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THE MADRAS GEOGRAPHICAL ASSOCIATION

RULES.

1. The name of the Association shall be 'The Madras Geographical Association.'

Objects.

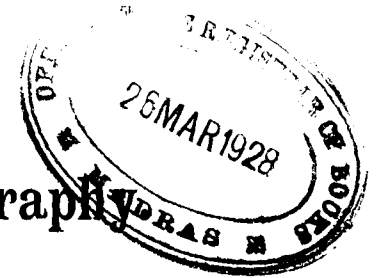
2. The objects of the Association shall be :—
 - (A) To promote geographical knowledge ;
 - (B) To secure for geography its proper place in the High School, the University and its constituent and affiliated colleges ;
 - (C) To help to improve the methods of teaching Geography ;
 - (D) To work for a School of Geography being started ;
 - (E) To promote studies about South India from various standpoints.
3. These objects shall be secured by :—
 - (A) Holding meetings and conferences, and publishing periodicals and occasional bulletins ;
 - (B) Organizing geographical exhibitions and excursions ;
 - (C) Helping in the preparation of geography books in the languages current in the Presidency ;
 - (D) Forming a central library of geographical literature; and collecting maps, charts, plans, models, slides and instruments ;
 - (E) Providing for circulation to members, of books, periodicals, and other collections ;
 - (F) And by such other ways as are deemed necessary to effectuate the objects of the Association.

Membership.

4. The membership of the Association shall be open to all those who are interested in the promotion of geographical knowledge or in the teaching of geography.
5. There shall be two classes of members, honorary and ordinary.
6. Honorary members are those who shall be so elected by the council by the majority thereof present at its meeting. They shall be exempt from liability to pay subscription, and shall have all the privileges of ordinary members, except voting.

Continued on Page 3 of the Wrapper.

Sewage and City Geography



Villages are generally built, following the lines of natural drainage. The waste waters of the homes there are neither much in quantity nor so foul as to be much of a nuisance, and they generally are allowed to find their way to the fields.

It is in towns that the disposal of sewage assumes menacing proportions and dimensions. Among the factors that control the rise and growth of towns and cities, the mode in which sewage is disposed of plays a really effective part, though to all appearances a subordinate part. There is a direct correlation between the health of towns and its water supply and drainage. Ever since Chadwick, Sanitary Science has become keenly alive to the dangers waiting upon inefficient drainage and busies itself at improving methods of efficient disposal of Sewage in order to promote the health of the population, and to do so at least cost and with the best results.

Sewage is defined as the waste water discharged by a community and may consist of nightsoil from latrines, waste water from bath-rooms and cleansing the houses, street washings and a lot of other vegetable and animal refuse. It carries much organic matter in a putrid stage giving rise to foul smells; and contains both nitrogenous and non-nitrogenous substances. Bacteria are in continuous action.

The primitive methods of disposal have been to collect, by hand and otherwise, the excreta etc., and then to let them flow along natural lines of drainage into a near lake or river or sea or some low-lying outfall station a few miles from the town which the sluggish current may be trained to reach. This, day by day, fills up, and eventually may become a source of danger.

Good work may yet be done by efficiently organising the collection of sewage and directing it along artificially constructed drains to the

outfall stations. This is the method of disposal practised in most Indian towns with more or less success according to the vigilance that is brought to bear.

Only two or three cities in India like Bombay and Calcutta use the water-carriage system of the West and this is a brilliant success from the standpoint of removal. But there is no treatment of the sewage.

The septic tank treatment does not dispose of the smells altogether and is very costly.

In none of these methods is there any attempt at recovering things of value carried off in sewage. Sewage may be made into excellent manure.

In the exchanges set up between town and village, human agency takes in the rural produce in the shape of food and ought to give back the urban product of sewage as manure to the fields. This obtains best in China and Japan.

But this is not done here in India. The one and only object which Unions and Municipalities set to themselves is how soon and how best to be rid of the sewage, which is injurious to health. It is not taken into consideration at all that the sewage makes valuable manure and that without in the least impairing the efficiency of the removal of sewage the manurial contents of it may be recovered by a simple treatment and at a small cost. This opens a source of income to their coffers.

Sewage Farm treatment requires two acres of land for every thousand inhabitants and The Madras Sewage Farm is an illustration of how grass may be grown on it with profit. Other plants may as well be grown there.

The limitations to this kind of treatment are twofold.

Such land has to be wholly in the vicinity of the town and the sewage turned on to it becomes manure available for that land alone and for nowhere else. And this too, in the long run, fails, from the land becoming sodden with sewage.

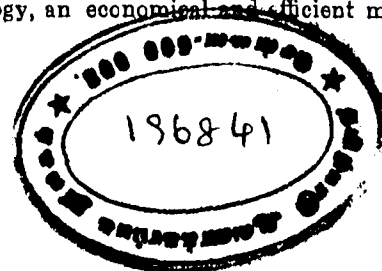
Man in his Conquest of Nature, has found in recent times, through study of Bacteriology, an economical and efficient method of disposal of

sewage in what is known as The Activated Sludge Process. This is the crown of a long series of endeavours in this direction and use is made of the property of the bacteria known as M 7 to precipitate hydrated oxides of iron present in Sewage along with organic matter.

The Activated Sludge method of sewage treatment may be described as a bio-chemical process wherein the purification of sewage is accomplished by intensive bacterial oxidation. The process consists in passing screened and detritus-free sewage through a system of open tanks and bubbling compressed air in a fine state of division through porous plates known as 'diffusers.' By this means the sewage is briskly agitated and the nitrifying organisms which are ubiquitous in conjunction with the air supplied, coagulate all the colloids and effect a distinct clarification of the oxidised sewage. Owing to intensive bacterial oxidation all the offensive smell is got rid of and a chocolate brown precipitate deposits down, which has been termed 'Activated Sludge.' When a sufficient amount of this sludge (say 25%) has been accumulated in the tanks, the time taken to purify the further sewage is reduced to a few hours. Since the sludge is developed strictly under aerobic conditions it does not possess any unpleasant smell and is in no way obnoxious to handle.

