
rayan. |

Dharmapuri Taluk.

- | | |
|------------------|---|
| 1. Hale Vs. Hose | Signifying old and new. Ex. Hale Dharma-
puri. |
|------------------|---|

Hosur Taluk.

- | | |
|---------------------|---|
| 1. Pedda Vs. Chinna | Big and small. Ex. Kullu-Pedda and
Chinna. |
|---------------------|---|

Salem taluk.

- | | |
|----------------------------|---------------------|
| 1. Attavanai Vs. Agraharam | Ex. Pulaveri. |
| 2. Agraharam Vs. Sircar | Ex. Nattarmangalam. |

It is noteworthy to find that there are more estate lands in the Salem district than elsewhere. We find throughout the district Mittas, Zamins, Inams, etc. Agraharams are innumerable. The existence of such a land system has necessitated doublets in nomenclature to a considerable extent. The estate lands are governed by Estate Land Act, while other villages are governed by the general Revenue system, viz., Ryotwari. Even in the very town of Salem, there are Mitta lands as opposed to Ryotwari.

IV

Indian names of places generally submit to an analysis regarding their origin and history. The name of a place has two component parts, the first being a proper name while the second a common name. The proper name gives the historical sense, while the common name the nature of the place. For example, in the name *Rayakottai*, the prefix *Raya* is the name of the person who established the place and the suffix *Kottai* signifies the nature of the place that it is a fort. *Such an interpretation suggests another kind of analysis which is worth noting. We can classify the place-names in the district under the following heads:—

I. Geographical:

1. Towns and parts of towns:

Example of suffixes:—Patti, Atti, Palli, Halli, Puram, Puri, Pettai, Vadi, Padi, Kurichi, Ur, Mangalam, Kup-pam, Valasai (Telugu valasa), Kadai, Agraharam, Mahadevi, Vasal, Cheri, Pundi, Pattanam, Abad, Agaram.

* The first part of a name, which gives generally the historical significance, is capable of an analysis which is as follows:—

1. Name of the originator, as in *Rayakottai*, *Adamankottai* or *Gopalapuram*.
2. Name of the people who occupied it, as in *Oddappatti*, *Edayapatti*.
3. Name of the flora in the place, as in *Eechampatti*, *Kallipatti*, *Tennamgudi*.
4. Name of the fauna, as in *Keeripatti*, *Karadipatti*, *Erumaipatti*.
5. Name of a geographical feature as a river—*Kaveripuram*.
6. Name signifying relativity, etc., as in *Peria patti*, *Sinnakulam*, *Melpatti*, *Puttur*, *Ilampalli*, etc.

2. *Hills and parts of hills :*

Example :—Kal, Giri, Durgam, Kodu, Malai, Kombai, Thittu, Moolai, Parai, Betta, Kuzhi.

Countryside and parts :

Example :—Nattam, Karai, Nadu, Palai, Thindal

4. *Forests :*

Example :—Kadu, Solai, Veli.

5. *Water-courses :*

Example :—Eri, Maduvu, Kuttai, Thurai, Karai, Kundam, Utru, Samudram, Kulam, Anai, Aru, Kerai, Koodal, Talav, Madai, Kuzhi, Guttai, Bavili, Teertham.

II. *Historical :*

Example :—Kottai (Fort), Mangalam (remnant of Chaturvedi-mangalam generally a gift by the ancient dynasties, especially Cholas and Pandiyas), Durgam (hill fortress), Agraharam (village gift to Brahmins), Mahadevi (ex. Thipramahadevi, a gift by the queen of the ruling dynasty and hence named after her), Padai-veedu (Military camp).

