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Editorial Notes.

The Indian Science Congress.

The Indian Science Congress was this year held in Bombay from the 13th to the 18th of January, the meetings taking place in the fine buildings of the Royal College of Science, the greater part of which are at present in use as a War Hospital. A large number of members attended from all parts of India those from Coimbatore consisting of Dr. Norris and Messrs. T. V. Ramakrishna Ayyar, B. Viswanath, K. Krishnamurti Rao and T. V. Subramanya Ayyar.

The scope of the Congress was on this occasion enlarged by the addition of a section on medical research and it was therefore most appropriate that the President for the year should be Col Sir Leonard Rogers I. M. S., F. R S. of Calcutta whose researches on tropical diseases have received world-wide recognition. The President selected for his address the subject of Cholera, probably the most fatal disease in India, and a severe epidemic of which

was at the time of the meeting devastating Bombay. A most interesting description was given of the various stages by which the mortality of Cholera has been reduced from 59% in the ten years 1895—1905 to 19.1% in the three years 1915—1917. This striking success has been the result of a remarkable series of researches, each symptom of the disease having been separately investigated and the appropriate treatment worked out. There has thus been nothing empirical about the remedies adopted, each being the result of careful and accurate deductions based on clinical, physiological and pathological observations on hundreds of cases.

On the second day the chief item of interest was a paper by Mr. C. M. Hutchinson of Pusa dealing with the question of nitrogenous manures, one of his points being that in a large proportion of Indian soils nitrogen is not the limiting factor and indiscriminate addition of large quantities of nitrogenous manures would lead only to the exhaustion of the soils in other respects. Allowing however for the above factor there is no doubt that large quantities of nitrogenous manures will be required in India if intensive methods are to be employed. Two ways of increasing the supply at once suggest themselves viz., restriction of export of oil cakes and fixation of atmospheric nitrogen by electric power. A most interesting discussion followed, the general opinion being that for a considerable period to come there was no likelihood of electrical fixation in India being able to compete with Norwegian production and so reduce the cost of nitrates in India. For the present, it seems, reliance will have to be placed on the

better employment of resources already available and the education of the ryot to take advantage of modern methods. In this respect the importance of demonstrations on the ryot's own lands was emphasised.

The following day the various sectional meetings began and the President of the Agricultural section gave his presidential address dealing with some economic factors affecting agricultural progress. Mr. Keatinge's view was that agricultural holdings have become so small as to be insusceptible of orderly and adequate improvement. A large number of the occupiers moreover are lacking in energy and skill, balancing a low standard of endeavour by a low standard of living. These defects can only be remedied by the creation if possible of suitably sized holdings and the passing of these into the hands of the most progressive men.

It was unfortunate that the attendance in the agricultural section was not larger as many of the papers were of considerable interest. Papers on the improvement of Indian cattle with regard to milk production were read by Mr. Smith of the Military Dairy Farm, Bangalore and Mr. Yegnanarayana Ayyar of Mysore, stress being laid on the necessity of agricultural co-operation and careful control of breeding. Sugarcane received attention at the hands of Messrs. B. Viswanath and K. Krishnamurti Rao, the former describing his method of sampling canes by means of a hypodermic needle, the sugar content being estimated by the refractometer for which method one or two drops of juice are sufficient; while the latter discussed the influence of salinity on the growth and composition of canes and showed

that excess of chlorine in cane juices resulted in poor growth, low sugar content and co-efficient of purity and inferior jaggery.

Two interesting papers on nitrification were given by Mr. N. V. Joshi of Pusa and Mr. Plyman of Nagpur, Mr. Joshi dealing with the nitrification of green manure and Mr. Plyman with the decomposition of poonacs. There is a good deal of difference in the rates at which various poonacs are broken down and eventually nitrified. In the case of Mahua cake no nitrification—and apparently little ammonification also—was observed. This is doubtless due to the toxic glucoside which is known to be present in Mahua seeds and which was investigated by Moore and others in Liverpool in 1910.

In the same section Mr. Ramakrishna Ayyar drew attention to the risk of importation of foreign insect pests along with imported agricultural produce and urged the necessity for inspection of such products at the port of entry where these are likely to carry pests. Mr. T. V. Subramanya Ayyar also described his work on the life history of a Longicorn beetle found boring on the Moringa plant.

It is impossible for us to describe here in any detail the work of the other sections. One paper in the Medical section may however be mentioned in which Sir Leonard Rogers described his treatment of tuberculosis with sodium morrhuate a chemical compound separated from cod liver oil. In the great majority of cases treated with this drug, striking improvements were produced and while it is much too early to make any positive statements it would appear

likely that a most valuable advance has been made in the treatment of this distressing disease.

The Presidential address in the Medical section by Lt. Col. Glen-Liston, C. I. E., I. M. S., was also of great interest, Col. Liston emphasizing the urgent need for further financial support for medical research in India and also the necessity for combined work between Bacteriologists, Biochemists and other specialists if the best results are to be obtained. In support of such team work he quoted the successful results obtained by the Plague Commission which led to a complete understanding of the methods by which plague is transmitted.

In addition to the formal meetings a series of popular lectures open to the public was given in the evenings. The two which aroused the greatest interest were perhaps those delivered by Dr. G. T. Walker on the life history of a Star and Mr. F. M. Howlett of Pusa on methods of dealing with obnoxious insects. Dr. Walker's lecture was illustrated by some very beautiful slides which were much appreciated by a large audience.

A large number of interesting visits were also arranged for members of the congress to the chief industrial concerns in Bombay. The serious strike of cotton operatives unfortunately prevented visits to the cotton mills but many members availed themselves of the opportunity to inspect the Royal Mint—then turning out 15 lakhs of new coin a day—the Docks, the G. I. P. Railway Workshops and other similar institutions. One afternoon was also devoted to the Bombay Bacteriological Laboratory where a large number of demonstrations were given all of the greatest interest. As

usual there were many social functions in connection with the congress these including a reception at Government House by Sir George and Lady Lloyd and a garden party at the Victoria Gardens given by the President of the Bombay Municipal Council. Altogether a very pleasant and instructive Congress.

Mr. P. H. Rama Reddy.

We offer a very cordial welcome to Mr. P. H. Rama Reddy, M. A., B. Sc. (Edin.) who has been appointed to the Indian Agricultural Service as Deputy Director of Agriculture. He is the first South Indian to be directly recruited to the Imperial Service, and we congratulate him on this distinction. We hope that during his stay with us here, he will give the journal the benefit of his experiences of the Agricultural training he receives abroad.

New Year Honours.

We are very glad to learn that the title of Rao Saheb has been conferred on M. R. Ry., M. R. Ramaswami Sivan Avergal. He is one of the founders of our Union and has rendered valuable service to it in various capacities as General Secretary, as Editor and recently as Vice-President.

Borehole yields.

Geological considerations. It is generally agreed to both by Geologists and boring Engineers that it is next to impossible to divine the existence of subterranean reservoirs of water with infallible precision. It is on the other hand admitted that it is possible to

predict the chance of lighting on a good or bad spring of water in any particular locality by a study of the geological conditions obtaining in the neighbourhood. At present this is the only scientific method that is available for scenting underground supplies of water. In this country we do not possess that geological information which should form the basis for any investigation of water bearing strata. The geological survey of India does not deal with the detailed survey of particular tracts and even whole tracts of country have yet to be studied from the well-sinkers point of view. The general results published up to date should however enable one acquainted with geology to make the detailed study of any given particular area. The results of boreholes so far put down in any locality are, of course, of great value in making any such detailed study of a particular tract. Shallow boreholes sunk with an avaricious hope that large quantities of water might be tapped with the least expense and abandoned when such hopes were not naturally realised are, of course, of no practical value to a geologist. This statement is to a certain extent applicable to numerous boreholes put down in this presidency by the Pumping and Boring Department. The ordinary hand boring sets are designed to work to an average depth of 100' and in special cases to 150' and it is very rarely that ryots are encouraged to go deeper than that. We find that all over the world the celebrated artesian springs are obtained from strata lying far below 150' from ground level. On deltaic regions, largely formed of recent drifts and thickly everlain with alluvium, the chances of a successful bore at the shallow depth of 100' are very small. What the geologist would want is few deep bores put down in selected points of any area under considersation. This statement is subject to reservation in the case of rocky tracts abounding in masses of igneous formations at shallow depths.

The water-bearing strata of earth's crust are generally confined to sandy and gravel deposits, the pervious limestone and sand-stone formations, chalky and laterite beds. The water is held in the pores of these strata. It is likewise held in the pores of clayey soils. But the latter are impervious i.e., they absorb water but do not part

with it except by slow evaporation from the exposed surface. The flow of water through any compact medium like sand or limestone takes place through capillary passages that exist or are formed in the body of the stratum. The magnitude of the flow depends upon the adhesion between the particles of water and the surfaces of the capillary tubes. It is a well known hydraulic principle that the smaller the tube through which water flows, the greater the resistance that is offered by the sides of the tube to tne flow of water through it. The friction is greatest in clayey soils and may be said to be the least in gravelly soils. Clayey soils do not therefore yield water. It is also the case with certain classes of rocks generally and specially those of igneous origin which are practically non-porous. These latter do however hold water, under favourable circumstances, in fissures or cracks which may again be connected with pervious strata. In soft sedimentary rocks, cavities or canals may be formed in the body of the rock which serve to collect the percolating water from the surface. These cavities may sometimes be large reservoirs yielding considerable quantities of water from year end to year end. The so-called artesian springs rise from sandy and gravel beds which may be folded between two impervious layers of clay These sandy beds may sometimes be formed in massive layers supported on bed rock. The yield from these soils depends upon the effective size of the particles of sand and gravel composing them. The larger the size of these particles, the less the resistance offered to the flow of water through the stratum. Hence it is that, though sand generally speaking is a good water-bearing stratum, very fine sand is almost as impervious as clay. Mr. Medlicot in his report on artesian bore holes in India, gives the results of a series of interesting experiments carried out under his guidance for studying the conditions of flow of water through porous soils. A leaden tube of ½" diameter laid at a particular inclination discharged 3·22 c in. per minute. The same tube under the same conditions of flow i. e, for the same fall, discharged a far smaller quantity when filled with fine shot. In another experiment the same tube laid to the same slope gave greater discharge when filled with shot of a larger size than when filled with shot of a smaller size. The same set of experiments also proved that the level to which water will rise in any bore-hole depends upon the hydraulic gradient of the strata in which the flow takes place. In the case of boreholes which are sunk in thick layers of sand or gravel, the percolation of water into the bore takes place from a conical space, the base of which, lies at the surface of the layer and its apex at the botton of the borehole pipe. The cone gets constantly extended as the discharge from the bore increases. For any stated depth of the bore, it can be shown that this cone of depression has a critical value at which it will furnish the maximum discharge. If the sandy layer has a general inclination in any direction, the contained water has a tendency to move in that direction. The pervious strata that underlie the surface of a valley or a river bed may have the same slope as the general lie of the country. Hence, if a borehole is sunk in such a valley with a rapid fall from the hills to the plains, the height to which water rises in the bore-hole depends upon (1) the position of the point in the line of gradient and (2) as already said, upon the nature of the stratum. In flat masses of drift sand, the water that has percolated through, and is held in the bottom layers can only be reached at by low pumping. For in that case the cone of depression will have to be sufficiently deep to create head in the borehole. The yield of a borehole will, therefore, depend upon a multiplicity of factors, chief among which may be stated to be the following :—

1. The nature of the strata and their depths from the surface.

2. The relative position of the water-bearing stratum with reference to the others.

3. The sources of water supply.

4. The inclination of the strata.

In addition to the above data, the rainfall, its intensity and magnitude and the surface run off if it could be calculated at known points of discharge like tank weirs or by the volume of flood waters passing down the central stream are points which demand careful study. Contour maps of the tract under investigation are a great help

but in their absence, the general lie of the country can be roughly gauged from the configuration of the natural drains which intersect that particular tract.

Practical cases. The advice of a geologist who has made a special study of any locality should be perhaps more in requisition after the borehole is taken down to a certain depth than at the commencement. Such advice cannot be by its very nature faultless or always useful. Yet it would sometimes prevent waste of money that might otherwise be incurred in blind prospecting. If for example it is known that there is a sub-stratum of igneous rock below a thin layer of top soil no one would be wise in risking a good deal of money on the doubtful event of a good spring being struck by chance. And yet there are instances where boreholes were put down deliberately in igneous rock with the hope that the igneous stratum might be only an intrusive layer and overlie another sedimentary stratum of pervious structure. It is said that in the heart of Australia, the seat of some of the richest gold mines in the world, water is dearer than gold and is brought to the place over hundreds of miles from the sea coast. In this arid region a borehole was sunk to the great depth of 2000' in quest of water. The boring proved a failure as possibly its projectors expected from the nature of the strata which consisted entirely of igneous rock. It may sometimes happen that a thick layer of impervious clay is traversed by a thin stream of isolated sand or that there is a fissure or cavity in the massive formations of an archaen rock. False hopes are likely to be entertained in such cases. In the town of Karaikkal, a French town on the east coast of this Presidency, there has been an artesian spring playing for a good number of years and a rich mill owner of the town wanted to prospect for underground water in the precincts of the mill which lies in the outskirts of this town. The boring was carried to a depth of 150' and all through except at the top where the soil was composed of sandy loam, stiff clay was met with and there were no signs of any water bearing stratum. The boring was ultimately given up. As far as the details of this particular borehole showed, it appears that there is a layer of drift sand perhaps

due to the receding of the sea in recent times, overlying a thick layer of porous but impervious clay. This clayey stratum is obviously very thick probably more than 200' in depth. It is said that the depth of the Artesian spring at Karaikkal is slightly above 300'. It is therefore, quite possible that the layer of stiff clay referred to superimposes one of sand or gravel or even of porous limestone. That there is an artesian spring in another part of the town is almost a proof that there is a good water-bearing stratum below the site of Karaikkal. Whether this stratum covers an extended area or exists as an underground stream, it is rather difficult to say. It is however obvious that before the sinking of another borehole is projected in the same town it should be the duty of the person in charge of the boring to study the history of the existing borehole and the nature of the surrounding country. If such a study had been made, it would have been possibly understood that no good spring could be got at within 300' from ground level and a good deal of useful money of the millowner would have been saved. The case I refer to, is to some extent typical of the situations where it would be wrong to attempt sinking shallow bores. A parallel case was observed in the village of Ayyangudipallam very close to the Coleroon near the lower anicut. The top soil is sandy loam or alluvium. Below this there is sand which formed probably the river bed at some former time in the history of the earth. Below this sand there is again a stratum of clay which overlies a layer of fine sand. The boring was carried down to the depth of nearly 150' with no appreciable improvement in the discharge from the borehole. There was some water in the bore and the spring was very feebly 'subartesian.' But it was of almost a negligible economic value as the well whose supply it was intended to augment had a good supply in the shape of percolation from the top soils. The failure actually experienced could have been anticipated from the existence of a deep river bed closely and an extended flat country all round. Says the author who is quoted above that 'the presence of a river which has cut its bed considerably below the level of the alluvium would act as a complete drain upon the accumulation of underground water to a considerable depth. The only chance of a spring rising to the surface in such an area

would be from a source far up the valley.' And again it is stated that the prospect of an artesian boring in a coastal alluvial region would as regards primary considerations reduce to the consideration of catchment area and rainfall. Such localities need special study with reference to the question of making underground waters available. This aspect of the problem will be discussed in some detail later on. (*To be continued*).

H. Venkatramaniah.

Fish manure for wet, garden and dry crops.

In this Province 70 per cent. of the population depend on agriculture for their subsistence. Still, the right sort of men are not taking kindly to it, nor is the required capital invested in the concern. One of the most important reasons for this state of affairs is that agriculture does not pay adequately when carried on in such a perfunctory way as is generally done at present. Insufficient manuring is the prime reason for the deficiency in the yield. It is not possible to overstate the usefulness of manure for crops. No animal can live long and be useful without food. It is exactly the case with plants. They cannot grow and bear fruit without plant food, which means manure. There will be considerable difference between a manured crop and an unmanured one even though the expenses of cultivation are practically the same. Besides, it is possible to reduce the seed rate and thus save expenditure in a well-manured field. Such being the case it is a great folly on the part of the cultivators not to manure the crops properly. It is certainly unpardonable to allow indegenous manures to be exported to the foreign countries when the natural supply of the manure is admittedly so limited. The case in point is fish manure. Nitrogen, Phosphoric acid and Potash are the ingredients which the plants find wanting in the soil, of which the first named gets too short. It is apparent from the analysis of the fish manure given below that it is rich in Nitrogen, Phosphoric acid and Lime: and the comparative deficiency in Potash can be easily made up by the addition of ashes.

Fish guano.		**Beach-dried sardine.**	
Water	9·77	Water	6.5 to 15·0
*Organic	66·28	*Organic	36·5 to 60·0
Insoluble—		Ash	18·4 to 41·0
mineral matter	1·58		
Soluble—			... ...
mineral matter	22·37		
	100·00		
*Nitrogen	8·31	*Nitrogen	4·4 to 6·8
Phosphoric acid	8·82	Phosphoric acid	3·9 to 5·3
Potash	·40	Potash	·2 to ·7
Lime	10·11		

The fish manure therefore is more or less a complete one. Of the various kinds of manures tried on the Government farms in the Presidency, fish manure has given invariably good results. But the only drawback is that the price of it goes high in some years on account of the insufficient supply and great demand from foreign countries where its value has been highly appreciated, so much so, that the planters pay almost double the price at which it is available locally.

The source of supply is chiefly the West Coast seas. A large quantity of a variety of fish called Mathi (sardine) is caught in nets. In the olden days the only use of which was for human consumption. When larger quantity of which than what can be disposed of as such is obtained, it was thrown away into the sea or buried into the ground; but, the chance application to the coconut trees and paddy lands produced appreciable results which led to the use of it along the coast as manure. But on account of its obnoxious smell and the consequent difficulty of transport when not properly prepared, its use is restricted very much to the sea coast. Gradually when demand was created by planters in and outside the country, the sardines began to be dried at the beach and exported on a large scale. Then the use of its oil prepared in a very rudimentary process came to prominance. Since

the advent of the Fisheries Department, Pressing plants were introduced to extract the valuable oil. The refuse after extraction of the oil, known commercially as fish guano, which is less obnoxious, more concentrated and easier of transport than the beach-dried sardine, became very popular. These two kinds of fish manure worth several lakhs of rupees are exported to the foreign countries, particularly to Ceylon, Japan, Malay States &c. The price of guano is rightly about double that of beach-dried sardine.

The manure can be used mixed with bulky cattle manure or alone. But it would be better always to mix it with some ashes for the reason already stated. The manure admits of much adulteration, with sand. The quantity to be applied therefore has to vary according to the purity of the stuff. 300 to 400 lbs. of guano will be a fair dose to cereals such as paddy, ragi, cholam &c., per acre; double the above quantity to heavy yielding industrial crops such as, ginger, tobacco, cotton, turmeric, plantains &c.; for sugarcanes, about a ton and as much of ashes; for fruit trees and coconuts at 5 lbs. each for full grown trees; for pepper, about a lb. each vine. In the case of beach-dried sardine the quantity bas to be doubled. When other manures are mixed, the quantity can be proportionately reduced. The time of application is generally before sowing or transplanting. In the case of trees, the manure can be dug into the ground just at the beginning of the chief monsoon of the locality. On the Government farm, Coimbatore, wet land paddy when applied at 5 cwt. per acre, of sun-dried fish, for 8 years has given yields varying from 2800 to 3900 lbs. per acre. Ragi, cotton, sugarcane too responded very well to this manure. On the Taliparamba and Manganallur farms these results were corroborated. In the former, paddy gave a net extra income of Rs. 8 to 10 per acre. In the west coast districts, tapioca, sugarcanes, tobacco, coconuts and other crops are manured with this with success, on a very limited extent. Encouraged by these results the question of the supply of the manure was earnestly taken up by the Department last year. So far, about 400 tons valued at about Rs. 20,000 were arranged to be supplied to the ryots of Vth and VIIth Circles. A good number of demonstration plots in the ryots' fields were arranged in the VIIth

Circle for the 1st crop paddy. They were all successful. By far greater number of plots are now applied with the manure for the 2nd crop paddy.