SEWAGE DISPOSAL IN INDIA.

The number of towns in India which possess a regular system of sewers are very few. The water flowing through them is mainly sullage containing plenty of putrescible organic matter. The method of disposal is by treatment on land. Sewage farming has been practised in Madras, Allahabad, Patna, Lucknow and some other places. Bombay and Calcutta have adopted the water-carriage system but the water-carried sewage is discharged without treatment into tidal waters. In most of the smaller towns open road-side drains have been cut out and these drains are not properly looked after, with the result that the sullage water getting into them often soaks in the soil. The trouble of treating trade wastes is seldom met with, as there are very few manufacturing concerns. In Calcutta the annoyance caused to the public by the discharge of the Jute mill wastes is appalling and there the municipality is faced with a huge problem. Generally speaking, people in India are not quite keen on adopting any method of sewage treatment, much less do they care to know about the recent developments in this direction. The Septic



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Tank has found some favour for two reasons: (1) it offers a very cheap mode of treating the sewage; (2) it does not involve any great recurring expense. The Activated Sludge method has been adopted in four places in the whole of India viz., at Jamshedpur where a plant has been erected to treat the sewage of 3,000 persons at the rate of 50 gallons per head per day; at the Bengal Engineering College, Sibpur where a plant has been recently put up to treat the sewage of about 1,200 persons at the rate of 38 gallons per head per day; at the Indian Institute of Science, Bangalore; and at Ambarnath, near Kalyan in the Bombay Presidency. The last two are experimental plants.

At hill Stations the buildings on the hills are located on steep precipices so that the drainage or other waste water has to find its way down below into the streams. The pollution of streams is a very common occurrence and people have yet to learn the evils of pollution of a water-supply used for domestic purposes.

I understand that at Rajahmundry the river is grossly polluted with gutter water and sewage and a little below the stream, people draw water for household purposes. Again on the banks of the Vaigai and the Cauvery, the worst nuisance is committed without the slightest notice being taken. I need not repeat to you the dangers of such contamination of water-supplies. The only remedies that can be suggested are, to protect a water-supply by adopting filtration methods and also to adopt measures to treat the sewage by some method before allowing it into a water-course.

SEWAGE DISPOSAL IN THE MADRAS PRESIDENCY.

Coming to the system of sewage disposal in this Presidency the methods employed are very primitive and of a defective type. The number of villages and towns in the whole of the Presidency comprise 40,580. There are 81 municipalities and 543 unions. The total population may be roughly stated to be 45 millions. Thirty out of eighty-one municipalities and three out of five hundred and forty-eight unions are provided with a protected water-supply. Only five municipalities can boast of a sewerage or drainage system. The conservancy system of removing night-soil by hand is the only one practised. In many cases the transport of night-soil is effected in open, leaky carts. The sins of omission and commission are perhaps responsible for the prevalence of filth-borne diseases

such as cholera, hookworm, dysentery, enteric and the like. Very few receptacles are provided to receive the rubbish of houses. All odd street corners are resorted to as urinals and children are allowed to commit nuisance in front of the houses. Public latrines are very few and these few are badly conserved and never kept in order. These are some of the common observations that may strike anybody both in the metropolis and other towns.

Of the five towns provided with a sewerage or drainage system three are under execution.

The drainage system in Madras consists in the division of the City into a number of sections each having a pumping station. The water from the various sections gravitates through stone-ware pipe sewers into pump wells. From these wells the sewage is pumped out through pipes to the main or Royapuram pumping station. From here it is lifted up by another pump to the Tondiarpet sewage farm located in the north of the city adjoining the sea-shore. In addition to the drains and sewers there are parts of Madras city "night-soil depots" where the excreta collected in the usual manner are delivered into the depots. In these depots the night-soil is brought to a semi-liquid condition by the addition of sufficient water and after being passed over a screen which removes all stones, leaves, rags etc., is let into the sewers.

The treatment of sewage on land in Madras is stated to have been carried out as long ago as 1868. Mr. Standish Lee, the then Executive Engineer started some sewage farms with the view of testing the suitability of this method in satisfactorily disposing of the Madras sewage. In the year 1885 owing to the construction of the open drainage scheme of George Town and the opening of the main or Royapuram pumping station, the Tondiarpet sewage farm became the most prominent. The operation of the farm was also found to be quite successful. The soil of the Tondiarpet Sewage farm is pure sea-sand and has been found to be quite suitable for the growth of a grass known as Hariali grass. This grass with the aid of sewage grows luxuriantly on the farm. The grass is turned into hay and sold as fodder. [Some tobacco seeds once fell there by chance; and these have been observed to grow admirably well, which shows what

potential wealth awaits development. Ed.] The area of the farm in the beginning was only 126 acres and has expanded little by little and now it may roughly be about 400 acres in extent. The volume of sewage pumped in 1912 was only 5 million gallons per day. In January 1927 the volume pumped per day was between 10 and 12 million gallons. Unfortunately at present all the water is not utilised on the farm, a major portion being run directly into the sea.

In the year 1912, the net profit from the farm was Rs. 35,552. But this was the revenue obtained from the sale of grass and hay from an area of 200 acres. Revenue was also obtained from the lease of cocoanut trees and the right of grazing on the low-lying parts of the farm on which a coarse grass, chappar, was growing. The net revenue from the farm was about Rs. 360 per acre of cropped area. In the year 1922-23 when the sewage farm was worked departmentally by the Corporation, the total receipts from all resources amounted to about Rs. 40,354. There is a very good Humphry Pump lying idle and parts of it are getting rusty and corroded owing to constant exposure to wind and Sun. It seems undesirable that machinery on which large sums of money have been invested should be allowed to be idle and grow rusty for want of proper supervision. Only a small portion of the farm is watered with sewage and a large portion left uncultivated. If only all the sewage is properly utilised on the sewage farm, the farm may be made to yield a greater revenue. By scientific management of the farm the money flowing into the coffers of the Corporation would be at least ten times more than what it is at present and the burden on the tax-payer can also be minimised.