III. *Commercial :*

Example :—Kadai (means bazaar), e.g., Maharaja kadai, a bazaar started by a Maharaja ;

Salem—according to Tamil dictionary, the word Salem means “cloth,” being a modification of the word *Selai*. In an old inscription, the name is given as *Sālyam*. *Sāliars* are weavers. The name is derived from *Sēlai*, a Tamil word. Salem is noted for weaving. It cannot be said to be a very old town. Hence the industrial innovation brought by Vijayanagar or any previous enterprising dynasty would have been the origin of the place. The derivation of the name from the word *Syla* meaning ‘mountain’ is not convincing.

IV. *Religious :*

Example :—Kovil (temple), the prefix Thiru (sacred) in Trichengode, Matam (monastery).

V. *Agricultural :*

Example :—Panai (Palmyra), Madal (leaf-stem), Vēpadi (stem of a margosa).

There are some miscellaneous names which do not submit to the abovesaid analysis. They do not have prefixes and suffixes, but many of them have got fine significance behind them. The following examples are somewhat interesting :—

I. *Names of pure Tamil origin :*

1. Salem (already commented upon above).
2. Pennagaram.
3. Iveli (five hedges).
4. Thannirpandal (water-shed) some philanthropist might have started a water-shed there.
5. Thangal (support).
6. Mani vizhundam (signifies the fall of a gem. The origin would be very interesting if known).
7. Manjani (manju means cloud).
8. Mummudi (three crowns, a title assumed by some emperors and rulers).
9. Panaimadal (palmyra leaf).
10. Thummam (sneezing).
11. Nadathai (conduct).
12. Pottanam (packet).
13. Ilampillai (young one).
14. Kombu thooki (lifting of a branch).
15. Kankatti Alai (the mill which closes the eye).

II. *Names of Sanskrit origin :*

1. Abiramam.
2. Pavitram (purity).
3. Prantakam.
4. Arangam (Rangam-land between rivers).

It may be noted that most of the suffixes given above are of Tamil origin and that only a few are of Sanskrit origin. Those of Sanskrit origin are : pattanam, puri, puram, agraharam, mahadevi, giri, samudram, theertam and matam. The rest are of vernacular origin. Hence the Aryan influence has not been felt much in the establishment of villages in this district. This idea takes us to the mythological lore current in our country. We do not find much of mythology either based on the Itihasas or puranas in this district. The usual attribution to the travels of Rama occur in the names of three places only : Ayodhyapatnam, 5 miles east of Salem which has a fine temple, reminding us of the capital of Dasaratha. Poimankaradu on the way to Rasipuram from Salem is a cloven rock with a figure of a deer which is said to be the false deer which en-

ticed Sita away. Jatayu-Malai is said to be the fossil of the bones of Jatayu who was murderously assaulted by Ravana. As a matter of fact the magnesite ore found therein has nothing to do with bone fossil. The Salem Magnesite Syndicate is working there, and is quarrying out a good quantity of magnesium carbonate for commercial purposes.

The puranic lore is equally meagre in this district. Even sacred shrines sanctified by the feet of saints are not many. Trichengode is the only place sanctified by Thevaram sung by Sambandar, the Saiva saint. It has got a puranam which connects the hill with Adishesha calling it Nāgamalai. The deity is Ardanariswara, half man and half woman, a form which is peculiar to the shrine. Teer-tamalai is another place having a puranam written by a poet, Saiva Ellappa Navalar. The only other place which has a puranam of recent origin is Belur (*பெள்ளூர்*). Two other places which have no puranams but have got old temples are Taramangalam and Ayodhyapatnam. The former has a temple of a high sort of architectural value, built by local chiefs called Getti Mudaliyars. Namakkal has a temple, several centuries old but it somehow escaped sanctification by a Vaishnava Acharya. Vaishnavism seems to have made its mark a good deal in this district. The big Nāmams found on the hills surrounding Salem, signify its influence. (Nāmakkal—Nāmam + kal). Arappali in the Kollimalais has been immortalised by the poet Ambalavana in his Arappaliswara Satakam. Kapilamalai and Hogainakal have been given mythological connection as their names indicate. Besides the above-said few instances, we do not find much of mythology in this district.