The Government having realised the great economic possibilities involved in creating an internal demand for this indegenous manure, have sanctioned fish manure depots as a temporary measure in Malabar to afford facilities to the ryots to obtain the manure at a reasonable price and to check rapid fluctuations and thus create a permanent internal demand. All who propose to give the manure a fair trial are requested to apply to the Assistant Director of Agriculture Vth and VIIth Circles for further information and the quantity of manure required.

M. Govinda Kidavu.

Notes on sugarcane cultivation.

Sugarcane is a very valuable crop in Madras, and attention to every bit of detail, from beginning of cultivation to the final disposal of product is of great importance.

Varieties. The Government Farms in various tracts of the Presidency have got varieties suitable to each tract, which are better yielders, and in every way more paying than the local ones or a haphazard selection from a foreign tract. These may be easily procured by writing to the Farm Managers of that tract.

Spacing. There is always a varied opinion on this point. In a way, a greater spacing means less seed rate, and vice versa. Spacing is evidently connected with the texture of the soil and its fertility. A well manured loamy soil, where the roots have free feeding area will respond very well to broad spacing and the canes will tiller freely and give a good crop. The writer had an occasion sometime ago to see some cane fields in Kelamangalam in Hosur Taluk, where the setts were planted two yards apart each way, bearing very heavy crops.

1200 pits 2' × 2' × 1' each were dug for an acre and the pits were filled with a mixture of soil and decomposed cattle manure, and two good setts were planted in each, making a total seed-rate of 2400 setts per acre as against the usual 15000 to 30000 setts per acre. The saving in seed alone amounts to Rs. 40 to 60 per acre. At the time of visit when the canes were only five months old (September) the field was quite full, and there were from 25 to 30 well developed canes in each clump with a large number of vigorous tillers still coming up. The owner who was already propping up the canes, said that he realised Rs. 1000 per acre, with a nett return of Rs. 600 per acre, in the previous year, and that he expected a better return in the present year. The soil was a sandy loam with good irrigation and drainage facilities.

A similar trial in a very stiff soil is being made in the Central Farm and the results as judged by the present growth of the canes is encouraging. It is a good plan to plant the canes in long rows instead of the 'ridge and trench in bed' system as the long rows aid in inter-cultivation with bullock power in the early stages of the crop, and later in irrigating and draining. An alternate 3 and 4 feet rows method has a great advantage in keeping a good tilth between rows of canes, and providing a free drainage even in stiff lands. The space between 4 feet rows is used for cutting trenches which are used both for irrigation and drainage. The soil removed in trenching is thrown between the 3 feet rows which are kept well cultivated. Manuring with bulky manures like leaf is easy, and the subsequent earthing up keeps the root system well below the ground level where water is applied in trenches, the plants having thus a firm roothold are less liable to lodge.

Cutting. Ordinarily a stout knife is used for this purpose. This is difficult to handle and it cuts the cane above the surface of the ground, and thus bits of canes, sometimes several inches long, are left. It is these bits that contain a high percentage of sucrose of great purity. Hence an implement that could cut the canes sufficiently well below ground increases the outturn, which may vary from 3 to 5%. A thin flat axe with a sharp convex edge of about 5" broad and 7" long fitted to a thin handle about a foot long will be the most convenient to use.

This will cut the canes from 3 to 4 inches below ground level. Such axes are common in Dharapuram and Udumalpet and the introduction of such axes in the Central Farm has been very much appreciated by the coolies who handle it.

Preparation of jaggery. The cleaner the canes the better the colour of the jaggery. Some people go to the extent of shaving the nodes and the eyes for getting a very good coloured jaggery. At any rate, where close cutting is done, cleaning the bottom portion of the canes and filtering the juice are very essential. The choice of the roller is very important. The size of the rollers must be adapted to the nature of the animals used. For animals of the ordinary cart bullock size, a roller 8½" × 8½" would be most suitable. Instances are common where the ryots had purchased mills much bigger than their animals could draw. The length of the beam had thus to be lengthened, which resulted in a waste of time, as the animals had to make a larger circuit. Irregular feeding, or feeding a single cane at a time on this account results in throwing the rollers out of gear and uneven wearing.

Furnaces. Improved furnaces economising in fuel consumption have been devised by the Agricultural Department and are being demonstrated to the cultivators who have to apply to the Manager of the nearest Government Farm for help. A leaflet on this has been published by the Department of Agriculture, Madras. (Leaflet No. 23 of 1911).

Mould frame. The moulds or cubes vary very much in size, and the nature of the wood out of which the frames are made. In Bangalore they make cubes about 2"x2", in Salem 1½"x1½", in Coimbatore less than 1". The size of the cubes probably represents the purchasing power of the poorer classes of the locality who go in for an occasional single cube for the day's use.

The frames are made of Babool (accasia gummi) or Vagai (albizzia lebbeck) which are strong and fibrous and withstand the heavy hammering necessary to bring about the removal of the cubes from the moulds. In the Hebbal Farm at Bangalore they use a special

kind of mould frame, which is made up of a number of detachable pieces of wood cut lengthwise along the middle of the line of cubes. These pieces are passed through three stout iron pins and when all the pieces are brought together and tightened by screws, the cubes form and the treacle is poured in. After cooling, the pieces are separated by loosening the screws, and the cubes drop down easily without recourse to beating. Such frames would last more than a lifetime, and when it is remembered that even a small cane grower has to own at least two mould frames costing anywhere about Rs. 70 and that they do not last for more than 10 years the value of the detachable frame will be realised. A trial with a similar frame at Coimbatore gave satisfactory results. It is in use in the Central Farm, and can be seen at any time.

Preservation of jaggery. As most of the cane growers, mill their canes and manufacture jaggery, the question of disposal of the produce is worth consideration. Jaggery is generally sold to dealers soon after it is prepared. As there are only two definite seasons there is a slump in the market when the jaggery comes in and the jaggery goes for a low price. To add to this it requires a little care in preservation and badly made jaggery runs to molasses during the rainy season if not carefully preserved. It is on this account that it is offered a very low price, sometimes 20 to 25% lower than the prices which will prevail a few months later. Trials in preservation of jaggery recently made in the Central Farm showed that jaggery can be well kept during the rainy season with little wastage with only a small care. Three lots of 100 lbs. each of a mixed lot of jaggery were bundled in cane trash, and three more in paddy straw, tied round with paddy twists. They were kept in the store for more than 8 months (May 13th to January 3rd), subject to the influence of both the South-west and North-east monsoons. When opened, the jaggery kept up its colour and consistency, and the loss was only from ½ to 1%. Even the inferior quality jaggery, which would otherwise have run into molasses kept the colour and shape, though they went to powder with a slight pressure between the fingers. The larger the quantity of straw the better was the preservation. It was however noted that the jaggery

from the bundles kept at the botton got a bit powdery indicating that much peessure is not desirable. So where large quantities of jaggery have to be preserved the following method would appear useful. Spread a thick layer of cane trash at the bottom and spread a bamboo mat over and place all the jaggery over to a height of about 3 feet and cover again with mat and a layer of trash and tie up well with paddy twists. If it is desired to sell in small lots compartments may be made. The heap must not be exposed to cool draughts. The expense is only little and the extra money that is obtained is great.

Country sugar. This is not prepared in such large qantities as desirable. If carefully prepared it is almost as good as the costly white sugar and a cheap substitute for tea and coffee and various other culinary purposes. The process of manufacture is almost the same as for jaggery. Well ripe cane must be used, and the skum must be completely removed if quality is desired. The pan must be removed from the oven just a bit earlier than for jaggery. The treacle is poured with a wooden trough and stirred with paddles for cooling and when it gets to a hard consistency, it is worked by a wooden mallet till the whole thing becomes powdery. The sugar fetches a higher price of 5 to 8% more than jaggery with only a little extra labour.

After treatment of cane lands. In stiff soils the difficulty in getting a good crop is on account of bad drainage. The best plan in such lands must be to dig deep drains all round the field as early as the preliminary cultivation begins. Cross drains must also be dug at regular intervals of from 50 to 100 feet apart, which must all be connected. To save recurring expenditure upon this, it is useful after the cane is harvested and before the land is levelled to fill the bottom of the drains with some porous material or compact bundles of twigs and then fill the drains. These drains will work well for considerable time, and benefit subsequent crops.

K. Raghavachari.

Report of the Agricultural Department of Madras, 1917—18:—A Review.

It was a custom, indroduced we believe, by Lord Curzon in his pursuit of efficiency, to print in a prominent place in every report, of whatever department, a note stating the maximum number of pages prescribed. If an officer exceeded this limit he did so presumably at his own risk! The Madras Agricultural Department was no exception, and we find up to the year 1911—12, a printed note on the front page of the Director's annual report, a limit of ten pages fixed. This was not always observed, for we find in 1910—11, 12 pages, and in 1911—12, 13, but it was not until the practice above mentioned was dropped, that we find the report rapidly increasing. In 1913—14, it filled 20 pages, in 1916–17, 28, and in the present report before us, for 1917—18 no less than 35 pages.

We have called attention to this point because it seems to us that this tendency is wrong. An examination of the report, to which are attached as appendices, the reports of the various Experts who go to make up the Department of Agriculture, shows that much of the matter in these 35 pages, is a repetition of what has already been written in the separate reports of the officers concerned. As an instance we may give the accounts of Mr. Parnell's work on the probable error involved in comparing paddy strains: the Director's report merely repeats Mr. Parnell's words almost exactly. It may be said that the report should be as full as possible, so that those interested should be able to obtain in a concentrated form, an idea of the progress made during the year, but does the general public, or even that portion of them specially interested in the progress of agriculture, ever read Government reports? It would be better we think to keep to the original length, and compress the report to ten pages. That this would not be an

easy task, is clear from the wonderful record of progress which occupies every page. From this mass of information it is difficult to select, and we can do no more than indicate a few salient points.

As is right, Agricultural Education takes first place among the activities of the Department, and here progress was steady if unexciting. The 'novelties' of the year were the Antipest course for Estate Writers, for which the Planting Community have largely to thank Mr. McRae, and the new Farm School. The next twelve pages contain the account of the Research and Experimental work of the Department, grouped under Agriculture, Botany, Chemistry, Entomology, and Mycology. Under Agriculture, the work is treated under the different crops, and here we cannot but remark that it is wofully small. Will it never be realised that Agricultural Experiments are no whit easier than Chemical or Mycological Experiments, and that just as much do they require the whole attention of a staff, trained and kept for the purpose? It is true that most of the Section Officers in this Department do a certain amount of what may be called District Work: demonstration or investigation, but it is nothing compared to that which the Agricultural District staff have to do, and the result is that Agricultural Experiment is either omitted or left in incompetent hands. We remember the early annual reports of the Central Station, crammed with figures of all sorts: Experiments on planting and manuring paddy, cotton, sugarcane, experiments with cattle, experiment with implements: the last report describes only three or four. Even these are not carried out with the care which their importance warrants: the writer has recently been looking up some Experimental work on paddy done by American investigators in the Philippines, and there is no doubt that it is of a higher order than much of the work alluded to in this report. The most encouraging section of the whole report indeed is that of the Government Economic Botanist: an officer who has practically no district work, and practically no correspondence, and who can thus devote his

whole time to the work he has taken up, namely, the production of improved strains of paddy. Mr. Stuart calls attention to the annual value of the paddy crop in this Presidency, something over sixty crores of rupees: and points out that Mr. Parnell has demonstrated the possibility of a 20% increase in this crop! Can any Department show anything to beat this?

But it is impossible to regard the different sections of the Department as separate units. No sooner do we consider the question of raising bigger crops of paddy, than the manurial problem becomes one of intense importance, and that solved, as the Department shows, that there is a good chance of doing, the Mycologist comes along with news of a new paddy disease which appears to confine its attention to well-grown and luxuriant crops!

The fourth section of the report deals with the means taken to spread the gospel of the "New Agriculture" throughout the land. It occupies twelve pages, and discloses the means which the Department adopts to get into touch with the tiller of the soil. Leaflets, Bulletins, Agricultural Associations, Co-operative Societies, Cattle shows, Exhibitions, Agricultural Lectures and direct demonstrations and sale of implements, seeds and manures: all in turn are used to suit the different circumstances of each case. Doubtless we shall see in the near future, cinematographs pressed into the service of the Department, and we would suggest that the demonstration train which has proved so successful in other countries should certainly be introduced here. The work is increasing rapidly, and the staff cannot cope with it, and there is grave risk that the high standard the Department has hitherto set before it, and which they have hitherto attained, may be lowered.

Here indeed is work for Young India: and work not without its reward, whether in the consciousness of good work done for one's country, on a wage which compares favourably with that in other professions, or in the very large profits which have been

shown to be possible from the actual pursuit of this ancient calling. We hear much of New India,—the most realistic forecast of it we have read, is to be found in the pages of these Departmental Reports, which foreshadow a time when prosperity such as the ryot does not now dream of, will be his natural heritage.

Extracts.

Imitation Coffees. The imitation coffees do not possess all the properties of coffee and only vaguely suggest its flavour. They are either mixed with coffee or used alone; they all contain a bitter principle and impart a brownish colour to water. One of the most largely used coffee substitutes is the roasted and ground root of chicory (Chichorium intybus) which was largely produced before the war in Belgium and the north of France.

Another widely used coffee substitute is barly malt which when roasted has a pronounced aroma resembling coffee, hence its extensive use as a nonstimulating tonic, and digestive beverage.

The seeds of three European leguminous plants are used in some parts of Europe as coffee substitutes; they are the narrow leaved lupine (Lupinus angustifolius); the chick pea (Cicer arietinum) and the spanish astragalus (Astragalus bacticus). The seeds of these plants are roasted and ground and the infusion made from the resulting powder, is said to be not unpleasant.

The long pods of the carob or locust tree (Ceratonia siliqua) reduced to a pulp and subjected to a roasting process, form the basis of an imitation coffee largely consumed by the natives of Algeria.

Roasted figs are very largely used in France especially after the war began as a coffee substitute instead of chicory. The fig

coffee is said to resemble the real article amazingly. Used alone, it yields a sweet infusion of agreeable flavour. Mixed with coffee in the proportion of one third, colours the infusion deeply and modifies its bitterness: it sweetens and makes it nutritious.

The okra (abelmoschus esculentus) well known in the West Indies, is said to form an excellent imitation coffee. The dry seeds are carefully roasted and when cooled are ground.

The seeds of another West Indian plant growing in the tropics (Cassia occidentalis) roasted and crushed furnish the so-called black coffee of Senegal. They are used by labourers in several of the West Indian Islands.

Lastly it has been discovered that the seeds of the widespread wild tamarind (lucaena glanca) roasted and ground yield a reddish brown powder having the smell and colour of coffee, the infusion of which possesses an even stronger armoa than genuine coffee itself. (Agricultural News).

K. R.

The flowers of Avaram (Cassia auriculta) are dried and powdered and the decoction is mixed with milk and taken as a coffee substitute by many in South India.

In the Central Farm chicory is being tried this year and there is an excellant crop growing.

Ed.

It has generally been considered that lime, in the form of Calcium Carbonate or Sulphate, liberates potash from minerals like felspar and mica. Within recent years, this opinion has been contested by several soil chemists of the United States as a result of actual researches. Plumer, Soil Chemist of the north Carolina Station, proves that Calcium bicarbonate—precipitated calcium carbonate dissolved in carbonic acid—does not increase the solubility of potash in the minerals biotite, muscovite, orthoclase and microcline. The usual conception is that micas are less easily

disintegrated than the felspars, but biotite and muscovite are found to yield their potash better than orthoclase, and microcline to the action of Carbonic acid, as determined by extracting impalpable powders of each mineral 5 times, each time shaking the material for 96 hours. The growth of oats, soybeans, rye and cowpea in poor soil to which nitrogen and phosphoric acid were applied, together with different proportions of the above potash bearing minerals shows that in order of liberating potash, biotite and muscovite lead, while orthoclase and microcline lag behind. It might be worth remembering that the biotite contained 8·45%, muscovite 9·14%, orthoclase 13·40% and microcline 14·40% of potash.

(From the Journal of Agricultural Research).

M. R. R.

News and Notes.

Peltophorum ferrugineum, Bth. An instance of what one may call idiosyncracies of plant growth may be seen in the above plant which is an excellent avenue tree indigenous to Ceylon and Malaya and grown with success in South India. Out of 137 trees counted by me in the Central Farm 87 were in fruit, 25 were in a state of repose, 10 were in flower, 7 in flower and fruit and 8 had almost completely shed their leaves bearing ripe fruits only. Of the 10 trees in flower 7 were in full blossom, and in the remaining 3 single boughs were in flower while the other boughs were in a state of mere vegetative activity.

From the above observation it may be concluded that

(1) a definite periodicity in the matter of flowering does not exist in the case of all plants.

(2) flowering is independent of seasons especially when these are of irregular occurrence and their climatic differences are not well marked.

(3) the vegetative or sexual activity of plants is to a great extent determined by internal conditions which vary according to individuals.

"Leucas."

A creeping mango tree. The October number of the Poona Agricultural College Magazine contains an interesting account of a creeping mango tree in the Deccan by C. B. Patwardhan B. Sc. The plant is an Alphonso graft about 9 years old and 18 ft. high and from the very beginning refused to stand erect unless tied to a strong stake. The creeping habit was not the result of 'training' as is possible in other instances but due to an inherent tendency in the plant to fall down to the ground. The environmental conditions were by no means unfavourable.

From the drooping nature of the plant, its zig-zag stem and the uniform thickness of the stem and branches throughout the length, it is thought that the plant is probably in a stage of evolution to a climbing habit. We are rather inclined to consider this as a case of abnormality and attribute the above peculiarities to lack of efficient mechanical or strengthening tissue probably due to modifications in the anatomical structure and brought about by unsatisfactory grafting.

"Leucas."

Paddy selection. It is gratifying to note that selection work in paddy by the Economic Botanist Bengal, has assumed very large proportions. A variety known as 'Indrasail' raised by pure line selection has spread very rapidly throughout Bengal. More than 20,000 acres were under it last year and over 200 tons of

seed are being distributed in 1918—19 season. It has maintained its reputation in several of the districts of Eastern Bengal where it was first distributed and a considerable demand for this variety is springing up in the neighbouring province of Bihar also. The Director of Agriculture, Bengal, mentions that it has been found to be a high yielder even in Central Provinces where it was tried in Raipur Farm.

New Farms. From first of April 1919 we are to have four more district experimental farms, all in the Planting Districts and under the control of the Deputy Director of Agriculture, Planting Districts. One is to be for Coffee in Siddapur near Coorg, and another for Tea in Peermade. The other two are for Rubber one in Tenmalai, South Travancore and the other in Palipally, Cochin.

The Government has directed that the five taluks of the Kistna District mentioned below be transferred to the Jurisdiction of the Deputy Director of Agriculture, First Circle:—

1. Narsapur. 2. Bhimavaram. 3. Tanuku. 4. Ellore. and 5. Yernagudem.

Estate News.

Dr. Norris and Messrs. T. V. Ramakrishna Ayyar, B. Viswanath, K. Krishnamurti Rao and T. V. Subrahmanya Ayyar attended this year's Indian Science Congress at Bombay from our College. All except Dr. Norris had prepared papers of their own which and one by Mr. P. V. Isaac were read in the Agricultural Section of the Congress under the presidentship of Mr. Keatinge.