The second drainage work carried out on modern lines in the Madras Presidency is that at Ootacamund on the Nilgiri Hills. In this town sewers on the separate system have been laid out connecting up all the important inhabited parts. Public latrines have been built on the water-carriage system and dumping pits are provided as pail-depots. A night-soil shoot has been erected and has been in use with satisfactory results to the conservancy of the town. The sewage is disposed of by means of a Septic Tank and Sewage Farm. The septic tank is stated to treat 200,000 gallons over a 24-hour period and the sewage farm which receives the Tank Effluent is 14 acres in extent. The produce on the farm is

said to be mainly grass and green-oats and the revenue nearly Rs.100 per acre per annum.

The drainage of Madura is still under execution. A complete drainage scheme of pipe sewers on the separate system has been drawn up and the town has been divided into six sections each provided with a pump well. From these wells the sewage is pumped to the main pumping station. From here the sewage flows through a 24" cast-iron main five miles long to a sewage farm of 186 acres. At present about 800,000 gallons of sewage are being pumped out of the town daily. The estimated revenue from the farm is about Rs. 250 per acre per annum.

At Vellore the open drainage system has been completed and the sewage disposal portion of the work remains to be done. It is proposed to pump the sewage of the city to a sewage farm 44 acres in area on which sugar-cane is proposed to be grown.

The drainage scheme of Kumbakonam is still under execution.

Besides the public schemes for big municipalities there are also a small number of sewage treatment plants in and around Madras. There are some Government educational institutions and also some private managed bangalows and mills possessing some form of sewage treatment plant.

THE SEPTIC TANK.

The objections to the Septic Tank method of sewage treatment are:—

(1) The harmful and objectionable gases given off during the decomposition of the sewage prohibit the treatment being carried out in the neighbourhood of habitations.

(2) The sludge produced is of an offensive nature and is of little value as a fertiliser.

(3) The effluent produced has to be still further treated on bacterial bed.

(4) Large areas of land are necessary for these processes.

(5) The process cannot be manipulated to produce an effluent of the desired character.

THE ACTIVATED SLUDGE.

The Activated Sludge process of sewage disposal seems to be eminently suited for all forms of treatment of sewage. It offers the following advantages:—

(1) The sewage can be treated to any desired extent. The suspended solids can be completely removed and the organic matter thoroughly oxidised so as to produce a clear and sparkling effluent; bacterial purification can be carried so far as to make the effluent almost wholly innocuous.

(2) The sludge produced from a domestic sewage is very valuable as a fertilizer and contains a large amount of available nitrogen, phosphate and potash. A million gallons of sewage treated in this way will yield about 42 tons of wet sludge or one ton of dried sludge. On the nitrogen and other bases one ton of dried sludge costs Rs. 60 and the working costs can be materially reduced by the sale of sludge.

(3) The plant can be built in any place without nuisance being caused.

(4) The area of land necessary is only one-third of that required by any of the other processes.

(5) The process is very elastic and can treat varying amounts of flow within limits and may be adopted to treat trade wastes such as tannery, creamery, sugar, textile and other wastes. The process is sensitive to acid liquors but if the acid is neutralized, then purification can be easily effected.

I have had the privilege of working with an Activated Sludge Plant at Bangalore for over four years. It was designed for 200 persons at the rate of 30 gallons per head per day, but actually it was treating much more. There was good purification effected right through and there was no manner of trouble whatsoever.

It requires only a small staff with an expert to keep it going.

A plant has been built at Milwaukee to deal with the dry weather flow of 75 million gallons a day collected from the city proper and the outlying area in the district having a total area of nearly 100,000 acres.

An overload storm water of 50% is provided for. This is the largest plant in the world yet built.

The adoption of the Activated Sludge Process will yield such a large quantity of liquid organic manure that vast areas of barren land may be made easily cultivable. At Bangalore the practically jungle land has been converted into a fertile soil by the application of activated sludge manure. From three-fourths of an acre, within eight months, a revenue of Rs. 330 was obtained by the growing of all kinds of English and Indian market garden produce. At Jamshedpur where I have had the opportunity of working for some time on deputation I have seen astounding growths of sugarcane and other produce from a purely laterite soil. The yield of sugar-cane was 50 tons per acre.

I have worked out the Capital and running costs of 6,000 gallon Activated Sludge Plant and they are as follows:—

Capital costs including equipment, Masonry work, motors, compressors etc.	} Rs. 12, 663.
Maintenance costs per annum including interest on Capital, depreciation on machinery, cost of power, charges of a chemist, watchman etc.	} Rs. 2,874

These figures give a liberal estimate of the Capital and running costs of the plant. All details of expenditure have been carefully gone through and on the above basis the capital costs come to Rs. 33-12 per head of population assuming 375 persons connected to the sewers at the time or Rs. 5-10 per 1,000 gallons treated assuming a yearly treatment of 6,000 gallons per day.

The maintenance costs on the same basis come to Rs. 7-10-0 per head per annum or Rs. 1-4-0 per 1,000 gallons treated.

The costs are materially reduced for plants of larger size and capacity. Estimates given by Dr. Gilbert J. Fowler on the basis of a number of plants proposed to be erected in India go to show that the equipment cost would not exceed

Rs. 25	if the numbers connected to the Sewers are above 500
Rs. 10	" " " " " 5,000
Rs. 5	" " " " " 25,000

From these quotations it is evident that for a population of 25,000 the costs are reduced by one-fifth and for still larger numbers it may go down still more.

The present system of conservancy is awfully imperfect and inefficient and the cost of the method of removal and disposal is also considerable. If the water-carriage system be adopted the premises of buildings may be kept clean and the health and comfort of the people can be improved.