Curiously, the names of rivers have something to do with mythology, and most of the names have got a local Tamil name as well; hence the loud sounding mythological name may be of later origin. Vasishtanathi, Sarabanganathi, Manimuthar, Swetanathi, Sanat Kumaranadi, and Markandanadi, are a few such names. On the other hand, the names of hill ranges have no connection with mythology. Servarayan, Kalrayan, Kollimalai, Javvadimalai, Pachamalai are such names without any smack of mythology.

Besides Jatayumalai which has its magnesite ore, there are one or two places which denote geological significance. Kanjamalai has much magnetic iron ore. It is said to be the place where Kanjamalai Siddar performed alchemy. Kanjam in Tamil means gold. There is a river named Ponneri which means gold river. Salem district is full of geological interest, but very few place-names are found which signify such a connection.

List of Books in Geography and History

GEOGRAPHY

- D. M. Forsaith—A hand book for Geography Teachers. Methuen, London 1932. 4s.
- James Fairgrieve—Geography and World Power. University of London Press 1924. 5s.
- Geography in school. University of London Press 1930. 7s. 6d.
- K. C. Barnard—Principles and Practice of Geography Teaching. University Tutorial Press, London 1933. 4s. 6d.
- M. Whiting Spilfaus—The Background of Geography. Harrap, London 1935. 7s. 6d. seniors.
- W. R. Kermack—New Geography of the World. Johnston, Edinburgh and London 1931. 3s. seniors (Secondary, Central or Senior schools).
- J. F. Unstead—World Geography and World Problems. (The citizen of the World Geographies). Sidgwick and Jackson, London 1923, 3s. 6d. Seniors (to Matriculation standard).
- J. Fairgrieve and E. Young—Human Geographies: Primary series, Books I-VI. Philip, London, 1s. 6d., 2s. each.
- Human Geography for secondary schools: Books I to III. Philip, London 1927 and 1928. 2s. 9d., 3s. 6d. each.
- Human Geographies.—(i) The World, (ii) The British Empire. Philip, London. 2s. 6d. each.
- J. H. Stenbridge—The world-wide Geographies: Junior series—I. Seeing the World; II. Peoples and Homes of other lands; III. Exploring the British Isles; IV. The world we live in. Senior series—V. Africa, Asia and Australia; VI. North and South America; VII. Europe and the British Isles; VIII. Geography of Industry and Commerce. Oxford University Press, London 1929-33. 1s. 9d., 2s. 6d. each.
- M. Bayne—The World's Goods. The World around us. Book II. Chambers, London 1934. 1s. 9d. Juniors
- C. Ridgley—New Picture Geographies: A lower school course (7 or —11 years): I. Peoples of the world; II. More peoples and other lands; III. The world's workers; IV. The world and the Home land. Johnston, Edinburgh and London 1930 & 1931. 1s. 6d. each.
- L. Edna Walter—Life in Many Lands: I. Life in other homes, Juniors; II. Work in other lands; III. Men's work to-day; IV. In British to-day. Nisbet, London 1934 & 1935. 1s. 9d. and 2s. each.
- H. Alnwick—A Geography of Commodities. Harrap, London 1934.
- R. H. Duce—Home and overseas Geography: Regional series: Book 5. A simple world survey, Africa; Book 6. The Americas, Asia, Australia, New Zealand; Book 7. Europe. The British Isles and the Irish Free State; Book 8. The British Empire Regions of the World. Pitman, London 1935. 2s. 6d.—3s. 6d. each.

PRACTICAL GEOGRAPHY

- J. V. Cameron—*Maps and Map work*. Harrap, London 1932. 2s. Seniors.
 James Walker—*Map Interpretation*. Johnston, Edinburgh and London 1933. 2s. 9d. Seniors. (School Certificate standard).
 E. J. Orford—*Junior Practical Geography*. Pupil's book, 1s. 8d. Teacher's book, 3s. 6d. *Senior Practical Geography*, 1935. Pupil's book, 2s. 4d. Teacher's book in preparation. University of London Press.
 E. H. Sanders—*Observational Geography*. Philip, London 1932. 2s. 6d. Juniors.