Our Editor Mr. T. S. Venkataraman who left this place early in December on a tour in Upper India returned to head-quarters on the 26th.

The Bajana Kalakshepam which commenced last month terminated with the celebration of the Radhakalyanam on the 5th. The functions began with the religious rites on the 5th morning which was followed by a grand procession and ended with a sumptuous dinner on the same afternoon. There were musical entertainments for 4 days in succession by expert musicians from different places who had come specially for the occasion. The success of the function was greatly due to Messrs. Ramamurti and Sundar Rao Bhutgosami and to liberal donation from the estate residents.

Students' Corner.

The College was reopend after the Christmas holidays on the 16th. The students of classes III and IV have joined the district staff in the Tanjore district to attend to the harvest of the manured plots under the 'Increase of food production scheme.' They are likely to return by the end of February.

Class II students were taken on a tour for 10 days in the Tinnevelly District by the Assistant Principal.

The following are the results of the Diploma Examination in Mycology of class III. All of them were placed in the First class.

1.	K. Govidan Nambiar	87	6.	K. K. Raghavan	80
2.	M. Gopala Chetti	83	7.	A. Vittal Punja	76
3.	M. Subrahmanya Pillai	82	8.	K. K. Subrahmanyam	72
4.	A. Venkatarangam	80	9.	M. P. Kunnikutti	71
5.	C. M. Ranga Reddi	80	10.	T. K. Balaji Rao	70

Correspondence.

To

The Editor,

Sir,

I beg to enclose for publication my views on "The Phosphate question in relation to crop production" and shall feel obliged to your publishing it in the Journal.

Reference:—The paper by Mr. M. R. Ramaswami Sivan, B, A., at the eighth annual Agricultural Conference on "Phosphate question in the Madras Presidency in relation to crop production."

The paper by Mr. M. R. Ramaswami Sivan, B. A., in the year book of the Madras Agricultural Department for 1918 on the "Phosphatic Nodules of Trichinopoly and their availability as manure."

It must be "the object of every farmer to grow only profitable crops and not big crops." As such the cost of the phosphates in relation to the production is a very important point. In table No. II quoted in the first paper 500 lbs., of mineral phosphates costing about Rs. 11 (at Rs. 50 per ton) gave an extra yield of 300 lbs. paddy valued at Rs. 10 at 12 M. M. per rupee). In table No. III 3 cwts superphosphates costing Rs. 12 (at Rs. 80 per ton) gave an extra yield of 320 lbs. paddy valued at Rs. 11. In table No. IV 1 cwt Ammonium sulphate costing Rs. 30 (at Rs. 600 per ton) and 3 cwts supherphosphate costing Rs. 12 or Rs 42 of manure gave an extra yield of 1900 lbs. of cholam which can be sold for Rs. 47—8—0 (at 40 lbs. per Rupee). The sale values are all last year rates. These results will not allow an ordinary farmer to experiment much less a poor man to risk.

What is really necessary is a cheap manure and make these returns inviting. If phosphatic nodules can be had at Rs 12 per ton at Trichinopoly should it cost Rs 50 when converted into

flour? Unless two or three tons are required to produce one ton of flour, the rate is rather high. In the latter case the conversion if made near the mines (as suggested by Dr. Voelcker) would make the manure cheap say about Rs. 25 per ton at Tricinopoly, gunnies extra.

I believe as a mechanic and as a co-operator that such a result can be achieved on co-operative working and only where this is obtained, these nodules will be useful. One ton of these nodules actually cost me Rs. 22 delivered at Tiruvadi and may cost Rs. 25 at Tanjore.

Yours truly,
S. Venkataramayyar,
Mechanical Engineer.

To

The Editor,

Sir,

I see a note in the November issue (1918)—vide page 304 of the Students' Agricultural Journal—on the efficacy of the application of sodium bisulphate as a destroyer of weeds in cereal crops.

In this connection I would also make mention of Adhatoda Vasica, a common shrub found everywhere in waste lands throughout India, more especially in North India whose leaf is held to possess not only high qualitities as a manure when worked into the soil with the plough and left to decay with moisture but also the power of killing aquatic weeds.

As we find several aquatic weeds especially in the rice fields, I would suggest a trial of this plant.

Yours truly,
Md. Azizuddeen Sahib.

Departmental Notes.

Appointments :—

Mr. S. Krishnaswami is appointed Supervisor. 1st grade on Rs 125, 12½-200 on probation to fill an existing vacancy.

Messrs. K. M. Thomas and H Srinivasa Rao are appointed Assistants in Mycology, IV grade on Rs. 75, 78, 75-5-125, on probation, to fill existing vacancies.

Mr K. Narayana Ayyangar, Farm Manager, Paddy Breeding Station is posted to the Aziznager Criminal Settlement to assist the manager Mr. Beattie in the management of cultivation.

Mr. V. Ramachandra Ayyar, L. Ag., is appointed Assistant Agricultural Demonstrator IV grade on probation, on Rs. 40 in the Rs. 35-2½-75 grade. He is posted to the III circle and will join at an early date at Hospet to assist the Agricultural Demonstrator during the sugarcane crushing experiments at Chittavadigai, Hospet.

Mr. K Govinda Pai, L. Ag. is appointed Assistant Farm Manager, IV grade on probation on Rs. 40 in the Rs. 35-2½-75 grade. He is posted to Hagari for training.

Mr. P. M. Kesava Ayyar, Supervisor, 2nd grade on handing over charge of the Chittavadigai sugarcane plant to Supervisor III grade as ordered is posted to be Supervisor 1st circle Waltair.

Leave :—

Mr. R. Sitaramayya, Assistant Farm Manager, sick leave from 25th November to 30th December.

Mr. G. Sitarama Sastri, Assistant Farm Manager, extension of leave for two months on medical certificate in continuation of the leave already granted.

The privilege leave granted to Mr. P. V. Raghavendra Rao, Assistant Farm Manager, is commuted to combined leave on medical certificate for 5 months from 17th September 1918.

Mr. C. Arulanandam Pillai, Assistant Agricultural Demonstrator, one month's privilege leave from the 15th January 1919.

Mr S. N. Krishnaswamy Ayyar, Surveyor, Agricultural Engineering Section privilege leave on medical certificate for one month from 7th January 1919

Mr. A. Kondayya Sarma, Assistant Farm Manager privilege leave for 1½ months from or after April 6th.

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THE JOURNAL

OF

The Madras Agricultural Students' Union.

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Editorial Notes.

Agricultural Pests and Diseases Act.

Readers of this journal are aware that the rapid expansion of the Agricultural Department in Madras and the quick awakening of the ryots of this Presidency are associated with the early efforts of the Government of Madras in tackling the question of the Redrot disease in sugarcane. It is common knowledge that important crop diseases have been the subject of anxious concern to the local Government and trained experts have been taking up the study of several crop pests and diseases during the past 10 years. We need only instance the Budrot in the Palmyra, the Tikka disease of Groundnut, Koleroga of Arecanut, the Bleeding disease of Coconut, the Blast disease of Paddy, and the Smut of Cholam but up to the present no serious attempts have been made by the cultivator to keep these diseases in check. It is therefore only fitting that the local legislature should have taken up the question of Agricultural pests and diseases and passed a bill during its sessions just ended.

The present measure is very modest in its scope and we heartily congratulate the non-official members on their active co-operation in passing it. This enactment empowers the Governor in Council by notification in the gazette to declare that a certain pest, disease, or weed is an insect pest, plant disease or a novious weed, to prohibit or restrict the removal of any plant from one place to another, to prescribe preventive or remedial measures and to define the local area within which such notification shall be in force. Every occupier is compelled to carry out the remedial and preventive measures proposed by the officer appointed who can enter any land or water to ascertain whether the pest, disease or weed is present.

Failure to comply with a notice to carry out the measures suggested is considered an offence, but there is no compulsion on the part of an occupier to meet the cost which would be remitted if he was extremely poor. In other cases the cost will be recovered as arrears of revenue; but ryots are entitled for compensation if an inspecting officer in carrying out these measures destroys or causes to be destroyed any tree or plant infected or liable to be infected. Contravening notification issued by the competent authority is an offence punishable with a fine not exceeding Rs. 50 or in default simple imprisonment for 10 days, but no prosecution shall be started without the previous sanction of the District Magistrate.

We consider that the provisions are mild and the interests of the occupiers sufficiently safeguarded. We hope the powers conferred by this enactment will be judiciously used and will prove a boon to the agricultural population instead of an unwelcome source of annoyance in the hands of the executive staff that will be created in consequence of the passage of this measure.

The Mysore Agricultural and Experimental Union Journal.

Through the courtesy of a friend of ours we happened to see the first copy of "The Journal of the Mysore Agricultural and Experimental Union." We offer it a very cordial welcome and shall watch its progress with brotherly love and esteem. We learn it is to be a quarterly and is priced Rs. 3 per annum. The matter and the get up leave little to be desired and the present volume contains some illustrations.

We are ourselves reminded of those early years when we made our first appearance as a quarterly—in the year 1913. We are led to wonder if our Mysore colleague also will later on develop into a monthly. Till then we confess to a feeling of envy at the greater leisure which the Mysore Journal just born will be able to command.

The Third Entomological conference took place at the Imperial Research Institute, Pusa, from the 3rd to 15th February. There were about fifty delegates present and our Presidency was represented by Messrs. T. V. Ramakrishna Ayyar, Acting Govt. Entomologist and P. V. Isaac, Assistant in Entomology.

Sunday. His wages for one day's work were Rs. 7½. This gives some idea of the height to which wages have risen in this country and how expensive everything is. It was Sunday work and therefore payable at 1½ ordinary rates. Recently eggs cost 9 or 9½ as., each. He was fortunately a grand worker and as there were now two of us at it, the work began to move. We also had some fine Sundays. April, the chief sowing time, was fine but May was very wet. So the old clay land got really boggy. I had been able to get a little farmyard manure from a neighbouring farm though, I had to wheel it in from the road myself. I did not mind much about manure. There ought to have been plenty of plant food in my clay if only I had given enough lime to render it available. We hoed and raked and tried to keep interoultivation going in summer but I am afraid some part got dry. And when it did the old clay patch baked hard like iron.

Then, what of the crops? The carrot fly got at the carrots and they were no good. The season and land were dead against onions and most of them failed. The first sowings of turnips germinated and died. Spinach was poor but gave as much as anyone's round about. Potatoes were disappointing as many developed corky scab and wireworm had a good feed on them. I am still convinced there was plenty of plant food in that clay patch but there were plenty of wireworm too and I had not given a sufficiently heavy dressing of Vaporite. Always put the failures first, and now for the successes. All the Brassica tribe has done well—Brussels sprouts, cabbage etc. The beans were excellent. Black fly tried to get the broad beans but we defeated that. The big crimson runner beans gave us many surplus tins for winter use. The parsnips have grown as if they had enjoyed themselves. Celery has been good, even the best of the leeks I am not sure. Marrows and pumpkins were also useful. Parsley, Jerusalem artichokes—easy things to grow—very good. Lettuce good, salsafy poor, swedes good. So on the whole the condemned clay patch

has yielded something. Has it paid even with war prices for vegetables and at the wages I have had to give? No. But we have never been short of fresh vegetables; we have been and are almost entirely self supporting for vegetables, which in war time we were all told to be and each year that clay patch is worked, it should improve. In fact this winter (1918–19) it turned up quite differently from last, and except for the small parts where crops are still standing it has all been rough dug, that which was not trenched last year, trenched and all either manured or limed. And I have not spared the Vaporite this time. So we are well forward and if we get some hard frost the land next year should be still sweeter. I am not exactly wanting frost though because we are all severely rationed for coal and it makes the house very cold.

Having dug up the rough grass and planted my crops I did not stop there. In this cold variable climate a cold frame—i. e., a lower wooden enclosure with sliding glass top so that seedlings and plants placed inside are protected from the cold air and weather and yet get all the sunshine and warmth—is very useful. Prices for such things were however absurd and a carpenter's wages were worse than a gardener's. I bought two glass tops second hand but had no wood to make the box part. So we built up the walls with turf. It was not a success. The ridge cucumbers we tried to grow failed. In August we got some scaffolding planks from a builder and with a saw, some nails and a foot rule soon made a proper frame which is now in use.

With so much to be done in the kitchen garden and such little opportunity for doing so I am sorry to say much of the flower garden was neglected. This is wrong, for war time or not, flowers beautify a garden and give pleasure in a house. One thing we did and got into trouble over it. In front of the house was a large bed of dismal, mournful, very small rhododendron bushes. We had those out and put in front of the kitchen garden; whereupon the

landlord came down upon us and said that rhododendrous were trees and under our lease we had no business to move them without his consent. However it was done and it was only a case for smooth words. We had other plans for that bed. We had seen dahlias growing in a mass at Ooty. So we put 41 dahlias in that bed and nothing else—practically all cactus and peony varieties. They grew beautifully, some nearly six feet high and flowered to profusion. They were a joy. They have now been dug up, the bulbs stored for planting next year and the bed is now planted with wall flowers to blossom in the spring. The rest of the flower borders have been dug, manured, during this autumn and roots of perennials divided and a few rose bushes and creepers planted. So the garden as a whole is in much better order than last year and given a good season and a little opportunity we hope for a better year.

However there is always something in a garden "crying to be done" and in wet weather the grass paths in the allotment become very sticky. But one cannot spend much on permanent improvements on a temporary allotment. The land had been meant for a building site and the plots on either side have been built upon. Thus it was not surprising when we dug up this plot last year we turned up many old bricks mostly broken ones and misfits. So this Christmas I have collected all these and as far as they would go dug up the old grass paths and made a dry hard brick walk. Good paths and tracks are a great help to the working of any land and Dr. Barber at the Sugarcane Station, also at Palur and Samalkota always made good tracks.

I now have an eye like a hawk for a wireworm and what I do not know about couch runners is not worth one anna. I hope my old friends at Coimbatore will forgive my not writing more frequently. They recognize the call of the land and know that a garden is not made by saying "Oh, how beautiful," and sitting in the shade but by steady hard work; and even if I am officially

styled a Trade Commissioner they at least will, I hope, still count me among the agriculturists.

A good New Year to all in 1919.

D. T. Chadwick.

Borehole yields. *(Continued).*

The Economic value of borehole yields.

Among other tables given in the annual reports of the Pumping and Boring Department, there is always one giving the number of successful boreholes put down during the year under review. The word "successful" there, however, only connotes something as distinguished from unsuccessful and nothing more definite. The word "successful" used to describe the yield from a borehole is an extremely ambiguous one. For instance a borehole that is put down for domestic supply or for irrigating a small pleasure garden and which yields, say 3 gallons a minute may be very rightly termed a successful bore but it is by no means a successful one if it is intended to irrigate a plot of garden land. Boreholes are generally classified into two categories viz., the artesian and the sub-artesian. Sub-Artesian boreholes are those in which the water overflows the tops of the lining pipes which may be considerably below ground level. Artesian boreholes are those in which water rises above the surrounding ground level. Very few artesian bores appear to have been drilled in this presidency and even among these few artesians, there do not appear to be many which yield anything like 100 gallons of water per minute. Among the sub-artesians too the yields have rather been poor, very rarely, exceeding 30 gallons per minute. The success of a borehole depends in the first instance on the actual yield that is obtained from the bore and secondly on the depth at which this supply is obtained. An example will make this clear. A borehole yielding 30 gallons per minute at a depth of 25' from ground level may be said to be an eminently successful one when the lifting machine is a mhote. If however an engine and pump

are installed a bore hole of that capacity though useful to an appreciable extent cannot be said to be an unqualified success. The ryot who is primarily interested in the results of the boring and the technical man in charge of the boring operations will therefore do well to think twice before they declare any borehole to be a success and to consider whether further tapping of the underground strata will not yield better results. To arrive at a correct decision on this point, the help of the geologist is almost indispensable. It may so happen that a good water bearing stratum may be in a particular tract at a prohibitive depth from ground level. A ryot owning a few acres cannot be expected to invest a very large sum on a speculative concern like the prospecting for underground water. Even if a substantial spring could be obtained from a strata of a comparatively shallow penetration from the ground level and therefore within the reach of a ryot of ordinary means, the amount of the yield and the level at which the yield is available may sometimes introduce insoluble elements in the problem of water supply. I have seen instances in which the ryots have fought shy of a pumping installation altogether and would not hear of boreholes if they cannot be assured of an artesian supply. Of course, such instances are rare. But the fact must be conceded that there is no use of a pumping installation if the supply from the bore or the well falls short of the pumping capacity of the plant, which means the requirements of a ryot which are compatible with economy. In places where big gravity irrigation systems exist the borehole enterprise will never make any head way. In these localities too, however, there is pressing need for extraneous sources of supply of water in ever so small quantities for carrying out certain important agricultural operations like the raising of seed beds for transplanting paddy. This is surely the case in certain arid areas where the rainfall though good is concentrated during certain portions of the year leaving the other parts of the year quite dry and rendering the conditions for a rapid evaporation from small storage ponds most favourable. The land commanded by the Vellar anicut system in South Arcot District furnishes a good example in this respect. The Vellar receives its freshes in the south west monsoon which also

breaks out simultaneously in the tract commanded by the Vellar. The supply from the Vellar at the beginning is precarious and is just sufficient for raising seed-beds. Soon after the transplantation is over, the monsoon breaks out with all its fury and floods the country. Year after year a good deal of low lying transplanted area gets submerged and much of it damaged or even destroyed. Only a late second crop of short duration is precariously raised late in the irrigation season. It has always been the contention of the ryots of this delta that the best results from the anicut system could be obtained only if they could be given enough water for raising their seed beds and transplant them sufficiently early in the year. In this problem, there are two things involved viz., (1) supply of water from other sources than the Vellar (2) the drainage facilities. A discussion of the latter is not germane to our theme. We shall, therefore, deal only with the former. Here is a case in which the subterranean sources of water supply may perhaps be tapped with advantage. It is quite probable that no artesian spring would be struck in a vast expanse of almost flat country with a very limited fall towards the sea. Nearer the sea it is still flatter. It is this flatness of the country that makes the drainage problem so difficult. At the head of the delta, there are laterite formations which hold large quantities of water in their pores. If such porous strata be present at some depth from the ground level in the lower portions of the delta, it is quite possible that they may yield large quantities of water. The existence and discovery of such a stratum would be of untold value to the ryots of this region. The level at which it is available is of paramount importance. The greater the depth at which it is available, the greater is the cost of lifting the water to the surface and cost is a vital point in the problem of water supply. The value of the crops raised, the amount of water that is available in the top soils, the magnitude of the rainfall and its intensity, and the presence of other sources of supply are some of the factors on which the success of a bore in any given place depends.

H. Venkatramaniah.

Reviews.

The Philippine Agriculturist.

The appearance of the November issue of our worthy contemporary as an *alumni* number marks a stage in its life well worthy of emulation by all well wishers of this journal. Commencing its seventh year of existence, it has built up a steady reputation for its worth and regularity and the succession of theses appearing in almost every issue are a proof of the solidity of the work of the student body running the journal. The issue under review starts with a short note from the Dean on the College in relation to its alumni. This is followed by an article by H. M. Gonzalez the first representative of the alumni on the Board of Regents of the University. He gives details of the formation of the Alumni Association of the Agricultural College and its objects. He says that "the greatest and at once the cheapest service the alumni can render the College is to give it their moral support, by their loyalty to the institution and its principles." Every old boy he thinks should make an effort, whenever opportunity warrants, to advertise his *Alma Mater*. Among his numerous suggestions to the Alumni association is one to erect a monument to their patriot novelist Jose Rizal to serve as an inspiration to scholarship and patriotism to coming students. 'Concerted action by the Alumni,' is the subject of a short note by Mendola, and it is well for us to realise with him "that Agricultural welfare depends upon so many phases of a country's development that its boundaries are beyond even our coast lines."