The cost of sewerage and sewage disposal varies considerably with various localities. The estimated drainage cost of the Madura drainage scheme is Rs. 21 lakhs. The scheme is expected to serve a population of 171,460. The cost per head of present population is Rs. 18 and of the future population Rs. 13. The estimated annual pumping charges up to 1927 are Rs. 49,630 out of which amount Rs. 37,500 is expected to be recouped by net income from the growing of sugarcane on the sewage farm. Therefore the net working cost of the scheme is only Rs. 12,130.

For Vellore the estimated cost of the scheme is Rs. 3,67,764 which is at the rate of Rs. 9 per head of present population.

As against these estimates the cost of the Reading Activated sludge Plant is 10 shillings per head or £ 60,000 for 120,000 persons. For Oslo the capital cost comes to only Rs. 3-12 per head. The running costs calculated on electric power supplied at as 2- per unit may come to less than As 6- per head per annum. A lot of revenue may be obtained by the sale of sludge which may thus compensate for the cost of operation.

The cost of construction of a septic tank latrine treating 70,000 gallons per day has been estimated to be nearly Rs. 35,000. In spite of having spent such a large amount there is a lot of smell in the neighbourhood and the effluent and the sludge are of little value as fertilisers.

One ton of dried activated sludge has been found to contain 30-40lbs of nitrogen, 10-15lbs of phosphate and 1-4lbs of potash. The fertilising value of activated sludge has been found to be double that of an equivalent amount of ammonium sulphate and 50 times that of cowdung.

CONCLUSIONS.

(1) The adoption of improved systems of sewerage and sewage disposal very appreciably reduces sickness and death-rate of a community.

(2) The cost of maintenance and disposal will be low as compared with other systems. The present method of collection and disposal of sewage is very unclean and inefficient tending to lower the vitality of the people.

(3) The manurial constituents in sewage are very little utilised and by the adoption of modern methods they can be successfully put back on the land and a great yield of crop may be obtained thereby. It is well known that the world's supply of combined nitrogen is fast disappearing and attempts should be made to conserve the nitrogen from easily obtainable sources. India is mainly an agricultural country and the aim of the agriculturist should be to make two blades grow where one grew formerly. This can be done only by improved methods of agriculture and intensive cultivation of the soil by the judicious application of the right kind of manure.

Activated sludge has been found to contain nitrogen, phosphates and potash in a very available form for the plant to take up. In addition it contains a large number of useful micro-organisms. Activated sludge being a product of bacterial elaboration is said to contain auximones or plant vitamin and perhaps this is the reason for the better yield of crop from this manure as opposed to other artificial manures.

For these reasons it seems eminently desirable to put up an activated sludge plant for sewage disposal purposes and thereby save a lot of money and secure better comfort.

SUMMARY.

To sum up :—

Sewage disposal is a problem of every town, vitally affecting human life.

Being both *noxious* and *valuable*, sewage has to be first *removed* and then *converted*.

Removal *abates* the nuisance at the place of *origin* while conversion *mitigates* the nuisance at the place of *destination* and also may *recover* the valuables according to the method adopted.

The problems of removal are entirely under the control of local geography, the soil and the slope, the contour and the terrain ; and subject to these basic conditions, Sanitation makes use of modern methods of Organisation and Transport.

The problems of *Conversion of Sewage* are not so much attended to as they ought to be. Where the removed sewage would be a nuisance to the place of ultimate destination, some kind of *treatment* is resorted to, primarily to mitigate it. The Septic Tank method is such a one.

Treatment for the purpose of recovering the valuables over and above removing the nuisance or mitigating it is seldom found.

The Sewage Farm does this but its benefits are confined to the *suburban* land alone which, too, after a time becomes 'sick' and 'dead' being choked with sewage.

Last in the evolution has come The Activated Sludge which removes the nuisance and recovers the valuables as fertilisers and makes these available for *any* land wherever situate.

This latest process of Activated Sludge is a fulfilment and a completion of the Cycle of Geographical Exchange between Town and Village, the Sludge being available as fertiliser for *any* land. Thereafter, economic laws determine *which* land will have it.

Many of the diseases of Indian towns are directly traceable to the water-supply and drainage. To that extent, they are of a preventible character. Public opinion must therefore keep a vigilant eye on the municipalities so that they may not fall off from their duties. The towns must be kept clean and healthy places to live in.

N. Swaminathan, B. Sc., A. I. I. Sc., King's Institute, Guindy.

At a meeting of the Madras Geographical Association, held on 2nd September 1927, Mr. R. D. Anstead, M.A., Director of Agriculture presiding, a paper on 'Sewage utilization—a problem in urban geography' was read by Mr. N. Swaminathan, B.Sc., A.I.I.Sc., at the Presidency College.

Mr. R. D. Anstead introducing the lecturer of the evening said :—

Gentlemen, It is now my duty to introduce the lecturer of the evening. It is a very interesting subject and one which deserves greater attention than it is receiving at the present moment. It is a subject in which I am technically interested. I shall reserve my remarks now and I call upon Mr. Swaminathan to deliver his lecture.

[The above-printed lecture was read.]

MR. R. D. ANSTEAD :—Gentlemen, I know you will feel interested in this subject for it gives a very interesting account of sewage disposal. The point which I should like to analyse, if I may, is this, that the methods of sewage disposal ordinarily used, the sewage farms such as we have in Madras, merely aim at the removal of sewage. The object is to get rid of sewage and if that is done, the municipality considers its job is finished. Now in the modern activated sludge process there is more advantage because not only is the sewage disposed of in a satisfactory way but it is made use of in the manufacturing of fertiliser and therein it has an enormous advantage over other methods. Supposing for a moment that the activated sludge method is not cheaper than the old method as far as sewage disposal goes, it does in addition the manufacturing of fertiliser. Now that is of enormous importance in India and I want to stress that point. In India our great cry is for manure. It is only one of the reasons; but it is certainly a reason and every endeavour has been made by Agricultural Departments to increase the stock of organic manure in this country. And activated sludge is one of the methods I know. Enormous quantities of valuable fertiliser in big towns in India are being wasted