GENERAL HISTORY

- H. G. Wells—*A short history of the world*. Watt, London. 1s. Older pupils.
 H. G. Wells & H. E. Carter—*A short history of Mankind*, 1929. Blackwell, Oxford (adapted and edited for school use from the author's "Short History of the World").
 I. O. Evans—*The Junior outline of History* by permission of H. G. Wells. Denis Archer, London 1932. Illus. 7s. 6d.
 F. C. Happold—*The Adventure of Man*. Christophers, London 1932. Illus. 3s. Senior pupils.
 Helen Corke—*A book of Ancient Peoples*. 1931. *A book of Modern Peoples*. 1933. Clarendon Press, Oxford, Juniors.
Class Book of World History: I. *The World's Family 1924*; II. *The Home Builders*, 1928. 2s. 6d.; III. *The Adventurers*, 1929. 2s. 6d.; IV. *Mankind the Conqueror*, 1930. 3s. 6d. Oxford University Press, London. (I-II for pupils in 2 highest classes of new junior schools, III and IV for 1st and 2nd years of new seniors or Modern schools).
 J. F. Horrabin—*An Atlas of European History*, 1935. 3s. 6d. *An Atlas of Current affairs*, 1934. 3s. 6d. Gollanez, London.
 F. S. Marvin—*The Modern World*. European from the French Revolution to the League of Nations. Longman Green, London 1929. 3s. 6d. Seniors.
 John T. Greeman & J. Madison Gethany—*Units in World History* Development of Modern Europe. McGraw Hill Publishing Co., London 1934. Illus. 11s. 6d. Seniors.
 D. M. Ketelbey—*A short History of Modern Europe from 1789 to the Present Day*. Clarendon Press, Oxford 1934. Illus. 3s. Seniors.
 K. C. Knapp Fisher—*The Modern World*. A Junior Survey. Gollanez, London 1933. 5s. (Author of outline of World History for Boys and Girls—not in possession of B. I. E. but said to be very good.)
 Stephen King-Hall—*Letters to Hilary*, 1928 from 10 years Hilary Growing Up 1929 Sequel. Benn, London.
 No author—*History of Senior Course I to IV*. Edited by Catharine B. Firth Ginn, London.

TEACHING OF HISTORY

- F. C. Happold—*The Approach to History*. Christophers, London 1931. 3s. 6d.
 H. Ann Drummond—*History in School*. A study of some of its Problems. Harrap, London 1929. 5s.
 F. Clarke—*The Foundation of History Teaching*. A Critique for Teachers. Oxford University Press, London 1929. 4s. 6d.
A Handbook for History Teachers. Edited by D. Dymond. Methuen, London 1929. 3s. 6d.
 (Recommended by the International Bureau of Education, Geneva)

News and Notes

It is pleasing to note that since the commencement of the new year the membership of the Association has been going up and the number of subscribers to the Journal has been on the increase. We feel we have turned a corner in the life of the Association; and we appeal to our members to help the Working Council to carry out its recent resolution "that all possible measures be taken to increase the membership of the Association and the circulation of the Journal." With their co-operation in this direction and the resulting increased financial support, we hope to be able to make our Journal more useful and attractive by enlarging its size and adding more of illustrative material of varied kind. Let each member introduce one other in the present year.

* * * * *

The Working Council has resolved that "in view of the fact that the Association has completed ten years and in view of its record of achievement, steps be taken to request His Excellency the Governor of Madras to become the Patron of the Association."