Then follows a brief summary of the work of the College graduates in the Bureau of Agriculture by another. The author of this article thinks that the curricula of public schools and of the College of Agriculture should be so formulated that the public schools will be the practical farm schools, and the college the institution for more scientific and advanced studies in Agriculture and it is only then it would be possible to turn out men properly equipped to be of value to the extensive agricultural propaganda. He mentions however, that the work of the Agricultural Inspectors is being more and more appreciated by the farmers and expects the time will soon come when the Agricultural Inspector will be viewed in the same light as an Engineer or a Health Officer.

The next article treats about the Agricultural graduates in their relation to the general farming public. The author gives a note of warning and asks the public to be patient and not expect great results of the graduates too soon. The graduates, he says, have several initial difficulties which they have to overcome before becoming successful preachers of improved agricultural practices. The institution from which these technical men are graduated is still an young one. Several of the technical appointments in Government service remain unfilled on account of the shortage of men so that most of the graduates are absorbed for the Government work leaving very few to do private farming. The situation as a whole described above seems to resemble fairly well conditions obtaining in Madras but there is no denying the fact that the agricultural graduates are beginning to gain due recognition on the part of the general farming public.

Another old student gives an article about his experiences as an independent farmer. He says to be a successful farmer one must be immune to disappointment and discouragement as farming is perhaps the greatest game of chance of any known business. One of the recompenses in farming is that the farmer is his own master. There is no chance for him to attribute failure to the imperfect orders of the chief above him or to some subordinate below him. To the right kind of man such a responsibility is certain to be a great stimulus. The issue closes with an article about the technical agriculturist as a Government official. The author thinks that an agriculturist if he does good work in Government service is sure to get a good offer for a private position later and quotes the advice of the Governor in the following words. "Do not make the mistake of considering a small employment or partnership position in private enterprise, abandoning the magnificent opportunity you have for a Government career to be followed by far greater rewards

in private agricultural enterprise subsequently when you will have made a real reputation for yourself." We commend the perusal of the whole issue to all old students and members of the Students Union.

'An old boy.'

Phytophthora Meadii on Hevea Brasiliensis.

We have recently received a copy of the memoir "Phytophthora Meadii n. sp. on Hevea Brasiliensis" and find it very interesting. Mr. McRae, our Provincial Mycologist, the author of the memoir has studied the subject thoroughly and offered very useful suggestions. These, if carried out, will we are sure, reduce the loss now sustained by the rubber planting community in South India. We need not dilate on the point that rubber has during the past few years come into great prominence in the tropics. The author has done well in drawing pointed attention to the serious but remediable defects in the system of combating the disease.

The present memoir deals with the abnormal leaf-fall, fruit-rot and bark-rot of that rubber known as Hevea Brasiliensis. The disease has been definitely proved to be due to a Phytophthora and it has been named Phytophthora Meadii after Mr. A. H. Mead of Mooply valley, Rubber Company (Cochin) who first drew attention to this disease.

The total area under this rubber in South India approximates 60,000 acres. The loss which this disease inflcts on the planter is actually 30 to 40 lbs. of made rubber per acre. It is sometimes as high as 80 lbs. on badly-infected blocks. The loss involved is in Rupees about 15 lakhs.

The disease starts its activity after the dry season at comparatively few points but when the monsoon sets in, it spreads rapidly first to fruits and then to leaves. This fungus occurs on different parts of the tree i.e., the branches, the leaves, the fruits and the bark.

In regard to the preventive measures a few observations of Mr. McRae are note-worthy.

(1) The fungus passes the dry-weather inside the branches that had particallj died back.

(2) The 'resting spores' of the fungus are found in the fruit.

(3) The fruits are the main propagating centres of the development of the fungus.

The methods suggested for combating the disease are the removal before the break of monsoon of the fruits and the branches that had died back. The Mycologist is of opinion that the removal of the dead branches, though difficult and expensive at the start, is economical in the long run. Applications of a mixture of tar and tallow is recommended as a preventive method against bark-rot of this rubber. Attention to plant-sanitation will, he expects, reduce the amount of damage.

'Fungus.'

Extracts.

RECLAMATION OF LAND FOR COCONUT CULTIVATION.

Mr. Baker's Estate at Kumarakam, is a back-water coconut garden on the banks of the Vermbaad lake from which it has been reclaimed. The process of reclamation consists of clearing mangrove and other wild back-water vegetation, of cutting parallel dykes in the mud for drainage and spreading the earth thus removed on the intervening land. These dykes are all connected together and thus a movement of soil water is effected. The width of the dykes and the distance apart varies in different parts of the Estate. In the older plantations, these are close together so that trees planted on the middle of the land strip are about 22—24 feet from those on the next strip. In later planted gardens both the dykes and land strips are much wider and a double line of trees are planted on each strip more or less on the triangle system. This latter system seems much more

preferable since navigation in the dykes is rendered more easy (all harvesting is done by boat), the cultivation of the ground is easier and it is easier to keep the dykes open thus allowing greater soil water movement. Cultural and manurial operations are mainly confined to keeping the soil in good mechanical condition and in supplying plant-food to the limited soil capacity in which the roots of the palm can develop. In the hot weather the water is pumped out of the dykes, which are then cleaned and deepened, the mud thus obtained being utilised to repair the planted strips which naturally suffer from land denudation during the heavy rains of the monsoon. Quicklime also is largely applied to keep these soils, which are naturally ill-drained and very rich in organic matter, sweet. The surface soil also is turned over annually but the effects of this were not very apparent as grass very quickly re-establishes itself under these moist tropical conditions. Backwater silt of a coarse sandy nature and rich in leaf debris is largely used for soil renovation, while where the soil is particularly heavy, this receives coarse sand as a top dressing to alleviate this. It was particularly interesting to me to visit a large property like this under careful and constant supervision and one realises even with a crop such as this how necessary careful and constant supervision is. It was also of great interest to me because it showed quite a new aspect of coconut cultivation to what I have hitherto had a chance of observing. Mr. Baker's experience in combating insect-pests is of interest and would probably pay for further investigation.

As a preventive against Rhinocerous beetle, Mr. Baker informed me that placing a small piece of "Marothi" or "Maruvatt" poonac in the young leaf axil will prevent the beetle from visiting the palm. The Red ant of which I have previously made mention in my October report is a very serious pest here in Travancore; not only does it tend and rear mealy bugs but it also attacks the men who gather the nuts. Mr. Baker uses white wash in the case of young trees with which he splashes the crown of the tree and I gather that the effect is that the mealy bug will not thrive where the white-wash is splashed and hence the red ants seek elsewhere to establish the colonies of the pest.

The 7th morning I spent with Mr. Davey of Darragh Small & Co., who has taken up coconut cultivation as a hobby. I visited some of his gardens south of Alleppey, situated on what appears to be a barren, bleached, white-sand, very similar to the white sandy soils one sees on the Malabar Coast and which apparently also suffers in the same way from lack of drainage. I need not further describe the condition of these gardens and the trees as this has already been done by Messrs. Anstead and McRae in last year's year Book. It is very evident however what an important part drainage plays in the health and productivity of this tree and it is astonishing how well these trees have grown when in some place they have not been able to spread their roots further than two feet into the soil. Though little difference was observed in the vegetative development of such trees compared with those in other parts where drainage facilities were better, their lack of reproductive development was very marked and I do not see how with such a limited soil capacity, this can be improved unless the ground water table can be lowered permanently. One question which suggested itself to me was whether the coconut tree itself did not tend by its matted surface root development to make the soil sour. The indigenous cultivation removes all such root growth annually. Gardens are dug deep and the soil left in small heaps for a month or two, after which time the soil is again levelled and often these surface roots are collected and burnt on the land. Certainly such roots can be of little use to the tree after the rainy season is over, as any near the surface must either die or remain dormant. If they are dormant then they can be of little use as feeding roots as it is in the dry months after the rains that the greatest fruit development takes place. Another point which also suggested itself was the system of manuring and how far the young tree differs in its manurial requirements to the tree in full bearing. I spent an interesting morning with Mr. Davey and benefited much from his practical experience in growing coconuts.

Extract from the monthly Report of the Deputy Director of Agriculture V & VII Circles.

The Increasing Popularity of our Department.

We visited the lands of Veerapandiapuram, Etturvattam, Kumaralingapuram, and also the village of Naduvupatti, where we were right royally entertained by the members of the Seed Union. Such a demonstration was in itself a proof of the impression the Department has created in the minds of ryots of that locality. They did not view us with suspicion, but received us as friends, and we were indeed glad to tell them who we were and the object of our visit. This visit to Koilpatti and Satur must have been an occular demonstration to the students of the real activities of the Department, and that they are not merely stories narrated in the class rooms. I was myself very pleased to have had this opportunity of visiting these parts for the first time, although I did actually visit Koilpatti once before in 1910 while in charge of the Southern Division.

Extract from the Assistant Principal's Report for the month of January 1919.

Indian Sugarcane and Japan's Competition.

A correspondent writes to the "Statesman" on the question of allowing foreign sugar easy access into this country and suggesting the imposition of a higher customs duty, draws attention to the following, which appeared in the "International Sugar Journal" of July 1918 :—

The Japanese are bent on making sugar production one of their greatest enterprises. Japanese capital, encouraged by the high degree of prosperity which was followed upon the development of the Formosan sugar-industry, is seeking for further opportunities, and so has turned its attention to the Dutch succession in the East as a promising field. Thus a Tokyo syndicate with a capital of £ 600000 has after preliminary investigations acquired 3 plantations totalling to 20000 acres in the province of Surakarta; these formerly devoted to coffee and rice, will now be planted with cane. But more significant is the fact that this and other Japanese companies have been making investigations in Northern Dutch Borneo and Sumatra,

regions where cane growing has not hitherto been undertaken, and are seeking for concessions in land in both these territories. They are also extending their operations into Sarawak, where one company has recently acquired 2600 acres of land and is negotiating for 25,000 acres more, and another has obtained 1500 acres. Simultaneously with these plans extended services of Japanese steamship companies are projected between Japan and the East Indies, and Britain and New York, with the principal purpose of carrying sugar from Java to British India and gunny from Calcutta to New York. It is clear that Japanese competition is going to be a serious factor in the sugar trade in the East primarily the Chinese market will be the aim of the sugar producers, but, thanks to Japan's efficient mercantile marine (which has probably suffered least of any from the ravages of the war) there is no reason why her sugar should not enter markets all over the world one day and compete with older established sources of supply. Next to China, Japan will assuredly enter into competition with Java to supply the Indian market and Calcutta Government will have to consider before long how far this competition can be allowed to run unchecked at the expenses of the native Indian Industry. The latter is faced with more competition than ever, and what is worse, competition of a very high technical order since the Japanese industrialist leaves no stone unturned to obtain the most efficient plant and employ the most up to date methods of production. "*The Hindu.*"

W. R.

Notes.

Effect of Grass on Palms:—The injurious effect of some plants on others growing near them is well known. The Persian Nim for instance is a menace in all gardens and the Portia, the Tamarind, the Kodukapilli and others too numerous to mention possess a similar deleterious effect. Readers may also have noticed a marked contrast in the growth of crops in fields bounded by the Rain Tree (cf. Central Farm, Manurial plots and Fs. Nos. 37 & 62).

In a recent bulletin of the Trinidad Department of Agriculture attention is drawn to the effect of grass on palms. Areca plants were put out, some in grass lawns and others in prepared beds. The plants in the grass remained stunted with short yellow leaves but those in beds grew rapidly in height and had large healthy leaves. After three years the average height in the case of the former plants was found to be less than half that of the latter. It is not exactly known whether the harm done is owing to toxic excretion by the grass roots or to the competition between the roots of the grass and the palms for water and food materials present in the soil. It is also stated that coconuts in grass-covered land often grow slowly and look unhealthy and yellow. Owners of coconut topes should therefore ascertain whether grass has a retarding effect on the coconut palms. If so, the ground must be well cleared of grasses (and weeds ?) before the seedlings are planted. For, as the writer says, the early years are important for all palms as failing proper treatment then they may never form strong well-developed plants.

"Leucas."

Selfing cotton flowers. In the departmental year book of '17, there is a note by Messrs. Hilson and Parnell describing a method of selfing cotton flowers which consists in the use of a fine needle and thread with which the bud is stitched before it opens. In the current issue of the Agricultural Journal of India there is another method described by Mr. S. K. Kottur of Bombay. Small rings made of thin wire have been used by him. These are put on the fully developed buds before they commence opening and the form of the flower being a cone there is no difficulty in putting the rings tight. Further the stalk of the protected flower is marked by a piece of cotton thread attached to the ring. The method, the author says, is easy, simple and inexpensive.

K. R.

The Loni School (near Poona). Though the purely educational side of this school is perhaps familiar to most of our readers its social side is not likely to be so well known. The students use a common dining hall irrespective of caste distinction and look after the whole of the messing arrangements. The food is of the simplest and even tea the common beverage in the Presidency of Bombay is not frequently indulged in. They maintain the garden round the school and do all the work in connexion therewith. The games played are of the indigenous kind, such as 'The wrestling Post' and the 'Gusthee' and the apparatus is consequently both cheap and simple. To one accustomed to the sight of the cricket, the football and the hockey played by green and yellow shirted students, the sight of the Loni votaries marching to the gymnasium with bare bodies anointed with oil like the Greek heroes of old came with something like a shock. The students are mostly untutored villagers and appear to feel quite at home in the school.

T. S. V.

The Coimbatore Mhote in North India. In parts of North India one frequently comes across a mhote much like the Coimbatore one but the bucket possesses no tail. This necessitates the employment of two extra men just to empty the bucket. When the tail was suggested various difficulties were marshalled out. It is likely a demonstration will convince.

T. S. V.

Estate News.

The Rural Educational Conference held its third and final sittings at the College on the 24th, 25th and 26th February, and we were very glad to welcome Messrs. H. Champion, K Ramunni Menon, and M. O. Parathasarathi Ayyangar of the Educational Department and Mr. Stuart, the Director of Agriculture to our

midst. The Agricultural Department, besides the Director, was represented by Messrs. Wood and Sampson. Mr. Wood gave an 'at home' to some of his friends on the 25th afternoon to meet the visitors, which was enjoyed immensely by all who had the privilege of being present.

Mr. Nicols, the Consulting Architect to the Government of Madras paid the College and Estate a visit towards the end of February in connexion with the preparation of plans etc., for the expansion of the College, as it is found that the present building is insufficient to meet the demands of the ever increasing staff. The idea is to build a separate building for Teaching with different laboratories, lecture and preparation rooms etc. We understand the Government have sanctioned far this purpose three lakhs of Rupees and the building is to be on the north-west corner of the Maidan. We trust that whatever shape the building might take, it would harmonise with the existing one in its grandeur and architectural beauty as we believe that the aesthetic side of education must also be developed rather than with a view to save a little money make it a monument of regret in years to come.

The Agricultural Adviser to the Government of India and Mr. W. Sayer, the Imperial Agriculturist now on special duty in connexion with Sugarcane visited Coimbatore on 9th to 12th February. We understand that the main object of the visit was to settle the future of the Sugarcane Breeding Station which at present is yet but temporary.

Many ryots from the adjoining Taluqs visited the Central Farm on 30th January. Mr. Vellingiri Gounder of Vellaikinar was the host and the visitors were accommodated in the students' Hostel. The party was at least 100 strong. We hope such visits will become more frequent in the future.

Departmental Notes.

Appointments :—

Mr. N. Krishna Ayyar, B. A., is appointed temporary Chemical Assistant on Rs. 75 under the Government Sugarcane Expert, Coimbatore.

Leave :—

Rao Sahib A. Rama Rao, Farm Manager, privilege leave for two months from or after 10th April 1919.

Mr. S. Kuppuswami Ayyangar, Farm Manager, will be in charge of the Mangalur Agricultural Station during the absence of Mr. Rama Rao on leave.

Mr. M. Raman, Assistant Farm Manager, extension of leave for one month in continuation of the leave already sanctioned-

Mr. S. N. Krishnaswami Ayyangar, Surveyor, extension of a fortnight's leave.

Mr. C. Arulanandam Pillai, Assistant Agricultural Demonstrator, extension of 10 days leave in continuation of the leave already granted.

Mr. R. G. Mal, Assistant Agricultural Demonstrator privilege leave for 16 days from 13th February.

A correction.

In the January 1919 issue Page 28 'Students' corner' we stated that all the candidates of Class III secured First class in Mycology. We now learn that this is erroneous and that only the first six were placed in the first class.

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Editorial Notes.

The Pusa Chemical Conference.

Of the different sectional conferences held in February 1919 at Pusa, not the least important was the chemical conference which was presided over by Dr. W. H. Harrison, Imperial Agricultural Chemist and which got through a crowded and interesting programme for nearly a week. Mr. J. Mackenna, Agricultural Adviser to the Government of India, opened the conference in a spirited address calling attention to the relative importance of the various subjects on the agenda and watched the proceedings and took part in the discussions throughout the session. There were two references from the Government of India on which the considered opinion of the agricultural chemists was invited, the formation of the Indian Chemical Service as formulated by the Industrial Commission and a Fertiliser Act for India. With regard to the former, the agri-chemists desired to be units in the Agricultural Department rather than be merged in a general

chemical service. As regards the latter, the necessity for a Fertiliser Act was pointed out, and a draft of the proposed Act was framed. The necessity for a uniform lowering of freights on manure carried by the several Railways was also pointed out.

The other subjects considered included the separation of Teaching from Research, the relation of Pusa to other Provincial Departments, soil surveys, standardising methods of analysis, holding of future conferences and bacteriology at the last of which Mr. C. M. Hutchinson, Imperial Bacteriologist presided. Some of the subjects discussed at this first chemical conference were of a domestic nature and chemists of native states and private firms had not been invited. We await the official publication of the Proceedings for a detailed review of the work of the conference which, from what we hear, was a most interesting and useful conference.

More than the discussions at the conference proper, every one who attended seems to have benefited by informal discussions with co-workers from other Provinces. The Agricultural Adviser seems to have been impressed so much by the success and usefulness of the conference that he agreed to invite as many of the chemical assistants as possible from all the Provinces for future conferences although the actual deputation depends on the local authorities. The Pusa staff was extremely hospitable to all the visitors and all provincial bias, if any existed, was merged in a happy united India, and it is no wonder because all had assembled at the great shrine of Science.

The Agricultural Calendars.

We have received copies of the Madras Agricultural Calendar for 1919–20, (April 1919 to March 1920) and the Mysore calendar for 1919 (January to December). Both are illustrated and contain valuable reading matter and they are priced one anna each.

The Madras one is a rather bulky volume running to 110 pages while the latter runs to 54 pages. The Mysore wrapper figures a Mysore cooly woman with a sheaf of Ragi and is certainly more poetic than the map of farms which adorns the wrapper of the Madras contemporary. It is now widely accepted that the calendar is a very useful adjunct in Agricultural propaganda work and we know that the Madras Department practically took the lead in the matter.

The mind of a Farmer or Ryot and its bearing on Agricultural Improvements.

Some time ago I noted in a publication that an enquiry had been made to see whether any correct idea of the mind of a farmer could be ascertained by enquiry.

The writer's conclusions were astounding, and read as follows—"That the mind of a farmer could not be conceived and is inconceivable."

Without dwelling on the methods which were employed in the enquiry, as of these I have only a hazy recollection, I think that the subject might profitably be reviewed in a general way as it appeals to me.