and they should be, if possible conserved and put back on the land. A city like Madras is drawing into it from the surrounding country enormous quantities of food to feed the population. That is a definite drain. In return the city of Madras should render back 'the soil.' Instead of that, what does she do? She turns most of it into the sea. Now that is economically wrong. Many suggestions have been made for increasing the stock of fertilisers in this Presidency and for conserving those we have. Some of those suggestions have been turned down. Whenever there is a talk about legislation to stop or control export of fertilisers, I am told it is not economical. I fall foul of the account. While economically it is right to turn the sewage into the land, instead of into the sea (near your locality), scientifically it must be wrong to turn your sewage on the land outside the town. Now the fault of the sewage farms all over the world is this. The lecturer said that there must be two acres to every thousand. I noticed that at the end of the lecture, the lecturer said that the Sewage Farm at Madura was some 200 acres—I think he said 181. He said that the population at Madura was something over 200,000. That is the fault of all sewage farms. I have seen a good many. The land will not deal with that amount of sewage, and therein it fails. Sooner or later the land will get sewage-sick and you cannot go on pouring more and more sewage to the same piece of land. Therein the sewage farm has failed and from a scientific point of view it is dead. The septic tank fails for another reason as the lecturer said very clearly. It is very smelly and it does not do its job. In fact it does not satisfactorily dispose of the sewage. Now the activated sludge method is the only method of disposal of sewage in an economical and scientific

way and it is to be reckoned with particularly in these countries where we run the risk of tropical diseases. So that, the thing is interesting not only from the agricultural point of view but also from the health point of view.

I am rather glad to say that South India is just beginning to understand the possibility of sludge method. Before the next eighteen months, this system would be adopted in the new Golden Rock Colony. There will be one at Madura and it is not too late to add it to their system. And I speak with still more assurance that there will be one at the Agricultural College at Coimbatore within the next twelve months. I have asked for a plant and that plant is to be an experimental plant, that is to say, it is to be opened to many classes, and people like our friend, the lecturer, may go and experiment and see if he cannot improve on the present method. It is undoubtedly the duty of the Agricultural Department which I have the honour to control to pave the way in these matters. I am going to try and solve the problem with an activated sludge; I am going to have the ordinary system of conservancy for night-soil. I am having arrangements so that the nightsoil will be brought in carts, put in special tanks and then poured on to the land. Incidentally, I have to experiment. The point I want you to bear in mind is this, that whatever value the activated sludge is, it is of some value. You are getting something back out of your plant. So that I am very glad indeed for what the lecturer has given us. It is a matter for this society to take up. It is a matter for every citizen and anybody living in a city to be interested in the sewage disposal. And now you have heard the lecturer, you can do anything to collectively bring pressure upon the powers-that-be to give up their old fashioned ideas and adopt new ones and cease to be experimenting. I hope you will bring that pressure to bear.

With the usual votes of thanks, the meeting came to an end.

ILLUSTRATIONS

1. Luxuriant growth of garden crops under sewage.

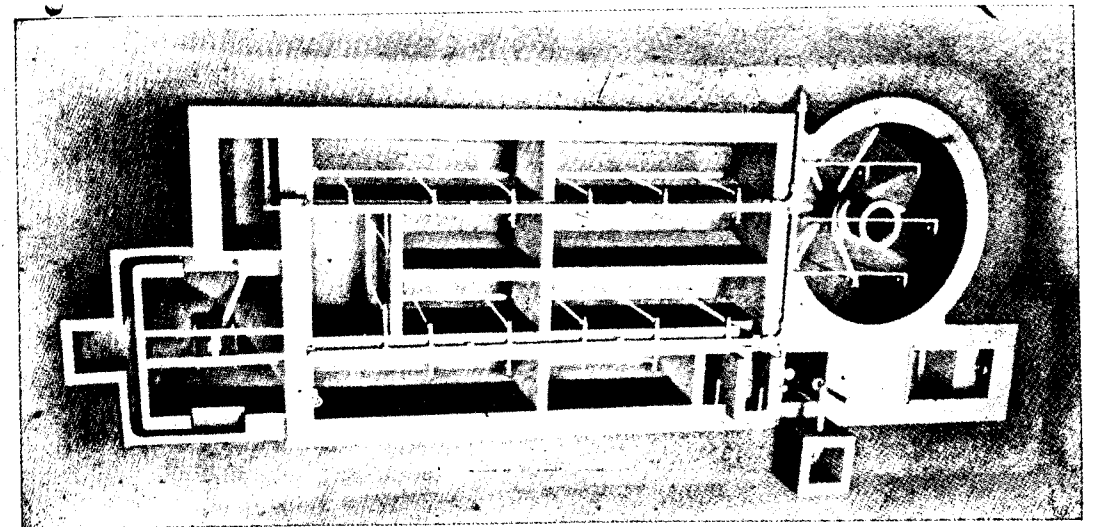
2. Activated Sludge Plant.

3. Plants grown in pots ; the first at right hand grown under Activated Sludge.

4. Tank in Activated Sludge Process.



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REGIONAL SURVEYS.

THE HIGH SCHOOL.

Regional surveys in the High School are naturally more intensive than anything attempted previously in the lower classes. The work done in these lower classes will form a very useful background for the investigations of the three highest forms.