The present issue is a special number of the Salem Conference, containing its Proceedings, the Presidential Address of Mr. B. Rama Rao and the papers read at the Conference. This symposium forms the sixth district monogram, the five earlier districts similarly studied being in order Coimbatore, Malabar, Madura, Trichinopoly and Anantapur. Individual teachers of Geography as well as institutions, who have not been subscribing for the Journal, will do well to take at least these special volumes, which they will find useful as a source-book for the study of the Geography of the particular districts.

* * * * *

The next district to be similarly worked up in the next Conference in May 1937 is Tanjore; and we feel sure that the members in the District will work for it from now by first getting in all the teachers of Geography and the sympathisers in the District, as members of the Association. This is the first deltaic district to be studied, and presents a unique interest of its own in the peculiarity and complexity of its human landscape.

* * * * *

The Working Council has appointed an *ad hoc* Committee, consisting of the following persons, to organise a series of excursions in the neighbourhood of Madras, covering all aspects of the geography of the region:—Miss E. D. Birdseye, Miss J. M. Gerrard, Miss

The next session of the Indian Science Congress will be held at Hyderabad in January next; and in view of the fact that the Geology Section has now been widened to include Geography also, it is hoped that papers on Geography will be contributed by specialists in sufficient numbers. It will then be possible in time to separate Geography into an independent section, as was done in the British Association.

* * * * *

Under the auspices of the Karnatic Historical Research Society, the Vijianagar Sex-Centenary Association proposes to bring out a Vijianagar Commemoration volume. Along with papers on various aspects of Vijianagar History, some papers on the geographical aspect of its History are also expected to be contributed.

* * * * *

We have much pleasure in congratulating Mr. S. Muthukrishna Das, B.A., L.T., on his success in the B.A. Honours Degree Examination in Geography of the University of London. He is a member of our Association, and had undergone Summer School training and taken the L.T. Degree in Geography, before going to England for his higher studies. We hope the Educational Department or one of the Universities of South India would utilise the services of this qualified teacher of Geography.

Reviews

Lands & Life : Our Food, Clothes And Shelter. By E. C. T. Horniblow. (The Grant Educational Co., London, Ltd.). 1936. Price 2sh. 6d.

This book is a middle volume in a series of Human Geographies meant for junior school children in England. It is intended to serve a double purpose. Firstly, it gives a simple course of World Geography to children through the medium of the things of their everyday life. At the same time they are continually kept in touch with their own country, partly through their familiarity with such things as the materials of their food, clothes and shelter and partly by the application of the Geography of their own country in terms of these things.

Suggestive questions and exercises tending to rouse the interest of the pupils are given at the end of each chapter; and simplified sketch-maps have been added at several places. The volume is copiously illustrated with a large number of typical pictures, illustrative of the regions, industries, and products dealt with. Bold print on glazed paper and a fine-get-up make the volume highly attractive.

Longmans' Descriptive Geography (Book I)—Tamil Edition. By L. D. Stamp. (Longmans, Green & Co., Ltd., Madras). 1936. Price 10 annas.

We welcome this text-book of Geography for Form I, prepared in accordance with the recent Scheme of Work and Syllabus issued by the Madras Educational Department. The treatment is simple and clear, and suited to the children of that class. A large number of suggestive and stimulating exercises and questions at the end of each chapter, plentiful illustrations and simplified sketch-maps and diagrams are some of the features that make the volume highly useful. In spite of these good features and its size, the price has been kept fairly low.

A New Geography (Book II)—In Tamil. By R. J. Johnson and B. Clutterbuck. (Macmillan & Co. Ltd., Madras). 1936. Price Re. 1.

This is also another text-book, written in accordance with the recent middle school syllabus of the Madras Educational Depart-

H. T. Scudder, Mr. George Kuriyan, Mr. B. M. Thirunarayanan, Mr. P. Sridhara Rao and Mr. N. Subrahmanyam (Convenor). It is expected that the Committee will take within its purview in due course other regions also in South India.