There is no doubt that, whether to the citizens of Madras, London, New York, Edinburgh, or Paris, the farmers in their

respective countries are comparatively little understood by the average city man. The farming profession generally is followed by what may be termed an agricultural class who, from the nature of things, have little in common with the city dweller. On meeting a city man, casually, a farmer will always tell (and *vice versa* in some other way) even if there is nothing in the appearance to betray the secret, whether his friend is a farmer or not by the way he looks at a plough, cultivation, or stock; or by the first remark made about these. It frequently happens that when some enquiries are being made regarding agricultural matters, the investigators, in their attempt to talk in such a way as to please the farmers and get information, trot out many sayings that are ridiculous in the extreme from the farmer's point of view. In the case of people following the same profession for many generations, there passes from one generation to another certain manners and customs, a knowledge of the arts of agriculture by tradition, many so called superstitions etc. etc. which are little known or understood by others, and thus certain characters are associated with the agricultural classes in all parts of the world.

In the first place, consider the meaning of certain expressions used in the country with reference to their literal meaning. Take for example in connection with Clydesdale horses in Scotland, the remark, " This horse has feet but no legs " which means that the feet are good, and the legs bad from all points of view. Again with reference to Ayrshire cattle " This is not a bad cow " which means that from every point of view the animal is a very excellent one indeed. Now the point of special interest is that amongst the ryots such sayings as the above have a counterpart. A ryot will say that a certain buffalo is a " Milk buffalo," and that another " is not a milk buffalo " although both are giving milk. The former expression means that not only is the buffalo giving milk but also that she is a good milker, while the second refers to a buffalo that gives very little milk. However the above could be multiplied almost indefinitely, and when these are applied to things in the various ways, it is after all not surprising that the writer referred to above came

to the conclusion that he did. It will be evident that a knowledge of the meaning of phrases is most important, and also that those without agricultural traditions working amongst the agricultural classes must beware of the many pitfalls into which they may unwittingly drop. Again, take the so called superstitions amongst the farmers in some parts of Scotland, exactly the same sayings are found amongst the ryots here. How these sayings and superstitions have come into being have their interest in the past and need not be pursued further.

Farmers are generally considered to have a very conservative type of mind, and this is quite true. A friend of mine writing from Africa lately said " The farmers here are even more conservative than the farmers at Home, and that is saying a good deal." But could this be otherwise when all is considered, indeed in my opinion it will always be so. Consider for a moment how the present agricultural practices all over the old countries of the world have come into being. For example tradition has handed down for thousands of years the essential things in paddy cultivation, leaving behind all the errors of former times, thus now only the counsels of perfection pass from one generation to another. In this way the ideas of ryots are exact, and therefore anything containing " If " " Perhaps " " Possibility " etc. in connection with advice is looked on with suspicion. Further, farming practice is connected with unforeseen circumstances. When preparing the land, no one can tell whether the season will be good or bad etc. etc. thus the position of the farmer is more precarious than that of almost any other profession. Seeing that a farmer is dealing all along with uncertainties, it follows that successful farming practice should be on the lines that makes crops as sure as possible. To obtain fair returns every year is the object of every progressive farmer, and therefore there is little desire to depart from the practices that have hitherto proved profitable and successful in this precarious calling.

Now, I think that these notes have a very direct bearing on agricultural improvement in connection with which there is much good

and useful work still to be done. It is just as well to take it for granted that the type of farmer-mind to be dealt with will not be changed by the stroke of a pen, and that it will remain a factor in the situation. Just consider for a moment that some new variety of grain has been introduced and tested in the districts during a favourable season with good results. How would this impress the mind of a ryot? He would say "What about a bad season". Suppose that under persuation of some enthusiast he sowed one field or a part of a field with the seed, the season a bad one, the crop failed, while other similar varieties of local grains produced fair crops. Just think with what such advice is compared. It is compared with the knowledge of tradition in connection with crops which on the whole is sound, and has stood the test of ages. The effect of this will be, especially on a conservative minded people, to make them still more conservative, as faulty advice is very slowly forgotten. Such things put back the clock, and also bars the path to further progress. Of similar happenings to the above I could quote many examples from other countries, and I dare say that those who have been long enough connected with agriculture in India could quote similarly.

Improvements cannot be made without mistakes, but the mistakes should first be made before the matter is put to the ryot, also the more conservative minded the ryot, the greater the care that must be taken to see that only sound recommendations are made. While the conservative type of mind at times has disadvantages, still it is not without its advantages. A sound recommendation when it finds its way into agricultural practice will be tenaciously followed and will soon spread all over the country due to one ryot recommending it to another. The prestige of the party who made the recommendation will be very greatly enhanced, and his advice will be sought after in the future. This brings into being the ideal state of things, namely that the ryots of their own accord will come and ask for advice. Wrong recommendations of course have a contrary effect.

When one ryot is discussing agricultural matters with another, each is up against a man who thoroughly believes in what he says,

and in such cases there is fixed conviction behind the arguments used. If a demonstrator goes to a village to recommend anv particular practice which he himself has not studied in detail sufficiently to convince his own mind that the thing is correct and sound, such a one will never convince a ryot to adopt a recommendation, although the recommendation may be perfectly sound. The reason is that there is an absence of fixed conviction behind the recommendation, and the ryot is very quick to detect this state of affairs.

The history of agricultural improvement all over the world shows that it has been slow, and from the nature of things I am of opinion that this also will apply to countries that are rather backward at present. Before anything finds an established place in agricultural practice it has first to be thoroughly tested before being recommended, then after introduction it has to stand a further test under ordinary conditions, and so far as successful or otherwise adoption or rejection will be decided.

When all is said there is no farmer in the world who does not welcome anything that will make his agriculture more profitable. Agriculturists carry on their farming for profit, and therefore anything that is not either directly or indirectly profitable will never find its way into progressive farming.

Farmers distinguish clearly between things that are "New" and things that are "Improvements." Many things that are put forward as "New" in connection with agriculture in Western countries are not improvements, and also many things that are improvements are not new, but resurrected from the past. The refusal to adopt many of these so called "New" things has to a large extent been responsible for the general opinion that the farmer is conservative—minded. If the conservative type of mind has not at times moved quick enough, it has frequently saved farming from disaster by refusal to adopt many so called "New" things. While even real economic improvements may find their way rather slowly

into agricultural practice, it is only fair to the farmer to say that eventually such items always find an honoured place.

Be sure of what you recommend,
That towards advancement it doth tend,
The ryots' lot will thus improve,
And from the groove he'l move! move! move!

A. Carruth.

Borehole yields. *(Continued).*

Methods by which subterranean supplies of water may be made more available :—

The water-bearing strata of the earth's crust may be broadly divided into three classes.—

(1) Hard metamorphic rocks with fissures and cracks in them. (2) Stratified beds of rocks of varying degrees of porosity (3) massive or stratified deposits of sand or gravel. The conditions of yield from the bores sunk into these strata vary with their nature and consequently the methods by means of which the yields may be augmented will differ accordingly.

1. *Supply from fissures aud cracks.* Here there is no question of percolation at all. The flow from the bore depends primarily upon the main source of supply from which water rises into the crack and secondly on the size of the crack. In many cases we have no control on the principal source of supply. As the flow of water through the fissure depends upon the size of the latter, we may increase the flow of water through this fissure by enlarging it and there is only one feasible method for enlarging a tortuous fissure occuring in the body of a rock. The method is known as "torpedoing" and consists in blasting the rock at the

bottom of the borehole. A charge of dynamite is introduced at the bottom of the borehole and exploded. If the rock in the neighbourhood contains faults or fissures, the explosion will widen them and may even cause new fissures, thus opening up new channels of supply into the borehole. This method is not always successful, and should be employed with caution. Sometimes torpedoing may end in adverse results. In the disturbance caused by the explosion, some of the water yielding fissures may get choked up and in consequence the supply from the borehole may be considerably reduced. Torpedoing may be tried freely in dry or almost dry bores as a last resource in getting at underground reservoirs of water and it is to a certain extent hazardous to attempt it in any successful bore.

This method of shattering rock at the bottom of a bore may sometimes be advantageously tried in the case of the strata belonging to the second category mentioned above. The flow from these strata depend to a certain extent on the area of the free surface at which the water flows out from the body of the stratum. This free surface in the case of a borehole under normal conditions is that portion of its internal surface which is intersected by the stratum. If the rock surrounding the bore is disintegrated, then the flow into the bore from the stratum will be accelerated along the lines of the fissures that might have been formed. In the case of a porous stratum there is no danger of choking up any existing fertile fissures by explosion, for water can percolate through any portion of the stratum. Hence torpedoing deserves a trial in the case of bores resting on strata like chalky-beds or laterite formations.

Conduits. When the water-bearing stratum occurs at the ground level or at shallow depths and if it is of considerable thickness, the method of driving conduits into the same is recommended. Such strata overlie beds of impervious strata like clay. The flow from such strata cannot be artesian and depends

only upon the rate of percolation from the surrounding medium which may be either one of composite structure like laterite or one of loose structure like sand. Conduit is a tunnel excavated laterally into the sides of a well, which should be of fairly large dimensions. In dealing with this method we are therefore outside the province of "Boring" proper. But as it forms in some instances an alternative method of securing water in localities where the drilling of a bore hole is impracticable, mention of the method is made here. The conduit simply serves the purpose of increasing the free surface at which water flows out from a stratum. Then the question will arise: if the area of percolation is to be enlarged, why not increase the diameter of the well? In other words, a tank might be excavated. There are two things which militate against this method being adopted. Firstly the cost will be prohibitive and secondly a greater area than might otherwise be utilized will have to be sacrificed. The driving of a tunnel is not an easy matter and in sandy soils the method will have to be modified as the exigencies of the situation suggest or demand. An example may be quoted here where an analogous method was proposed to be adopted for a tentative water-works in one of the District capitals of the Presidency. A river in which freshes occur for a very limited period during the year but which has always a small quantity of spring water flowing in it runs close to the town. The river-bed is composed of a thick layer of sand which entraps a good deal of water when the river is in freshes. It is this water that is caught in the pores of the sand that gives rise to perennial springs in the river bed. It was proposed to sink a number of deep wells of a medium size 100′ or so apart and to connect the wells with one another by earthenware pipe lines laid at a considerable depth from the bed level. The pumping would be done from one of the wells centrally situated and as the water is pumped up from this well, it would be kept continually replenished by the water that percolates into the whole system of

wells. A deep tank would have answered the same purpose but the construction of a stable tank in a river bed is, for obvious reasons, a matter of impracticability. A ryot of Perumpanniyur in the Tanjore district has been led to the adoption of the same device in a parallel situation by a long series of trials. The village lies in the heart of the Delta. Through dint of perseverence on the part of this ryot and at his initiative, it is said that a borehole was drilled in this place to the great depth of 400′ and it appears that even at that depth the alluvial bed was not completely pierced through. Owing to practical difficulties, the boring was given up. After the lapse of some years, he tried to prospect again for underground water and as luck would have it, the attempt again ended in a mishap to the lining pipes and the borehole was abandoned. The ryot owned a pumping installation with a 6″ pump which baled water from a big well sunk in a tank. Neither the well nor the tank were very deep. The tank was about 6′ deep. The soil and subsoil are made up of sand and contain and readily yield large quantities of water. Seeing that the boring quest ended in a fiasco on two occasions, the ryot proposed to sink more wells closely together in the same tank and connect them together by conduits. By this method he could tap water from a considerable depth which if he were to do by means of an open tank would involve the investment of a large sum of money. In the case of the Ayyangudipallam installation the same method could have perhaps been adopted with profit. This method may however fail in seasons of drought for the in-flow of water into the wells and conduits depends upon the level of the water table which the pervious stratum supports. In the dry season, the level of the water table in such strata gets considerably low and the water table itself may vanish at the higher points of the valley if the stratum has a definite fall in any direction. Again as has already been stated, under a pumping strain, the cone of depression gets very widely extended and in consequence the water level in the

vicinity of the borehole or the well, for we are speaking more of wells than of boreholes now, gets depressed considerably. It is this depression of the water level that necessitates the sinking of deep wells and the extraction of water from as great a depth as possible. Deep wells of a large size are enterprises involving heavy outlay of capital. There is therefore a limit to the depth of the wells dictated by economy and if we want to penetrate the strata to a great depth we must have recourse to boring. It is thus the very common practice of locating boreholes in existing wells has arisen. A case which illustrates this point may again be quoted from the Tanjore District. In Mannargudy which is situated in the lap of a river which almost encircles the town, a borehole was put down in a well for an enlightened and an enterprising ryot some years ago. The depth of the borehole was only 130′ and the result was quite satisfactory. The well ran generally dry in summer though it was 50′ deep. After the sinking of the borehole the supply from the well increased considerably. The example of this ryot was followed by a few other ryots of the place with equally good results. It is quite probable that the river bed is in some way connected with an expansive and pervious stratum situated more than 100′ below ground level. The water table was however low. It is not a 'syncline' ending in an outcrop at some higher level from Mannargudy. If it were so, the water level in the bore would also be high. It is a huge pervious deposit. It contains a good deal of water and the amount of water which it holds does not fluctuate very much with the changes in the quantity of rainfall in any year. This reservoir appears not only to be fed by the local rainfall but by freshes in the river. The only defect with this splendid reservoir of water is that its effective depth is low. In such situations, deep pumping installations are a necessity. But deep pumping means extra costs of installation and extra running charges. Under favourable circumstances this consideration may not deter a ryot from installing a deep pumping plant. If, for example, the quantity of water that could be

pumped up is quadrupled when the cost of pumping as a result of increased lift is doubled, the pumping of water from a greater depth will still remain a business proposition. A good deal of improvement might perhaps be effected in this way in the case of many boreholes which have been declared to be of an unprofitable yield. Whatever may be the nature of the stratum from which the supply is drawn the supply from it will increase as we approach nearer and nearer to it and as the effective depth from which the supply is drawn is increased. The second condition is as important as the first in the case of gravelly and sandy soils. It might be of very little import in the case of hard pervious rocky strata like laterite and limestone. But in all cases the fact that the lower the level of pumping the better the yield holds good. In the United States of America, in river valleys composed of massive layers of gravel and sand, enormous quantities of water are pumped annually from great depth for 'truck' farming. It is stated that the number of boreholes and the quantities of water drawn are so great that water companies have been formed to unite the whole thing into a business organization. It is said that continuous pumping for a number of years has lowered the water table in some of the tracts mentioned considerably and that the diminished output from the boreholes has led to the creation of water laws. Similar organizations are unknown in this country. The great anicut systems are controlled by the Government. There are two well lift irrigation systems in this Presidency which are prominent by their uniqueness viz., the Rashikuiya and the Divi pumping projects. There is however scope in this country for lift irrigation systems based on underground supplies being formed in favourable localities. The magnitude of them will however depend upon the available supplies of water and the possibilities of the concentration of a number of them within a manageable area.

When deep pumping has to be resorted to, there are two possible methods by means of which the yields for a borehole may

be made continuous and steady. The method is to construct a deep well, perhaps more than 50′ deep and disconnect the lining pipes of the borehole at the bottom of such a well. The pump will no doubt have to be placed sufficiently low so that the suction lift may not exceed 25′. The second method is to connect the suction of the borehole direct. This method does not appear to have been adopted in this Presidency as yet. There are however situations in which it will prove a par-excellance method for two reasons viz., (1) it will obviate the construction of a very deep well and the concommitant heavy expenditure, (2) with a vaccum of 25′ above the foot valve the inflow into the bore from the surrounding strata will be accelarated. By such direct coupling of the pump with the borehole, the finer particles which generally tend to choke up the borehole will be forced out. There are instances where the supply from a bore was reduced on account of the presence of fine sand around the borehole entrance. In such cases the introduction of large sized sand and gravel into the borehole improved the supply from the borehole. The fine sand from the bore was ejected along with water which was pumped up and the heavier sand and gravel took its place, rendering the percolation of water into the bore easy. The box of long strainers, a devise which does not appear to have been introduced in this Presidency as yet, is attended with distinct advantages in such soils and deserves trial. The theory of the strainer is based on the following argument. The inflow into a borehole depends mostly upon the surface of percolation and very little upon the diameter of the bore. The surface of percolation will greatly increase if one or two lining pipes of the bore which lie at its bottom are perforated. A strainer is simply a perforated pipe. Regarding the relation between the magnitude of inflow into a bore and its diameter, it has been found that the increase in water supply due to an enlargement of the diameter of the borehole is scarcely of any practical importance. Hence the auguary to effectively tap the water from the sandy strata is to draw the

supply through a greater height. Where there is no strainer, all the inflow into the borehole takes place through the bottom opening of the lining pipes. The frictional resistance felt by the inflowing water will therefore necessarily be greater than that in a long open strainer. With the increase in resistance, the flow will decrease. Our endeavour should therefore be to reduce this resistance to the minimum and the strainer is designed to achieve this object. The length of a strainer will depend upon the depth of pervious stratum, the total height of the cone of depression etc. The strainer will be of great use when sunk in river valleys etc., consisting of masses of drift sand. An instance may be quoted here where it could have been of immense benefit. In Nidamangalam there is a pumping installation the source of supply being a 12′ or 10′ diameter well supported by a borehole. The installation is situated on the banks of one of the numerous branches of the Cauvery. The overflow from the bore is very little so much so a 9 H. P. engine with a $2\frac{1}{2}''$ pump drained the well supported by the bore in about half an hour. The owner of the installation was advised to disconnect one of the top pipes by sinking a smaller diameter well in the outer well. But the effect of this proved to be of no practical value. In this case it is quite probable that the principal stratum pierced through by the line of pipes and from which the supply is drawn, is connected with the sand forming the river bed. It may be of considerable thickness. Probably a 20′ strainer coupled direct to the suction of the pump would have improved matters. The use of the strainer is limited to the sandy strata. Hard strata like chalky and laterite beds do not require any lining pipes. The question of strainers does not arise for these hard strata.

If the superincumbent layers of loose soil are not very thick, a well may be sunk till the hard stratum is reached. If they happen to be of considerable thickness lining pipes will have to be introduced to cover these. In almost all cases, except in the case

of powerful artesian bores, the construction of a well serves an important purpose. The pump may be installed low and if possible the engine itself. The suction lift of a pump as has already been stated above, is practically limited to 25' and hence in situations where deep pumping is a desideratum, the pump has to be installed at a fairly great depth from the ground level. We shall deal with 'Methods of Deep Pumping' in the next article.

H. Venkatramaniah.

Milk from cow to consumer on the Government Dairy Farm, Bangalore.
or
The Care and treatment of milk from the time it is drawn off the cow till it reaches the consumer.

Now-a-days we hear much about "clean milk," not only as regards suspended impurities visible to the naked eye but clean from a bacteriological point of view. In every health officer's report we see the wail set up for better quality of milk and also tbe reason for greater infant mortility. To sum up, he sets the defective milk supply as the root cause. It has been clearly shown by eminent bacteriologists beginning with L. Pasteur, that milk forms one of the best sources for the growth of such fell diseases as consumption, enteric, etc. Under such conditions it is no great wonder that the Indian Government should have Dairies of their own, un on modern principles under trained managers, for the production of milk under the best sanitary conditions for the benefit of the Military. In the following few pages I will try to give what I have seen in the Military Dairy Farm at Bangalore as regards the treatment of the milk ere it reaches the consumer.

First let me take the care and treatment of *Cows and Buffalos*. The herd consists of both cows and buffalos, the latter predominating. The animals are well housed in clean, sanitary sheds and stand very little chance of having their bodies soiled since the dung and urine fall away into the gutter behind. Moreover the sheds are cleaned well with water every day. The troughs and pillars are regularly white-washed at least once a week. In short all possible precautions are taken to keep the animals clean i. e., to keep the animals free from any out-break of disease. Just before milking the udders of animals are washed with a weak solution of condey's fluid and then wiped dry with a clean towel. During the milking time the dung is regularly removed so that no contamination may take place. Thus as clean a surrounding as possible is made for the milk man.