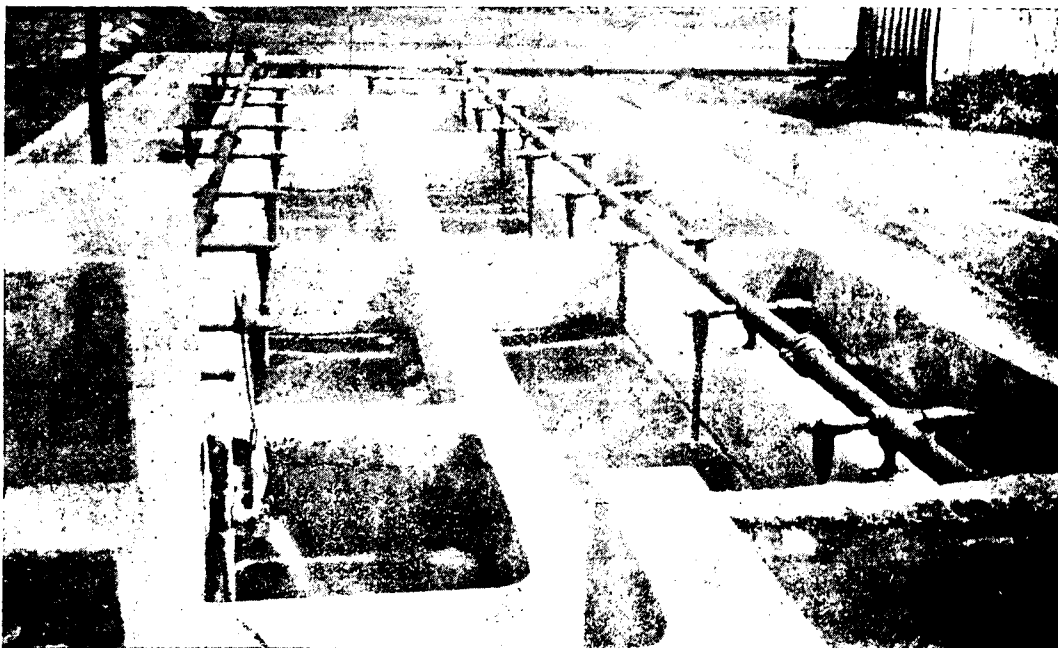
So far, the boys will have collected pictures of buildings and places of interest in the neighbourhood; they will have produced an elementary map of the water-supply sources in the district; and in addition to this they will know something of the soils and underlying rocks of that area. Communications and the extent and position of open spaces in the area to be studied will also have been mapped and these maps alongside those of the above facts will have given the boys a good idea of the Geography of the district. The work of the Second and Third Forms on the Botany and Insects of the area and the Climate fills out the picture still further to prepare the way for the work of the High School.

The Fourth Form will confine its attention to the study of the Animals and Birds of the area, the Fifth Form will concentrate on the Historical Development, and the Sixth will show how Modern Conditions have affected the life of the people in the district, and changed it since earlier times. This will then complete the picture and give a finished aspect to the study.

By the time a boy reaches his Fourth Form Year, he should be of an age when most boys are keen naturalists. He



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will be eager to make a list of the birds he has observed in the neighbourhood, and to learn something of their habits and habitats. Boys, if they are encouraged at this age, will soon become veritable encyclopaedias of natural knowledge; and when their observation has failed to discover any particular fact concerning some bird, then, and only then, should they be shown how to find the required information in a book of reference. The teacher in charge of this Form should aim at producing a book of detailed descriptions of the birds in the neighbourhood, illustrated by drawings pictures and photographs of the birds mentioned in the descriptions. One thing, however, should not be allowed, on any pretext whatever, and that is, the reprehensible practice of collecting birds' eggs. Neither should the boys be encouraged to kill birds to make a collection of their own in the school. Far better is a collection of photographs taken by some skilful manipulator of the Camera in the Form. A love of birds and their care is what ought to be aimed at, and the more we can encourage this, the more we shall have achieved our aim. In a school surrounded by the open fields, an attempt can be made to maintain a bird-table and bath and when the smaller birds find that the use of these is attended by no harm to themselves, the school will soon have the pleasure of studying the habits of the birds in the school-compound. If there are plenty of trees about the school compound, birds may even be encouraged to nest there, and the boys will then have their little friends quite close at hand for purposes of study and observation. Of course the teacher himself must have the necessary knowledge to guide and check the observations of the class, and his aim should be to link up the knowledge the boys discover about these feathered friends with the other geographical facts of the district, and show wherever possible the intimate connection existing between environment and the types of bird indigenous to the district.

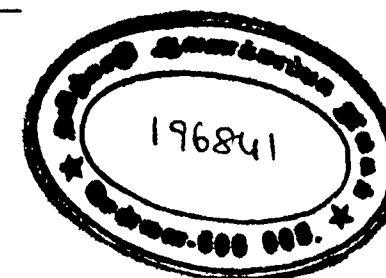
Alongside this work amongst the birds, there will also be carried on a similar study dealing with the animals of the district. This will be no less interesting to the boys, who will vie with each other to discover some new form of life not yet recorded in the Form's Book of Animals. Again, pictures, photos and drawings are the things to aim at rather than a collection of stuffed animals resembling a taxidermist's establishment. There is absolutely no need whatever to kill any living creature to do this work successfully, and some of the finest surveys in existence have been made by means of pictures, drawings and photographs.

This work amongst animals will naturally lead to a realisation of the many cruelties now practised—on our dumb friends; and if such realisation leads to an awakening of a public conscience in our younger generation, it will have done an exceedingly valuable piece of work for the humane treatment of these creatures. This is an urgent necessity especially in our bigger centres of population.

So, the work of the Fourth Form is exceedingly important, both from the point of view of the regional survey and that of the education of the boys in the widest sense of the word; and for any teacher with an interest both in his class and his own district, we cannot imagine any other more interesting means of growing acquainted with both. Excursions and discussions with the class, in and about the district, will make the teacher conversant both with his class and with the district at the same time, as no amount of formal class work would ever be able to do.

G. D. Watkins, B. Sc.,

Christian College, Madras.



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AUSTRALIA AND INDIAN TOURISTS.

Under the auspices of the Madras Geographical Association, Diwan Bahadur T. Rangachariar C. I. E., who represented India at the opening of the Commonwealth Parliament at Canberra delivered a Lecture on "Australia and Indian Tourists" on 18th August 1927. Miss Fulton of the Y. W. C. A. Vepery presided.