The Association has been presented with a collection of negatives of illustrations, suitable for making slides for geographical purposes; and the Working Council has decided to supply slides made from them for institutions willing to meet the cost.

The Director of Public Instruction, Madras has forwarded to us for publication a list of books on Geography and General History which have been recommended by the International Bureau of Education, Geneva, in connection with the future planning for Education in India. It is hoped that schools and colleges will try to get them for their libraries.

The Standing Committee of the Association met and discussed thrice in the last term to work out a scheme of work and syllabus in Geography for the Elementary School; but, the work, still unfinished, is expected to be completed at its next meeting to be held about the middle of August.

Replies to the Questionnaires sent to the Headmasters of High Schools and Secondary Training Schools in the Presidency are being received; and their scrutiny will also be taken up by the Committee in that meeting. The results of the investigation will be submitted to the Director of Public Instruction, as required by him. It is disappointing to find, however, that so far only 25 per cent. of the institutions responded.

The Report of the Sixth Summer School of Geography, organised by the Association at the Teachers' College, Saidapet, in April-May 1936, will be published in the next issue. It has been suggested that the next Summer School may be conducted specially to serve the needs of the teachers handling Geography in Secondary Training Schools, in view of the recent issue of a revised scheme of work and syllabus for forms I to III.

The Refresher Course in Geography, organised by Mr. D. Samuel, District Educational Officer, Tinnevely, was conducted by Mr. T. S. Sundaram Iyer, Geography Assistant, Tirthapathi High School, Ambasamudram, for the benefit of teachers of Geography in the Tinnevely District. The Course was to have been held

during the last Christmas holidays; but owing to want of time, it had to be postponed. It was now held from 15th April to 25th April 1936. 41 teachers attended the Course, which included practical work in land forms, climate and weather, map-reading and map-correlations, statistical work, graphic methods and elementary surveying. An excursion was also made to the gravel-mound west of the railway-line to observe rock-sedimentation and land sculpture.

The permanent reorganisation of the S. S. L. C. Scheme in Madras is still being awaited; and the future position of Geography in it is uncertain. But whatever happens, we believe that its place in the High School curriculum is assured and that it will not be worse than that of any other important school subject.

Meantime, it is surprising to find that the Cochin Educational Department has taken a very retrograde step in its recent reorganisation by putting Geography in the B. Group of subjects along with Outline of History, but without any place at all among the long list of 19 optional subjects, which include Deductive Logic, Music, Mechanical Engineering, Needlework, Hygiene, etc. As, according to the scheme, the B. Group subjects have to be taught in Form V. along with two optional subjects, the time-table is sure to get too crowded, and only one period a week is to be allotted for Geography in that class. As it happened in Madras schools in days when Geography was a B. Group subject in the Presidency, even that one period is sure to be (mis-)appropriated for the teaching of the options, which are Public Examination subjects. The subject is to be dropped altogether in the VIth Form. It is hoped that the Cochin Teachers' Conference will discuss the undesirability of treating an important school subject in this fashion, and represent to the Educational Authorities the urgent need for rectifying this mistake. Otherwise, by the neglect of such an important subject, education in the State schools is bound to get lop-sided.

It is understood that a qualified lady has been deputed by the Travancore Government to undergo higher studies in Geography in London with a view to introducing Geography in the Training College at Trivandrum as one of the special subjects for teachers' training. The early provision for the teaching of Geography in the Arts College is also worth serious consideration; and we hope that it will be taken on hand soon.

ment for the use of pupils in Form II. As in the first book, there is undue emphasis on the factual side, a reminiscence of old Geography. The volume is illustrated with a large number of sketch-maps, diagrams and pictures; but some of the blocks appear as mere blotches as on pp. 145 and 146. The few colour relief maps are quite good, being simple, bold and free from crowding of names; and it is hoped that pupils will use them as basic maps.

World Studies. By Eva D. Birdseye. (Macmillan & Co., Ltd., Madras). 1936. Price 5 annas.