Guvallas. These are professional milkers. Each guvalla is provided with a complete set of clothes during milking. They hand it back to the soldier in charge as soon as milking is finished. The process of milking is closely supervised by the soldier in charge. The milkers first wash their hands in condey's fluid before they begin milking. The same thing is repeated whenever they milk an animal which has an affected udder. The soldier in charge is expected to report whenever he observes an animal "off condition" or animals with swollen udder etc. The milk of such animals is condemned lest the animals should be suffering from contagious Mammities or Tubercular udder etc., until it has been proved to be otherwise.

Milking. "The whole hand" method is used. The guvallas are not allowed to wet their fingers before milking but only moisten their fingers just to give them an easy grip. The milk is collected in buckets.

Recording. As soon as an animal is finished, its milk is carried to the Recording shed where a clerk in charge makes a record,

of the milk yielded by each animal, morning and evening separately. When the bucket is full the milk is poured into cans through a filter which is provided with fine wire sieve and also a fine muslin. Thus as far as possible all suspended impurities are retained by the sieve and muslin. No doubt the milk will contain some of these impurities in liquid form. When a can is full it is closed by means of lids and thus completely guarded against flies and dust laden air. When all animals are milked the cans are carried to the Dairy for further treatment and storage before it is distributed.

Dairy. The whole dairy building and its surroundings are kept scrupulously neat and clean. All the windows and doors are covered with wire mesh so that our deadly foe, the fly, is kept away. The equipment is of the most modern type and all the machinery is driven by overhead shafting and pulleys by belts.

Pasteurisation. It is well known that all harmful bacteria i. e., germs grow only at blood heat temperature. When the milk is heated to 180° F. all grown up germs die but only spores remain. This was the lesson taught by Louis Pasteur, the father of Bacteriology. Hence we may define Pasteurisation of milk as "the application of heat to milk for the purpose of destroying or checking the growth of undesirable micro-organisms therein." As said already pasteurisation will destroy only living micro-organisms but cannot destroy their spores. To destroy the spores we must have recourse to sterilisation which is impracticable in a large dairy. So we see that whenever milk gets contaminated it will remain so in spite of Pasteurisation. On the other hand if we heat the milk to a sufficiently high temperature for a certain time so that all grown up bacteria are killed and then cool it suddenly to a low temperature, we can check the growth of these micro-organic germs for a sufficiently long time provided we keep the milk at that low temperature. That is what is done here. The milk is heated to a temperature of 185° F. and is kept at that temperature for 4 minutes and then the heated milk is allowed to flow down over

a series of tubes. In the upper tubes cold water circulates and in the bottom ones liquid brine circulates. Since the milk flows down over the tubes in a thin film it not only gets cooled but also aerated so that all undesirable food flavours are driven away. Thus the milk which has a temperature of 185° F. at the top gets cooled to 45° F at the bottom. The milk is collected in cans and is removed at once to the cold storage room where the milk remains under the temperature of 45° F. till it is taken out for distribution.

Treatment of vessels. The vessels i. e., cans and bottles are first washed in luke warm water. The sides are well scrubbed with brush aud then with water. They are then steamed well till the cans get sufficiently heated. Steaming is not resorted to for glass bottles. These are immersed in water at a temperature of 190° for 5 minutes.

Distribution. Up to 2 lbs. the milk is supplied in bottles and larger quantities in cans. In all cases the vessels are sealed so that no mischief might be played *enroute.* In the case of bottles, the mouths are sealed by means of paper caps and rings and in the case of cans by means of twine and seals, so that it will be impossible to open the consignment on the way.

Thus all possible precautions are taken to supply the customers with milk pure from all points of view.

M. Krishnaswami.

Reviews.

The December issue of the Madras Bulletin of Co-operation contains an interesting article on 'the necessity for co-operative dispensaries' from the pen of Mr. C. N. Krishnaswami Ayyar, M. A., L. T., the Secretary of the Coimbatore District Urban Bank.

His plea is that medical help of the right sort is not within reach of the masses and where it is available it is too costly and he thinks that co-operation can easily set matters right. The author attributes the present slow progress of distributive societies as compared to the credit societies to the fact that they do not catch the imagination of people so well as the credit societies and thus proposes an attraction to the present distributive societies, popularly known as the 'stores' in the form of provisions for the sick, and a vendor for the same. Cheap approved medicines are to be stocked and a physician engaged at the most favourable rates to distribute the medicine. He hopes by this means to kill two birds at a stocked viz., cheap medicine near doors and the encouragement of the Unani and Ayurvedic systems of medicine, as the western school of medicine is out of question on account of cost and non-availability.

Such a development the author trusts will strengthen the stores movement considerably, and bring about its rapid spread.

K. R.

The following extract from the Bombay Co-operative Quarterly will be of interest in this connection.

"A novel type of society has just been registered in Bengal. It is a village antimalarial society, the object of which is to prevent malaria, to render free medical aid to members, and to supply to members ordinary medicines free of cost. In addition to an entrance fee, members pay a quarterly subscription of Rs. 3 and undertake liability for twice the amount of the subscriptions. These funds, together with any donations and subventions the society may receive from Government, public bodies, or individuals, are to be utilized in undertaking antimalarial operations, and providing free medical relief. The antimalarial operations will consist chiefly of clearing jungles and filling up insanitary pools of water, at the recommendation of the local sanitary authorities. For the provision of medical relief, the society will engage a doctor, whose services any member can command free of charge, and will also maintain a dispensary for giving out free medicine to members."

Cholam as a substitute for Barley in malting operations.

Under the above title Messrs. B. Viswanath, T. Lakshmana Rao and P. A. Raghunathaswami Ayyangar, Assistants to the Government Agricultural Chemist have issued a Memoir in the Chemical series Vol. V, No. 4. The abnormal conditions during the time of The Great War and the consequent increased attention paid to food products led the investigators to try and find a substitute for Barley in malting operations. From South Indian Cereals, paddy, cholam, ragi, tenai, maize and cumbu were tried. During the course of the investigations all were given up one by one except Cholam which they find to be superior even to Barley in many respects. The Memoir should greatly interest brewery men and we on our part invite their attention to an extract which we print elsewhere in this issue.

Ed.

Extracts.

Sorghum or Dari, a new substitute for Malt used in Brewing.

For several months brewers have been offered as a new substitute for malt, Sorghum or Dari, also called "dura" and "Guinea millet." Owing to the high price of rice and maize, used as substitutes in brewing, and their present use, particularly for bread-making, it was suggested that Sorghum, which is cheaper, might be used in their stead. It is offered either as a meal or as whole grains; sometimes the grain is not decorticated and the yield in extract is then low about (10%).

The moisture content is from 12 to 15%. If too damp the Sorghum quickly goes bad turning sour and takes on an abnormal odour.

The yield in extract –64 to 70% is much below that given by maize, and especially by rice. In maize it depends on the extent of cleaning. Sorghum is delivered at the brewery without any special

treatment, but it would be easy to treat it in such a way as to remove part of the fats, which amount to 3 to 5% i. e., little less than those contained in crude maize. In Sorghum, as in maize these substances hinder the solution of the starch, thus accounting for a yield in exract below that which might be expected from the proportion of starch it contains (62 to 66%).

Sorghum fat also has the disadvantage of going rancid fairly quickly. Care must, therefore, be taken to store the grain in good condition and to use nothing with any rancid smell, as this might be transmitted to the beer.

Most of the samples contain a fairly large amount of total protein; this would account for the rapid spoiling of over-damp grain. Most of this protein, however, is insoluble and, as in all crude grades does not pass into the must and can have no influence on the keeping quality of the beer.

Sorghum is used in the same way as maize and rice i. e., it is added during the first mashing or to the copper. It may be advantageously used in brewing. The only difficultly is that of filtering, which is attributed to the use of excessively fine meal, which must not exceed a certain degree of fineness. From the point of view of filtering, treatment during boiling is advantageous as it allows all the starch to be dissolved by dividing the cellulose of the grain into the smallest possible particles."

From the International Review of the Science and Practice of Agriculture Year IX No. 5 of May 1918 Page 613.

C. T.

Butter fat content and age of cow.

In the study of factors for production it is very important to know if there is any correlation between age and butter fat in cows. The mean yearly fat test of 86 cows in the Delaware College herd has been studied in relation to age of the cows. Some of the cows have more than one record, and the number of records studied is

104. The coefficient of correlation calculated is barely three times the probable error and so cannot be considered at all significant. The only deduction that follows from the studies is that the butter fat test of the milk of a cow is not at all influenced by the age of the cow. This being the case the study of the hereditary behaviour of the percentage of butter-fat in the milk of cows of different ages does not in any way affect the accuracy of the results.

(Journal of Heredity, Vol. IX No. 6). K. R.

The four O'Clock (Mirabilis Jalapa).

The cultivation of this plant is recommended for the following reasons:—

The seeds contain starch of vey good quality which may be used for making bread, paste, biscuits, etc. They may also be subjected to fermentation as they contain sugar.

The stamens, pistil and perianth give a fast purplish colour which dyes silk.

The flowers open in the evenings and give off a smell in the night which is said to keep away or stupefy mosquitoes thus making them inoffensive. This may be very advantageous in malarial districts.

(Agricultural News). "Leucas."

Students' corner.

The Wood's Cup Tennis Tournament.

The finals of the above tournament came off on the 19th evening when T. G. Muthuswami of Class IV, the winner of the cup for the last two years met K. S. Bhandary of Class II. Mr. Wood acted as referee. The match was very lively and well contested. Bhandary played a good game and was particularly strong in his service. In the

first set each was taking his service game and the score went up to 8 all. By a chance Bhandary losing his service game, lost the next game and the set as well. In the 2nd set Bhandary did not put such a tough fight and Muthuswami with his usual steady game won the set. The following are the scores :—

10—8 and 6—4.

After the match was over at the request of Mr. Wood, Mrs. McRae kindly presented the cup and the Championship medal to Muthuswami and the runner-up medal to Bhandary.

This is the third year in which Muthuswami wins the cup and hence it becomes his own and as Mr. Wood humourously put it he has got to thank the War for it as otherwise he should have left the College in December and not had the opportunity of playing this year's tournament. But we are glad to announce that Muthuswami has promised to follow the precedent of Mr. Dwarakanath by giving back the cup to the College.

Parlakimedi Cup.

We are glad to announce that K. K. Subrahmanyam of Class III has been awarded the Parlakimedi Cup for the best all round sportsman in the College for the year 1918—19, the next best being A. V. Babi of Class I.

Games :—Football.

A friendly match was played between the College and the Coimbatore Young Men's United eleven on our grounds in which we got defeated by one goal. There were two other matches with the Madras Forest College one on our grounds and another on their grounds. The first one was a draw and in the latter we won by four goals to two.

Hockey.

There was only one match this month with the Stane's European High School, played on their grounds. The game was a draw, the score being 3 all.

Students' Literary Club.

The Students' Club most thankfully accepts the recent instalment of present of books so kindly made by Dr. Barber. This is one of the several occasions where we are the recipients of such gifts from the Doctor. We members are at a loss how to express our gratitude to him except by assuring him that we try our best to derive the full benefit from the store of knowledge which his interesting and useful books offer us. Once more thanking him, on behalf of the club.

General Secretary.

Departmental Notes.

Appointments :—

During the training of Mr. P. H. Rama Reddi Probationary Deputy Director of Agriculture, for one month as Farm Manager, Central Farm, Coimbatore, Mr. S. Subrahmanya Ayyar Farm Manager, Central Farm, is transferred to the VII circle for district work under the Deputy Director of Agriculture, with headquarters at Coimbatore.

Mr. S. Ramaswami Pillai, Acting Assistant Director of Agriculture, to be Assistant Director of Agriculture and continue in charge of the II and III circles Bellary.

Mr. C. Narayana Ayyar, Assistant Director of Agriculture, on relief from the IV Circle, to be Special Assistant Director, VII Circle, Coimbatore.

Mr. R. Chokalingam Pillai, Farm Manager, is confirmed with retrospective effect from the date of appointment as such.

Mr. A. S. Nilakanta Ayyar, Assistant Agricultural Demonstrator is confirmed in his post with retrospective effect from the date of appointment as such.

Leave :—

Mr. K. T. Bhandary, Teaching Assistant privilege leave for one month from 5-4-19.

Mr. T. V. Narayana Rao, Farm Office Manager, privilege leave for 6 weeks from 7-4-19.

Mr. K. Raghavachari, Teaching Assistant, privilege leave for 2 months from 15-5-19.

Mr. S. Viravaradha Raju, Assistant Farm Manager, privilege leave for one month from 26-4-19.

Mr. L. S. Natesayyar, Assistant Farm Manager, privilege leave for one month from 5-5-19.

Mr. K. Gopalakrishna Raju, Teaching Assistant privilege leave for 38 days from 23-4-19.

Mr. Govinda Pai, Assistant Farm Manager, leave on loss of pay for 17 days from 16-2-19.

Mr. G. Sitharama Sastri, Assistant Farm Manager, sick leave from 21-2-19 to 4-3-19.

An Announcement.

We invite the attention of our readers to the annoucement appearing elsewhere in this issue regarding "The Godavary Prize essay." The subject is of very great interest and hope there will be a keen competition for it.

(Ed.)

THE JOURNAL

OF

The Madras Agricultural Students' Union.

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Editorial Notes.

The Certificates of Proficiency were presented to the successful students on the evening of the 11th instant by the Director of Agriculture. Out of a class of 30, only 21 got through and the Principal attributed this result to the low standard this year. Agricultural Colleges as a rule do not seem to attract the best talent of the country and our college is no exception to it. Agriculture is not a lucrative profession as Medicine or Law. Distaste to manual labour keeps some of the boys away. Among the agricultural classes themselves, the parents deride at their sons taking a course in Agriculture, as it appears to them so novel that a practical art like agriculture should be taught by means of books. There remain, therefore, a third set—the indifferent from both the sections,—who finding every other door shut against them, turn to the Agricultural Colleges in which they find a comfortable asylum for a period. We are of opinion that this question requires investigation.

The year's Convocations.

The presentation of the Diplomas to the Licentiates in Agriculture was rather a tame affair. There was no special function and the certificates were handed over in the Principal's room. We are indeed very glad that all the students passed, and it is specially gratifying because this course was broken up on two different occasions with regard to the food campaign work in the Tanjore Delta. The demand for such men is increasing rapidly and we hope that, as the prospects brighten, a better type of students will join the College. We print elsewhere in extenso the addresses by the Principal and the Director of Agriculture at the presentation ceremony.

The Late Mr. K. Sankara Ayyar.

We record with deep regret the demise of M. R. Ry., K. Sankara Ayyar, which took place suddenly on the 2nd March at Anamalai, while on duty. Mr. Sankara Ayyar belonged to the Saidapet College days and took his Diploma in Agriculture in 1905. Prior to his joining the College, like many others, he was employed in the Revenue Department as a clerk in the Taluq Office. After completing his Agricultural training, he was employed in this department and was posted to Koilpatti Farm as Assistant Farm Manager. Later he did very useful work as a district officer in cotton improvement. Subsequently he was posted as Farm Manager at Manganallur and from there was transferred to district work in connection with the introduction of green manures in the district of Madura. Coming back to Manganallur he remained there for a little while, attending to district work; he was thence transferred to Coimbatore on special duty on the improvement of Cambodia cotton; while doing very good work here, he died at the early age of 37, leaving his wife and family and a large circle of friends to bemoan his loss. Ever courteous and conciliatory in manner, Mr. Sankara Ayyar always proved an admirable companion, and those who knew him intimately since his college days can never forget his winning smile. We take this opportunity to convey to the family our heartfelt condolence.

Departures.

During the month we had great changes in the *personale* of the estate. First Dr. Barber, the Government Sugarcane expert, who has been associated with our Department for over twenty years left on the 7th April on six months combined leave, we understand, preliminary, to retirement. A short sketch of his career will be found elsewhere in this issue. Our Principal, Mr. R. Cecil Wood, who has been with us from the year 1909 left to act as Director of Agriculture, Madras. The estate will sadly miss his ever-active and genial personality. We do not remember ever approaching him in vain for help in connection with our journal or the Union. We have, however, the consolation that he has been lifted to a higher sphere of usefulness. Mr. Parnell, the Government Economic Botanist left on a year's leave on the 29th April. There were many parties and social gatherings arranged in honour of these departures.

Address by the Principal at the Presentation of Certificates of Proficiency.

MR. WOOD, LADIES AND GENTLEMEN,

Having taken over the office of Principal only a fortnight ago no credit can accrue to me for the measure of success that has been achieved during the session that is now coming to a close. All must go to Mr. Wood who has so recently vacated the Principalship in order to occupy the highest post in our Agricultural Department, viz., that of Director of Agriculture, in place of Mr. Stuart who has gone to Pusa to be Agricultural Adviser to the Government of India. We are very pleased to have Mr. Wood with us today and on behalf of the staff and students I offer him a sincere welcome and our heartiest congratulations.

As I am but gathering up the threads of office my speech will be as brief as my tenure has been short, but as Mr. Wood is going to address you afterwards he will make good my omissions.

To the men who have completed the short course the Certificates of Proficiency in Agriculture will be presented. During their two years they have done on the whole well but not brilliantly and the final examination has shown a disappointing standard, 21 students have gained the certificate out of 29 who appeared for the examination. This is not nearly so good as last year's record.

As the Diploma examinations are actually in progress I shall not refer to that class except to tell its members to keep cheerful and hope for the best. The students of this class were for a short time associated with a part of the work of the Department and this has entailed a considerable lengthening of the course.

This is the first complete year in which the tutorial system has been tried in the College. All the students are divided into groups of about 16 or 17 and each group is attached to a tutor who is a member of the teaching staff. It can be claimed even now that it has been successful in bringing the students and teachers into closer relation-

ship. This has enabled each to understand better and to appreciate the other's point of view to their mutual advantage. This develops greater confidence in the students and more sympathy in the teachers.

The mycology course was held during the second last term and the examination came immediately afterwards and I am sure the students were glad to get it over before the main rush of examinations.

(1) The Hockey Cup that adorned this table last year has been lost to the Reserve Police, our team this year only getting into the semifinals.

(2) The foot-ball team got into the finals of the Abraham Memorial Cup.

(3) Mr. Wood's Cup for Tennis singles was won by T. G. Muthuswami for the third time in succession.

(4) The Parlakimedi Cup, presented by the Rajah Sahib of Parlakimedi, for the best all round sportsman in College during the year was won by K. K. Subbramania Ayyar, a third year student.

(5) The Tug of war Shield presented by the Rajah of Ramnad and the Relay Race Shield presented by the Zamindar of Chunampet for competition among teams from the wards of the several tutors were both won this year by Mr. Ananda Rao's wards. I congratulate them and him.

The health of the students was uniformly good except during the influenza epidemic. The students are indebted to Mr. T. S. Venkataraman, the Warden, for the help given during the epidemic and also for attending to the general comfort of the students throughout the year. The appointment of Mr. P. A. Ragunathaswami Ayyangar as deputy warden will help to relieve the warden of some of his multifarious duties.

I now bid farewell and wish success to the students who are leaving the College for good. The day of departure from one's College is in its way a fateful day. One stage of life is over and another is about to begin. I hope that all of you are looking back with some

affection and pleasant memories on your days here and I know you are looking forward with hope and a few of you perhaps with some misgiving to days to come. To the man with misgiving I would say, do not despair. It is not always the over confident who finally make good. The success in life you all may achieve depends to a great extent on the use you make of your training here. Do not regard it as an end in itself. Consider it rather as an instrument put into your hands to be used with discretion and with increasing skill as your experience widens. Another small piece of advice I would give you. Whether you go out into the district to take private agricultural work or come into this department to do it, be loyal to your College. Remember that the extent of a man's love for his school or College is often an indication of the amount of good his tenure there has done him.