The Lecturer described how the Australian Government through its Publicity Department invites tourists; places much-needed information within easy reach; and offers facilities of various kinds at one's disposal. Of Indian Tourists there were a few, and such as he saw were mostly Parsis, and only one Ruling Prince, The Maharaja of Jalvan. Of Indian settlers there were very few. Most of them were Mussalmans, who had come there as lascars, hawkers, or as camel-drivers, camel-trains having done the work of Railways. Australia (at Freemantle) is within nine days' steam of Colombo. Sydney and Melbourne hold the greater part of the population and the rest lie scattered over a vast continent. Living there is costly, but the people are hospitable and kind, Democratic and Freedom-loving and mix freely and easily, shedding many a rigid Western convention and formality.

Australia spreads her charms for the tourist, with her wonderful climate, with her beautiful coastline and harbours, with her hills and streams and caves and long lines of Railway, and with her brilliant efforts in modern agriculture, ranches and sheep-runs, and the rearing of horses. The best season to go in is between April and October.

The Chairman remarked that the railways there being of different gauges require transshipment too often. She stressed on the fact that owing to the sparse population, the great dominant factor in the life there was the loneliness in which one has to live it out, especially so in the Bush. She next declared how Australia really belonged to Asia and was vitally connected with India.

With the usual vote of thanks, the meeting came to a close.

REGIONAL VARIATIONS IN RURAL LIFE IN THE UNITED STATES.

Under the auspices of the Association, Dr. Edmund Brunner, Professor of Rural Sociology in the Columbia University spoke on the 12th January 1928 at the Y.M.C.A. Auditorium on "Regional Variations in Rural Life in the United States". After referring to the works of Professors Mukherji and Park, he said that the United States could be roughly divided in the matter of rural sociology into five main regions, namely, the New England States, the Middle Atlantic States, the South Atlantic States, the Middle Western States and the Transmontane and Pacific States. He pointed out the peculiarities of these different regions, and explained how with the difference in surroundings and difference in soil and climatic conditions, sociology of the rural people also differed. He also showed how in some political questions geographical conditions played a prominent part, and instanced the voting on a bill intended to give relief to the agriculturists which went purely on geographical basis and not on party considerations. Finally, he touched upon the influence of transport facilities on rural life.

A discussion then ensued in the course of which the lecturer said that, while there were differences in the matter of details of cultivation and unit of holdings, there were far more striking and important similarities between the agriculturists of America and the Far East, e. g., land tenure, agricultural depression, indebtedness, and the demand for cheaper money.

With a vote of thanks to the lecturer, the meeting terminated.

GEOGRAPHY

I teach them interesting things
 Of where all goods are made,
 Of what their manufacture brings
 In profitable trade.

I teach them from a bloodless book
 To scan a bloodless chart,
 And pray one day their eyes may look
 To find the throbbing heart.

I teach that crumbling mountains built
 The spreading plains below;
 But I can smell the river silt
 In lands I do not know.

Around the decks I fret and fume;
 I set them routes to trace,
 But I can feel the deep-sea spume
 Lash fiercely at my face;

The pastures of the coastal belt,
 The soil the farmer tills;
 Speaking nothing of the grassy Scheldt,
 Toy villages and mills.

I teach of rain that comes in June
 To slake the withered grass;
 But I can hear the fresh monsoon
 Roar down, thin out and pass.

Shall I so teach the livelong day
 In inches and degrees,
 And never try to sail away
 Beyond the charted seas?

Nay: after dinner, lessons done,
 I have my fitful nap,
 And point my dream-boat to the Sun
 Across a worn old map.

G. D. MARTINEAU,
 IN 'THE SPECTATOR.'

REVIEWS.

FIRST YEAR IN GEOGRAPHY; PART I.

*I. (In Tamil)—by Miss Darling—C. L. S. Geographical Series—
 C. L. S. Press, Madras—pp. vi—34. Price 3 annas.*

Miss Lowe in her foreword says, "All teachers of Geography will agree that in teaching Geography, their aim is to give their pupils an accurate knowledge of their own environment and of its relationships to the rest of the world and in this way to help them to understand the conditions under which the people of the home-country live and work and by comparison the conditions of life and work in other regions.

"It is also universally agreed by teachers that the first step in giving their pupils a knowledge of the mode of life of the inhabitants of other lands should be taken at the beginning of the Geography course, during the story hour, when the little ones of the second or third class can be introduced to children living in other climates and can learn how they live.....

"The authoress has taken pains to insure accuracy and simplicity of language and correctness of Geographical detail and has brought to the work a wide personal experience of teaching in the lower classes of schools for Indian Children."

The book sustains every one of these claims and there is no doubt that it will be found an excellent first book in Modern Geography for Indian Schools. It is hoped that this book will be available in all the South Indian languages and that other books of the series will be soon brought out.

BOOKS AND JOURNALS RECEIVED.

Rural India : Vol. II, Nos. 4 & 5 (October & November 1927) and Vol. II, No. 6 (December 1927).

The Student : Vol. I, No. 3 (November 1927) and No. 4 (December 1927).

The Journal of the Travancore Teachers' Association : Vol. VI No. 4 (December 1927).

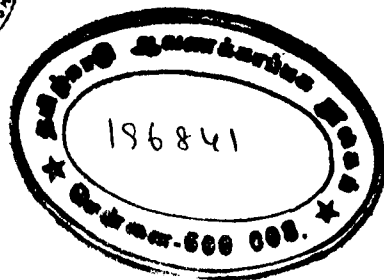
Subhashi : (Telugu) Vol. I, No. 2 (November 1927).

Geography of Villupuram Taluq : (in Tamil) by K. Narayanasawmy Ayyar (Hanuman Press, Villupuram). Price 2 as. 6 ps.