This is an elementary geography of the major natural regions of the World, treated in a simple and practical manner, with emphasis on the essentials. Suggestions for further practical work are given at the end of each chapter. World maps showing the distribution of each of the regions and a number of typical pictures increase the usefulness of the book, which can be used in one of the High School classes.

Major Natural Regions of the World: North America East of the Prairies. By Eva D. Birdseye. (Macmillan & Co., Ltd., Madras). 1936. Price 6 annas.

This book is prepared in accordance with the syllabus for the special region, prescribed for C. Group Geography of the Madras S. S. L. C. Scheme. The treatment is similar to that of the World Studies with emphasis on practical work. A good number of necessary sketch-maps and diagrams enhance the value of the volume.

How to Look at Geographical Pictures (Second Series). By W. J. H. Watkins and H. S. L. Watkins. (Macmillan & Co., Ltd., London). 1936. Price. Paper cover, 1sh. 3d. Limp cloth cover 1sh. 6d.

This is the second series, the earlier volume of which was reviewed in a back number last year. The aim of this book as of the first is to give some training in the analysis of pictures; and for this purpose hints on the method of analysing a picture are given on the front fly-leaf. Mere seeing of pictures in the mass is of very little geographic value; and teachers sometimes require some guidance in the use of them. These series are therefore suggestive to the teacher while being directly useful to the pupil. A similar series of Indian views can be used with great advantage in Indian schools.

Books and Journals Received

- How to Look At Geographical Pictures.* (Second Series). By W. J. H. Watkins and H. S. L. Watkins.
Longmans' Descriptive Geography (Book I) in Tamil. By L. D. Stamp.
An Elementary Practical Geography of the World: World Studies. By Eva D. Birdseye.
Major Natural Regions of the World: North America East of the Prairies. By Eva D. Birdseye.
A New Geography (Book II). By R. J. Johnson and B. Clutterbuck.
Lands and Life: Our Food, Clothes and Shelter. By E. C. T. Horniblow.
Indian Culture: April and July 1936, and Index.
The South Indian Teacher: April, May and June 1936.
Kalaimagal: May, June and July 1936.
The Indian Educator: April, May, June and July 1936.
The Geographical Journal: May, June and July 1936.
The Educational Review: May and June 1936.
The Indian Journal of Economics: April 1936.
Die Rumliche Gliederung der Landwirtschaft in nordlichen Kalifornien. By Gottfried Pfeifer.
The Scottish Geographical Magazine: May 1936 and General Index 1885-1934.
Geography: June 1936.
The Indian Co-operative Review: April 1936.
The Himalayan Journal: Vol. VIII, 1936.
Educational India: May, June and July 1936.
Our Home Magazine: May 1936.
The Geographical Magazine: June and July 1936.
Bibliography of the Orient: (Leningrad): Books VIII & IX (1935).
The Geographical Review: July 1936.
The Quarterly Journal of the Mythic Society: January-April 1936.
Proceedings of the Royal Geographical Society of Australasia (South Australian Branch): Vol. XXXVI.
Foldrajzi Közlemenyek: Vol. LXIII, 8-10. 1935.

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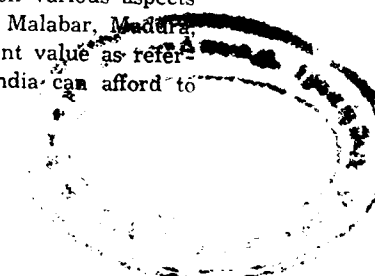
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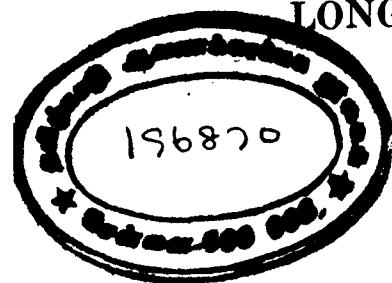
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