In conclusion I would say in whatever work you decide to take up, aim high—by that I mean keep a high standard of efficiency before you. There is a Chinese proverb which says "It is better to be a crystal and be broken than to be perfect as a tile upon the house-tops." Without depreciating the useful and necessary tile I would say try to be crystals unbroken.

The address by the Director of Agriculture.

MR. MCRAE, LADIES AND GENTLEMEN,

Inasmuch as my tenure of office of Director can be counted almost by hours you will not expect, and I can assure you you will not obtain, from me any announcement of new policy or any striking declaration of reform. Apart altogether from the fact that my work here has not kept me fully conversant with the many lines of activity of the Department and my natural diffidence to speak about that about which I do not know, it is perhaps more true now than it has been in the history of this Department to say that a cautious policy is the one which is to be recommended. A cautious policy does not, however, imply a lifeless policy. If there is one thing more certain than another at the present time, it is that the man who keeps in the old groove, or the company or the business which is afraid to take up new ideas

is the man or is the company which is going to drop behind in the struggle. 'Ideas! give us ideas!' is the cry heard on every side: new ideas to meet the new conditions; new ideas to combat the new difficulties which have been brought about by the recent great war. We in India have grumbled much, and at times possibly with justification at the inconvenience amounting at times to hardships which the war has brought on us. Though it has affected all classes of the community yet I can assure you that what we had had to suffer has been very little compared to the misery and suffering which has been brought on other nations. The first is a matter of congratulation but the thinking man will perceive that we proceed with the changes that have been brought about; and the change which I think affects us most is the great importance of the production of food grains and the very serious consequence which may come about by an interruption in means of transport which has hitherto been considered perfectly safe. The Agriculturist in all countries has come into his own and is recognised as he never was before as being a person of considerable importance. Not only this, but owing to the universal increase in prices his position has become much more favourable from a financial point of view. It is this particular aspect of the case to which I would invite your attention for a short while this afternoon. The difference between the professional classes at fixed incomes and those which enjoy an income derived from business of one kind or another is becoming more and more in favour of the latter. I speak as a representative of the former class as I suppose are most of my audience. I have in my family the traditions of that class which have led representatives to take up service, naval, military or civil, or educational work of some sort at a fixed income. There has always been an attraction in such a life as affording opportunities for the cultivation of a refined taste. The work is regular and affords leisure for self-culture. This is the class which has been most affected by the changes which I have so briefly outlined and the modern conditions are proving too hard for them. They must, as so many men have been compelled to do, in the last few years, adopt a different attitude. They must leave their desks and come out into the world. That world in the case of South India is largely an agricultural one, although in

other parts of India industrial opportunities are of considerable frequency. Agriculture to day offers a better field for considerable ventures than ever before. The prospect is indeed encouraging and there is room for all. Though again, as I have stated before,—it is the man with ideas, the man who can produce a policy which should be cautious without being lifeless, that will reap the greatest harvest. I cannot close without a word of reference to the various changes that will affect the College. There is no use disguising the fact that at present Agriculture as a profession is looked upon with disfavour by the young man of this country. It is not my place here today to take up your time by discussing the reason of this state of things. It seems almost incredible that after 10 years' steady work a single Agricultural College should still prove more than enough for the whole of Madras. That things will change, and change for the better, there can be little doubt. Like Mr. Montagu I have faith and can look forward to a time when this College in the development of which it has been my lot to be so largely interested will be the forerunner of other Colleges.

Dr. C. A. Barber, C. I. E.

In Dr. C. A. Barber who left Coimbatore for England on the 7th April on six months combined leave, we understand—preliminary to retirement—the Indian Agricultural service is losing one of the oldest and most efficient of its members.

When we first heard of Dr. Barber, it was as the officer in charge of three of the most important and successful farms in our Presidency, and we were led to wonder what a purely systematic Botanist—for this was his designation at the time—can have to do with farms where definite economic and agricultural experiments were in progress. The explanation came immediately afterwards, when we came to recognize in Dr. Barber, a highly trained scientific mind, a mind which can operate on any problem presented to it, however complex or to whatever branch of science it may belong. Dr. Barber's career is a striking example of the usefulness of such a training.

Coming out to India in 1898, on a 5 years appointment as a pure systematic botanist, he set to himself the arduous task of exploring the heavy forests of this Presidency, where the black monkey sometimes formed his sole food. The Collections then made resulted in a large number of plants being named after him and we learn that before the Madras Flora is completed many more are likely to be thus named.

But work of a more important nature was soon to occupy his attention. In 1899 the attention of Government was directed to the prevalence of disease among sugarcanes in the Godaveri Delta, and Dr. Barber was asked to investigate it with a view to introduce disease-resistant varieties into the District. The work was a complete success and the old local canes have now practically disappeared. There were days when the Government Botanist represented a good bit of the activities of the Agricultural Department as a whole and he cannot help thinking that this initial success contributed in some measure to the subsequent liberal attitude of the Madras Government towards development in this Presidency. The diseases of Pepper and Groundnut were next taken up and farms opened at Taliparamba and Palur for their study.

Along with Mr. Benson he was responsible for the selection of site for the present Agricultural College at Coimbatore and his early notes on this subject were published in April 1918 issue of this Journal. All the laboratories at the college except those in chemistry were designed by him, and in this work, his knowledge of the different laboraties in the United Kingdom gained during the period of his study leave in 1908, stood him in good stead.

In the year 1908 he returned to coimbatore after a couple of years furlough and was in charge of the Botanical, Mycological and Entomological sections at the college. He then laid out the Botanic Garden and started some preliminary breeding work in Cotton and Gogu. The conclusions on cotton then arrived at have since been made the basis of some of the recommendations of the Cotton Commission which sat at Madras in the year 1918. From a systematic botanist he was thus gradually drifting to Breeding work and

in the year 1912 he was appointed the Government Sugarcane Expert for all India but with headquarters at Coimbatore. This work, we understand is full of future potentialities and will perhaps be one of the most valuable contributions by Dr. Barber to the developement of agriculture in this Presidency.

This earned for him the much coveted title of C. I. E. in 1919.

Anyone coming in contact with him was struck with his system, accuracy and thoroughness and everything about him was orderly. This enabled him to get through an enormous amount of work with ease. He was a good and swift penman, always clear and direct, an artist of a very high order—he won a bronze medal and prizes in the Madras Arts Exhibition—an expert photographer and a good all—round athlete.

He has raised for himself a monument in the pages of the Annals of Botany and in the publications of the Agricultural Department in India. Some of these won for him continental fame and brought him the title of Doctor. His name will long be remembered in the Coimbatore College.

Mrs. Barber was a very kind and affable Lady and did her best to get into touch with the Indian staff at the College and their families. She took a very keen interest in the Coimbatore branch of the National Indian Assosiation of which she was a member and was of a religious and charitable turn of mind.

We wish them a *bon voyage* and good cheer at home and trust that their interest in India and things Indian will continue even after they are permanently settled in their own home.

Scraps by the wayside *en route* to Mesopotamia.

Madura is muggy at its best. The daily telegram announcing the current price of cotton at Tuticorin helps to relieve the monotony of a drowsy day. To-day's wire is much earlier than its wont. I open it with additional curiosity; and how my heart does leap to

find that its contents concern cotton in that country of ill-repute where nothing but the date-palm grows! It takes me less time than it does to tell, to accept an invitation details of which will follow, so says the telegram. In spite of the Thermometer (wet and dry) I think hard and decide on my programme. To take the King's shilling had become with me an obsession, but to be offered at the same time work than which none other could be more congenial was beyond my most expectant dreams. So off I go.

Having kept in close touch with the very excellent work that had been done by some of the Provincial Departments in introducing and acclimatising American cottons I decided on a lightning tour to North India where I could enquire in person into the factories that have contributed towards the success, and otherwise, of their pioneer work.

I spend a few days in the Bombay Presidency and find that excluding Sind—but little work has been done of late in the systematic breeding and wholesale distribution of staple cotton.

Needless to say, I give Central India but scant attention—the very word 'neglectum' spells anathema to a breeder of staple cotton! The days here are very hot, the nights sleepless and restless, and the brain becomes misty. A fellow passenger, R. A. M. C., gets interested and diagnoses my ailment as an aberrant variation of tropical neurasthenia due to long staple on the brain. Remedy,—to expedite my egress from the home of *pulichai!*

In the United Provinces I find some very promising unit-strain acclimatised American Cottons. So also in the Punjab I take note of those which appear to be worthy of experiment in the land of the date-palms. I was unfortunately unable to visit Sind where the conditions of climate and soil are more analogous to those obtaining in Mesopotamia than any other tract in India.

While in the United Provinces I had the good fortune to meet the members of the Indian Cotton Commission, then in session. The experience of two of the members in regard to Egypt was of special

interest aud very helpful. It was one of these gentlemen that first called my attention to the "Text book of Egyptian Agriculture" It is a most useful reference book and I feel certain that there is ample room in the library of every Coimbatore student, past and present, for a similar book on Indian Agriculture. Mr. Wood's little pocket-book, based on Mc Connell's masterpiece, serves many a useful purpose; but it naturally lacks detail. A proof of its utility, if any is needed, is that I have lost both my private copies since my arrival in this country. Up to the time of this discovery I had taken it that none but gentlemen had visited my quarters; and now I hear that the second edition is sold out—Just my luck!

But I am 'diwarting' as Sam Weller would say. A few days on a troop ship and I sight land. All one sees at first is a dim outline of hills bordering the Persian Coast. The nearer approach to the Bahrein Straits precipitous cliffs stand out prominently, and a few rocky islands skirt the coast. At this season both the Persian and the Arabian Coast appear to be absolutely bare of vegetation, and to a farmer—uninviting. The coast on both sides is visible all the way up to the gulf. On approaching its northern end the vista changes appreciably. It gains in interest. The date palm, so reminiscent of its sister palm of the Malabar coast extends inland as far as the eye can reach. (From the upper deck of a troop ship!) Closer inspection on foot at a later date reveals the fact that the date zone is very limited in its distribution. It skirts both banks of the Shatt-el-Arab (Tigris cum Euphrates) only for a few hundred yards inland. Here, we are on the threshold of Mesopotamia proper. We have just missed what is commonly known as the "date season," and the trees are bare of fruit. The monotony of the graceful palm is broken by occasional huts and some brick buildings on either bank, chief amongst which is Mohammerah with its Sheikh—our trusted and valued ally—who holds suzerainty over a larger population in the hinterland to the East. Obstacles emerging a few feet above the water in mid-stream hereabouts help to remind us that the war has been fought here in real earnest. The Turks probably lost more than they gained by sacrificing their treasured and meagre

river craft in the belief that they would bar the progress of our advancing armies. The date gardens, between Fas at the head of the Gulf and Kurna where the two rivers meet, witnessed what are considered to be the most sanguinary battles fought in this country. At the time of writing this locality is peaceful, prosperous, and happy,—more so, perhaps, than at any period within the memory of living man.

The climate of Irak is of all subjects the one most discussed both in, and out of officers' messes. Griffins are warned to beware of the perils of a 'date season.' Those under canvas, who have been so fortunate as to survive one such, implore that they may see Blighty, before they see another such.

The eloquent authority when asked to describe the climate of the country did so succinctly by declaring that 'Mesopotamia is a country where the date-palm grows; the date-palm flourishes best with its feet in ice and its head in heat, now it may so happen that the tract under review does occasionally enjoy the extremes of temperature typified by those obtaining in the Frigid Zone and the 'nether regions' respectively. But the man who declares that either of these extremes is unbearable under the amenities of modern civilised life is a gross perverter of truth. (Pardon the euphemism!) The climate of the country has made for itself a no mean reputation, a reputation based on the reports of those gallant warriors who fought in the 1915—16 compaign under conditions which were all but inconceivable. To live under canvas, and single—fly tents at that, with the thermometer above 120° in the shade, is a very different matter from reclining under an electric fan during the heat of the day in the basement of a brick building! But there, this is an endless topic, and I shall leave further observations for a later edition of the Journal.

Roger Thomas.

News and Notes.

Weed as Fodder. Weeds are undoubtedly harmful to crops, but when they persist in spite of the best methods of eradication

adopted or are confined to waste lands and bunds there is nothing to prevent their being used for different purposes e. g. medicine, fibre, fodder, manure etc. With a view to use them as fodder the composition of six weeds was investigated in Germany about the year 1915 with good results. Three of these occur in South India and are described below. It is stated that all of them proved good as green fodder especially to dairy cows and not the slightest harm resulted therefrom. In the fresh condition their feeding value was less than that of lucerne but it was higher in the dry state. It is suggested that the weeds should be cut before the seeding stage and a little above ground so as to avoid the inclusion of mud and stones.

1. Convolvulus arvensis, L. (Field Bindweed) convolvulus A beautiful but very harmful weed on all soils especially black cotton. Stem slender, twining. Rootstock creeping extensively underground. Leaves arrowshaped. Flowers whitish pink. The weed climbs on crops and strangles and pulls them down and hampers harvesting operations. It is well known in the Central Farm as dominating F. No. 19-20 and has also been noticed at Hagari. According to the above experiment this had the highest feeding value.

2. Chenopodium album, L. (Goosefoot, Fat Hen) Chenopodium Erect annual 1—3 ft. high somewhat grey or light green in colour. Flowers greenish and inconspicuous in spiked clusters at the end of branches and in axils of leaves. Sometimes abundant in irrigated loamy soils (Fs. Nos. 42,54,50). It appears to be an exacting weed and grows very rapidly.

3. Sonchus oleraceous, L. (Annual Sow Thistle) Compositeae. Frequent in irrigated lands and in moist shady situations (Fs. Nos. 42,54,60 and in wet lands) It is an annual 1—3 ft. high characterised by milky juice. Stem smooth and grey. Leaves lobed and auricled. Flowers in heads white or yellow. Fruits with white crowns above by means of which they are spread by the wind.

It will be interesting to experiment on the other common weeds of S. India to ascertain their several valuable properties.

"Leucas."

B. Dwarakanath. We are glad to learn that Mr. B. Dwarakanath has been appointed Lecturer in Chemistry and Physics in the Agra Medical School in addition to his own duties as Assistant to the Chemical Examiner and draws a special allowance of Rs. 100 for this work. His lecturing work, we are glad to note, is being very much appreciated by the students. This school is over 800 strong and is the largest in India and has a large number of military students as well. Sometime back it seems he had to teach the students of the Women's school as well but this has since been separated from the main school.

Dewan Bahadur R. Raghunatha Rao's Prize. Sometime back M. R. Ry., Rai Sahib A. Sethurama Ayyar, of Nidamangalam offered a sum of Rs. 500 for the purpose of providing an annual prize in the name of the late Dewan Bahadur Raghunatha Rao at the Agricultural College. The Govt. have accepted the offer with thanks and sanctioned a grant of Rs. 250 towards the endowment. The annual interest accruing from the total amount will be utilized for giving a prize which will be called "The Raghunatha Rao's Prize." The prize shall be awarded each year to the student who has shown the greatest diligence in the practical classes during the Certificate of Proficiency course. We expect the rules will be published in detail in the College Calendar soon.

We, on behalf of the students thank Mr. Sethurama Ayyar for his generous endowment and only wish that many more will follow his example.

Extracts.

From the 12th to the 16th January, I studied the cultivation of Chekrakeli plantains planted in what is called 'the company method' which is nothing but close planting (10 links apart). Very young suckers are selected and a thousand go to the acre against 200 pairs of full grown suckers planted in the usual method. In the new system side shoots are removed from time to time as they appear till bunching time. The garden is heavily manured with castor cake at 10 to 15 bags per acre and the land is kept moist by frequent irrigations. By this means bunching takes place almost at the same time and the field is cleared in about 12 or 14 months as if it were an annual crop like sugar-cane. This new method was introduced by me in 1919 in my own garden and it is now gratifying to see that over 2,000 acres are now covered with these new gardens in a radius of 4 or 5 miles with the special variety of Chekrakeli. In this new system the whole produce is realised just at one and the same time while in the usual country method the income is dissipated throughout the whole year. Further there is a great saving in watching expenses as this crop requires careful watching for one or two months only just before the bunches begin to ripen. Chekrakeli (lit. sugar-plantain) is a very superior variety the fruit of which fetches nearly Rs. 3 per hundred when well grown. I made arrangements to take 400 suckers of this variety for planting on the Samalkota Farm.

Monthly report for January 1919 of the Dy. Director of Agriculture, 1st Circle.

Cement as Rat poison. The way in which cement is used as a poison for rats is as follows:—Take a roasted or boiled potato; crush it and mix with the cement—about one third the mixture must be cement—roll the mixture into balls, and place them in the field.

(Jamaica Agricultural Journal, August 1918).

K. K. Rao.

Fireproofing paper. An English patent has been taken out by T. J. I. Craig and others of Manchester, on a method of fireproofiing paper. According to an abstract in the *Journal of the Society of Chemical Industry* on the process of rendering meterials non-inflammable by means of Sodium Aluminium Carbonate, those materials in which the proofing agent cannot conveniently be precipitated *in situ* may be treated by mixing a coating with a preparation of the double Carbonate.

(From the Mysore Economic Journal.)

W. R.

Co-operative sale of wool in Canada. The Canadian Government is vigorously pushing forward the co-operative sale of wool. The results achieved are that the middleman has been eliminated and the wool farmers are getting remunerative prices for their wool which has given an impetus to its production. The scientific grading of wool by experts has further enabled numerous improvements to be introduced into the sheep farming industry, in accordance with the principles of science, and into the method of shearing, preserving and packing fleece in order to obviate its deterioration in transit. An account of this is published in the February number of the *International Review of Agricultural Economics*, which may be profitably read by all those who are interested in, and connected with the co-operative sale of cotton in India.

(From the Madras Bulletin of co-operation.)

W. R.

Observations on the relation of lint length to rainfall in cotton :— In West Indian Islands the rainfall is generally the main factor contributing to environmental differences. Detailed tabular statements have been prepared for two seasons showing the lint length of bolls maturing from dated flowers and the amount of daily rainfall. From the tabular statement two sets of bolls are compared for their lint length, one which has had only 2·5 inches of rain during its critical period of development and the other 8·98 inches. The lint of the former was only 49 m. m. in length while that of the latter 57 m. m. From the tabular statement it would also seem that the 15th to 21st days after flower opening to be the most important part of the critical period of boll development as far as lint length is concerned. A graph giving total rainfall of the first 24 days of the life of the boll and the lint length ascertained when the bolls opened shows there is a definite appearance of correlation between the rainfall of that period and the ultimate lint length attained.

The results indicate that in the West Indian Islands the length to which cotton lint will attain in any season is dependent on the water supply of the plant at the critical period of the development of the boll. It appears that great caution should be exercised in making comparisons of the length of cotton lint grown in different seasons or in different places, the rainfall of which is in no way comparable.

(West Indian Bulletin Vol. XVII No. 2).

K. R.

Students' corner.

The Diploma and the Proficiency Certificate examinations were held this month.

Messrs. G. R. Hilson, D. Balakrishna Murti and G. Naraya Murti were the outside examiners for the Proficiency certificate.

The following is the list of students who obtained the proficienly certificate.