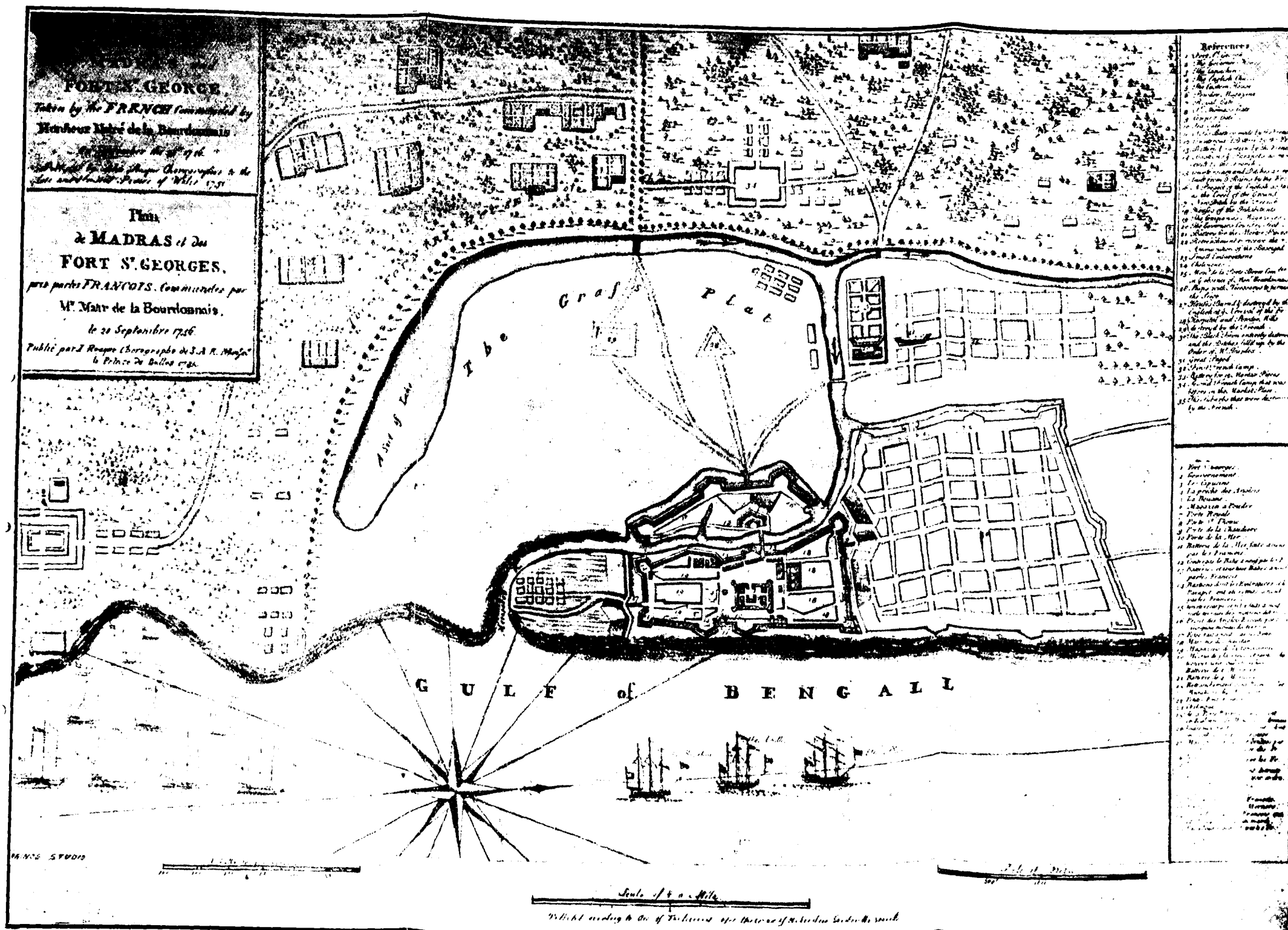
South Arcot District : Map exercises : by K. Narayanasawmy Ayyar (Hanuman Press, Villupuram). Price 4 as.

The Madras Presidency : Map Drawing Exercises : with hints and suggestive questions : by K. Narayanasawmy Ayyar, (Hanuman Press, Villupuram), Price 5 as

END OF VOL. II.



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7. A person shall become an ordinary member upon the proposal by a member, the seconding by another member and approval by the council by the majority thereof present at its meeting. He shall pay an annual subscription of rupees *two* payable in one instalment or in two equal half-yearly instalments at his option.

8. Those who pay an amount of hundred rupees in two years become LIFE MEMBERS, and they shall be exempt from payment of any further subscriptions.

Officers.

9. There shall be the following officers for the Association :—
Patrons, Vice-Patrons, President, one or more Vice-Presidents, Secretary and Treasurer.

Management.

10. The management of the Association shall vest in a Working Council, which shall consist of the president, the vice-presidents, the secretary and the treasurer as ex-officio members, and four others elected by the general body, one at least of whom shall be from amongst the mofussil members.

11. The *Quorum* for a meeting of the Working Council shall be three.

The Powers and Duties of the Working Council.

12. The duties of the Working Council shall be :—

- (A) To receive and approve all applications for membership ;
- (B) To arrange for the annual and other meetings of the Association ;
- (C) To provide for the custody and utilisation of the funds and other property of the Association ;
- (D) To appoint committees and assign duties to them ;
- (E) To act in all respects on behalf of and with the powers of the general body, except when it is actually sitting.

13. The Working Council shall have the powers, subject to the veto of the general body, to issue, modify or rescind bye-laws, for the regulation of the work and activities of the Association.

Miscellaneous.

14. The official year of the Association shall be from 1st January to 31st December, and shall be divided into two sessions.

15. The Annual Meeting of the Association shall be held in December, when the officers for the coming year shall be elected.

16. All life membership subscriptions, all unspecified donations and one-third of all ordinary subscriptions shall be carried to the capital fund of the Association.

THE MADRAS GEOGRAPHICAL ASSOCIATION, MADRAS.

THE WORKING COUNCIL.

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High Court Vakil, Madras (Editor of the Journal).
3. Mr. M. S. Sabhesan, M.A.,
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4. Mr. S. Rajaratnam, B.A., L.T.,
*Teacher, London Mission High School, Coimbatore
(Mofussil Member.)*

All communications and remittances should be addressed to—

The Secretary,

The Madras Geographical Association,
Gopalapuram, Cathedral Post, Madras.