1. V. Achutharamayya.
2. C. Appadurai Pillai.
3. A. Chidambaram Pillai.
4. S. Christian Bhakta.
5. Jagannatha Rao.
6. K. Krishna Menon.
7. B. S. Narasihma Ayyar.
8. M. Narayana Ayyar.
9. P. Padmanabha Ayyar.
10. N. Ramadas Pantulu.
11. K. L. Ramakrishna Rao.
12. V. M. Ramunni Kidavu.
13. P. V. Samba Siva Rao Nayudu.
14. K. C. Sankappa Bhandary.
15. M. P. Sankaran Nambiar.
16. M. Sanyasi Raju Pantulu.
17. P. S. Srinivasa Ayyar.
18. M. R. Srinivasa Pariksha.
19. N. Subrahmanya Ayyar.
20. V. K. Subrahmanya Mudaliar.
21. K. Sathyanarayana Gupta.

S. Christian Bhakta was awarded the "Clogston Prize."

Diploma Examinations :—

The following were the outside examiners for the Diploma Examinations.

Agriculture. Mr. K. Yegnanarayana Ayyar, Deputy Director of Agriculture, Mysore.

Botany. Mr Ajrekar, Acting Economic Botanist, Bombay.

Chemistry. Mr. Padmanabha Ayyar, Acting Agricultural Chemist, Nagpur.

Veterinary. Mr. Aitchison, Principal, Madras Veterinary College.

Agricultural Engineering. Mr. Newland.

All the twelve students who sat for the examination passed two being placed in the first class.

The following is the list of students who secured the Diploma.

1. P. Abhishekanatham Pillai.
*2. M. Ananthan.
*3. D. P. Chellam Ayyangar.
4. K. Avadinaickam Pillai.
5. M. P. Gowrisankara Ayyar.
6. P. Kesavanunni Nambiar.
7. M. Krishna Rao Nayudu.
8. B. Mangesha Rao.
9. T. G. Muthuswami Ayyar.
16. S. Ramachandra Ayyar.
11. S. R. Srinivasa Ayyangar.
12. V. Subbannachar.

*Passed in the First class.

M. Ananthan—winner of Robertson prize.

D. P. Chellam Ayyangar—winner of Kees prize.

STUDENTS' CLUB.

There was a social gathering on the 7th evening when all the staff were invited. Several of the staff could not attend the function as there was another at the college at the sametime being a send off to Dr. and Mrs. Barber.

The College was closed on the 11th. The third year course students were kept on till the 30th to make up for time lost in doing Food campaign work in the Tanjore Delta.

Departmental Notes.

Appointments :—

1. Mr. T. Budhavidheya Rao, Farm Manager on return from deputation to be in charge of Anakapalli Agricultural Station. (To join on relief).

2. Mr. K. Raghavachari, 2nd Teaching Assistant, on return from leave to be in charge of Hagari Agricultural Station.

3. Mr. T. V. Rajagopalachari, Farm Manager, Hagari to be 1st. Teaching Assistant, Agricultural College. (To join at an early date).

4. Mr. M. K. Nambiyar, Farm Manager, Taliparamba to be in charge of Central Farm, Coimbatore. (To join forwith and relieve Mr. S. Subrahmanya Ayyar).

5. Mr. S. Dharmalinga Mudaliar, Farm Manager from the V and VII Circles to be in charge of Paddy Breeding Station. (To join at an early date).

6. Mr. M. Viraraghava Rao, Farm Manager, Samalkota, to report to the Deputy Director of Agriculture, Live Stock for duty.

7. Mr. S. Vedantham Ayyangar, from Agricultural College Dairy to District work, Madura. (To join on relief).

8. Mr. S. Narayaniah, Farm Manager, Hagari to Cotton Work, Coimbatore, under the Deputy Director of Agriculture V and VII Circles. (To join on relief).

9. Mr. T. A. Krishna Ayyar, Assistant Agricultural Demonstrator from District work, Madura to Hagari Agricultural Station. (To join at an early date).

10. Mr. D. Panakala Rao, Assistant Farm Manager, Sugarcane Breeding Station to report to the Deputy Director of Agriculture I Circle for duty.

11. Mr. K. Ramanujachari, Sub Assistant, Paddy Breeding Station to report to the Deputy Director of Agriculture, Live Stock for duty. (To proceed on relief).

12. Mr. K. S. Ramana Rai, Assistant Farm Manager, is confirmed with retrospective effect from the date of his appointment viz., 7-11-1917.

Leave :—

1. Mr. S. Sundararaman, Assistant in Mycology, privilege leave for 6 weeks from 5-5-19.

2. Mr. K. Cunnikrishna Menon, Farm Manager, privilege leave for one month from or after 1st June 1919.

3. Mr. R. Chokalingam Pillai, Farm Manager, privilege leave for one month from the 30th June 1919.

4. Mr. V. S. Narayanaswamy Ayyar, Assistant Agricultural Demonstrators privilege leave for two months from or after 15th May 1919.

5. Mr. K. Ramanatha Ayyar, Farm Manager, privilege leave for 25 days from or after 1st. May 1919.

6. Mr. G. Rangayya Nayudu, Assistant Farm Manager, Chintaladevi, privilege leave for one month from the date of relief.

7. Mr. P. M. Kesava Ayyar, Supervisor, Pumping and Boring Department, furlough for one month from or after 4th April 1919.

8. Mr. K. M. Jacob, Assistant Farm Manager, extention of leave on medical certificate for 2 months in continuation of the combined leave for 5 months and 18 days already granted to him.

9. Mr. V. Ramachandra Ayyar, Assistant Farm Manager, leave on loss of pay for 12 days from 30th March 1919 to 10th April 1919 (both days inclusive).

THE JOURNAL

OF

The Madras Agricultural Students' Union.

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Editorial Notes.

Arrivals.

We offer a very cordial welcome to Mr. and Mrs. Ballard who arrived at Coimbatore, on the 19th May. Mr. Ballard has been serving with the colours for over four years. We offer a similar welcome to Mr. Broadfoot who has been appointed in the Indian Agricultural Service and joined at Coimbatore for preliminary training on 28th May. It is to be hoped these officers will be able to send some contributions to our journal about their experiences which are bound to be interesting to our readers.

College Day.

The Secretary of the M. A. S. U. asks us to announce that the "College Day" this year will be between the 15th and 20th December instead of in July as hitherto. We welcome the change as July used to be a most uninteresting month for visitors to the College.

We publish elsewhere the first part of an address delivered at the University of Adelaide by Mr. Arthur J. Perkins, the Director of Agriculture, at Adelaide. We offer no apologies for publishing this address on "Training and Research illustrated from the Agricultural view point" as it will readily be conceded that the question of Agricultural Education has been before the public of this country for some time and the question has, apparently, not yet been settled to the satisfaction of all parties. We beg to open the pages of this journal for contributions on this subject.

Agricultural Education.

"The Second Mycological Conference."

The second mycological conference was held at the Imperial Agricultural Research Institute, Pusa, and was opened by Mr. J. MacKenna, M. A., I. C. S., the Agricultural Adviser to the Government of India. His opening address dealt lucidly with the real difficulties that confront both the ryot and the mycologist in that, owing to the lack of advancement of education in mycology, even among that section of the population which has had some scientific training, the desire for sending specimens for examination and advice arises very late, but, thanks to the earnestness displayed by the staff of the several Provincial Departments, knowledge of this kind is being gradually disseminated among cultivators.

Various subjects of extreme importance were discussed at the conference.

The work done in the study and suggestion of remedial measures for the control of the prominent fungus diseases in this country, was first considered province by province. Messrs. Kulkarni and Ajrekar related their experiences in the successful anti-smut campaign work on cholam and grape-vine mildew in Bombay. In Madras we have palmyra bud-rot disease, fruit-rot of areca-nuts

(Mahali disease of arecanuts), blast on paddy, smut on cholam, leaf-fall of Hevea rubber and others. Mr. McRae and Mr. Anstead gave an account of the work done by the Department in these diseases. Mr. Shrivastavai, the acting Economic Botanist of Central Provinces regretted the inability of his Department to undertake useful work of this kind owing to lack of trained subordinate staff. Bengal was not represented as the only expert mycologist, Mr. S. K. Basu, was made the Deputy Director of Agriculture and thus was lost to the Mycological Section. Punjab had none to speak for her, the sister North West Frontier Province was represented in the person of Mr. Robertson Brown, the enthusiastic Deputy Director of Agriculture. The Indian Tea Association was kind enough to send in its Scientific Officer, Mr. Tunstall, who helped in discussing problems connected with diseases affecting tea and the methods of control, in which Mr. Anstead took a prominent part.

The question of the creation of a Bureau of Mycology in England was next taken up for consideration and Mr. MacKenna was present throughout the discussion. Problems connected with the identification of several groups of fungi could not be tackled in India owing to the want of workers in systematic mycology. It was pointed out in the course of the discussion that such a Bureau was necessary and England was a suitable place owing to its peculiar position and its advantages of having eminent mycologists within reach.

As a consequent step to the attainment of the objects held in view, the subject of mycological education was next taken up. Madras led the way though with its present undermanned staff it could not do all that was possible. The syllabuses for instruction in the Provincial Agricultural Colleges were threshed out by the several teachers. The methods of instruction at Coimbatore through large diagrams and models illustrating the mode of attack and the growth of the fungi causing several diseases of crops, were much appreciated. The Conference resolved that the several Universities in India be addressed to create professorships in mycology for the study of this branch of science.

It is needless to state that the study of planters' crops has become one of urgent importance. The practical steps taken to combat several diseases were the outcome of the sympathetic attitude of the Director of Agriculure, Madras, Mr. G. A. D. Stuart who helped Messrs. Anstead and McRae in accepting their suggestions to give a simple course of instruction in the preventive methods, to nominees from the planters' estates, for about three months. The utility of the system of popularising and effectively attacking the diseases was endorsed by Dr. E. J. Butler who in his recent deputation to organize the Department of Mycology in the Federated Malay States, found similar methods very successful there.

Dr. Butler was kind enough to demonstrate certain most useful and practical tips with regard to laboratory methods which are not found in books. This forms one of the most important benefits one gets from a conference of workers. He also gave a special demonstration on the work he has been doing, chiefly on the "Ufra" disease of paddy in Bengal.

The importance of the association of the mycologist with the plant-breeder in securing disease-resistant and better-yielding strains of crops was emphasised by Dr. Butler. It was hoped that this question would be kept in view and form one of the important items of discussion at the next conference to be held in 1921.

This short note will not be complete without a word of congratulation to Captain Froilano DeMello whose paper on Medical Mycology formed a special feature of this conference.

S. Sundararaman.

"Training and Research illustrated from the Agricultural view points."

The claims of Higher Technical Education.

(An address delivered at the University of Adelaide by A. J. Perllns, the Director of Agriculture, Adelaide 1917).

I am rather inclined to think that in the popular view technical education or training does not cover as wide a ground as we are

claiming for it to-night; too often, its scope is supposed to be limited to the development of skill in the arts and crafts. And yet, on reflexion, we must all realise that all the manual skill in the world must, from the nation's point of view, remain comparatively barren unless directed along fruitful lines by the technically trained minds of organisers and contrivers. I have no wish to detract from the value of skill in the artisan; we cannot do without it; our welfare demands that it shall be developed to the highest pitch. By all means, therefore, and as a matter of course, let us provide ample means for the ready acquisition of a high degree of skill in the manual arts and crafts; this is one of the essential functions of technical education. But, if, as a race, we are to retain leadership in the pleasant arts of peace as in those of war, the minds of those who are to organise, to direct, to utilise this acquired national skill, will stand in need to an even greater degree of that type of training which alone leads to unquestioned supremacy. I am not here to suggest that the imparting of even this higher training should be confined to the Universities. And were it so, there are two dangers that I should fear the creation of a special "caste," on the one hand, highly undesirable in these democratic times; and on the other, some degree of supineness, the inevitable result of lack of competition and an unassailable position. Nor in educational and training matters am I an advocate of anarchism, since quacks and faddists are often more to be feared than formalists. I feel certain, however, that it is not in the interests of the public good that any individual or institution should feel unreasonably secure in his or its position. The Universities can and should do much towards directing the march of events; in the many instances they must take a hand at the wheel; in others it should be their influence that keeps the helmsmen on the right course. In final count, our ideal should be a nation free and efficient through all its rungs, from the top to the bottom of the ladder, and with helping hands at every rung; efficiency, the foundations of which reach down to the training of youths taken in the recruit stage—and this is technical education—and subsequently expanded and crystallised by the innate qualities of the race. And this efficiency—if, indeed, efficient—must lead to increased national production and wealth, greater general leisure, and a higher standard of general mental and moral culture.

Good General Education must precede Technical Training.

We shall probably agree that technical education, whatever its scope, embraces in final analysis special training having exclusive reference to the particular vocation in life which a young man or a young woman proposes following; essentially, therefore, it concerns adolescents, and not boys and girls. I am led to make this somewhat obvious remark in some quarters. I rather wish to emphasize the fact that general education and technical training are two things apart, and that it is not to the interest of the nation that they should coalesce. We are tolerably familiar with the complaint of the parent who bewails the fact that his 15 year old or 16 year old son has apparently learnt nothing at school which can be converted into immediate cash values. Such a mental attitude, which is by no means uncommon, overlooks the fact that school age is, or should be sacred to the interests of even greater import than immediate material advancement; or, as it has recently been very tersely put, that saleable knowledge is NOT education. I feel very strongly the need that our people should be adequately educated as well as technically efficient; and whilst making no pretence to despise the immense advantages which technical efficiency confers upon a nation, I incline to the belief that in the battle of life the moral factor in education is likely to stand us in even greater stead. I should state here that it is my intimate connection with one branch of technical education—agriculture—which gives to me a lively interest in this particular aspect of the question. It has become the fashion to urge—rather shallowly, as it appears to me—that education in country schools should proceed along AGRICULTURAL lines—whatever that may mean—and not on the lines hitherto pursued. As to the educational value of the teaching at present being imparted in our country schools, I do not feel called upon to offer any opinion; I may state, however, that if this teaching does not differ materially from that obtaining in the city schools, and if the latter is judged to meet the educational needs of the nation then equally adequate must be the teaching imparted in our country schools. In other words, I shall maintain that be he of the city or be he of the fields, every child in the land has the same native

rights to educational facilities; and that to brand him indelibly with specialism in his earliest years is nothing less than a grave infringement of these rights. Let us reflect: Is it just that the community should take upon itself to determine, for all time, what shall be the future careers of children of tender years? Much as I would like to see our countryside more densely populated, I would, in our days, deem criminal any system of education so manipulated as practically to tie down to glebe country bred lads, and deny them the opportunity to test in other directions the dreams and ambitions of adolescence.

In the end, perhaps, everything hinges on what we understand by education—a question outside the range of my present address,—and far too vast to be raised as a side issue. I shall, therefore, content myself with the statement that whatever else it may include, I always like to think of education as the key to the accumulated wisdom of the ages—and our common heritage. Nor, in the circumstances, can I conceive of a lower ideal of what education should be than an efficient device for building up money-earning machines, or, as has recently been stated by a learned Bishop, "a patented contrivance for getting on."

In summary, and with apologies for the diversion, I suggest that early education, which builds up the man, and upon which specialised technical education must ultimately rest, should be uniform in character throughout the State, and have no conscious connection with future careers; when the ages of 16 and 17 have been attained to, it will be time enough to divert faculties and ambitions along wage earning channels.

The Home Training of Agriculture.

Hitherto, in an endeavour—rather inadequate, perhaps—to picture the position as I see it, I have perforce dealt with generalities. I now propose coming to details from the point of view of that side of technical training which has hitherto represented my life's work.

And, at the outset, does the agriculturist really stand in need of technical training? It would seem not, in the estimate of many, who throw up familiar, unrelated tasks to make their fortune on the land.

It would seem not, too, if not only here, but throughout the world, the low percentages of those following rural occupations who have gone through a recognised course of technical training be taken into consideration. In matters of this kind, however, we should beware of unintentional exaggeration; and we shall have to ask ourselves whether, in fact, most agriculturists do not go through a course of training, and a rigorous one at that.

Let us, for the sake of simplicity, take the case of a market gardener blessed with a family of reasonable size. From their earliest days these children of his will have ample opportunity to familiarise themselves with the secrets of paternal success; and, later on, to the extent of their powers, they will generally be made to contribute to it. To claim for cases of this kind the ideal aims of technical training would, I am afraid, do violence to my personal convictions; too often they trench openly or subtly on the forbidden ground of child labour, and always they anticipate forcibly the future careers of those chiefly concerned. But these considerations apart and given good natural aptitude and inborn love of the work, it is difficult to imagine training in market gardening more thorough than the early, if involuntary, apprenticeship of the son of a successful market gardener; a providing, always, however, that he elected to follow his father's calling under conditions substantially similar to those with which long custom had rendered him familiar.

Now, from the market gardener the argument may be extended quite logically to the farmer, who lives in times of economic stagnation, and occupies a locality in which, out of the experience of generations, have crystallised more or less immutable farming practices. And, in summary, the gist of the matter is that so long as the son finds himself confronted with an environment essentially similar to that of his sire, the training imposed upon him should, as a rule, prove equal to the usual contingencies of life.

Hence, notwithstanding inherent inelasticity, it would involve a contradiction of terms not to recognise in the hereditary farmer true technical training. We shall have to recognise too, that whatever

we may do or say, the majority of the sons of agriculturists will continue to receive their training at home; and, in addition, if subsequently they elect to put into practice the traditional family methods at home, or in its immediate neighbourhood, we shall have to admit that from the revenue-earning point of view this training could not perhaps be bettered; and, after all, is not this the crowning justification of technical training?

Change of Environment Renders Technical Training Imperative.

These facts notwithstanding, I cannot be expected to subscribe to the view that the son of the successful farmer would not be the better, both as a farmer and as a man, could he but add to his hereditary equipment a regular agricultural college training. I could not conscientiously endorse this view, even if it were in my power to immobilise economic conditions, and to guarantee to father and son alike identity of physical environment. Fortunately, or unfortunately neither of these two conditions is within practical reach of any of us; and in this country, perhaps more than in most, their very elusiveness must in times ahead of us speak powerfully in favour of extra-paternal agricultural technical training.

I have stated that home training was often good, indeed excellent, under favourable conditions; but only so long as economic conditions remained tolerably stable. Economic stagnation we may imagine to obtain, even for lengthy periods of time, in some of the older established farming communities; and it is here that traditional farming shows up to best advantage. But even here, the cheapness and rapidity of modern means of transport, and the thoroughness with which the markets of the world are explored and exploited, are apt, at inconvenient movements, to disturb even the most sober of local markets; and it is then that the parochial farmer is faced with heavy loss because in some distant portion of the globe his particular speciality can be produced, conveyed, and sold on his own particular market at lower cost than he himself is able to do; and in such cases time-honoured paternal rules are apt to fail, and the lack of more liberal outside training is most acutely felt. But if this can be said of countries in which rural economic conditions are normally steady

infinitely truer is it of those others in which economic conditions can only be described as being in a state of constant flux. I need not add, perhaps, that in this I have particularly in view our own country and the conditions that surround us.

Local Rural Economic Position.

Our economic history, to the extent that it affects rural conditions, can be sketched in a few sentences. First came the pioneering days and the murk of unknown conditions and dreams were dreamt the while we groped after realities. Sheep, by displacing the native fauna over open plains and park-like grass lands, first showed us the way to economic independence. Nor was the plough altogether idle, though less venturesome in those early days; gradually, however, it pushed its way forward in the tracks of favourable rainfall conditions, and, in its eagerness, even overstepped them at times. And to-day we have almost reached the limits of exploration and nominal occupation of land adapted to agricultural operations; nay, it is possible that even in these days we are in some instances attempting against Nature to cultivate land which should never have been wrested from forest conditions. Hence, we may be said to be entering upon a new economic phase, involving radical changes in practice and mental attitude alike, and which it is to be feared the shedding of hidebound time-worn coats is likely to prove painful to many.

Hitherto we have specialised in large areas, hasty and relatively slipshod methods; we have reduced man-power to a minimum, and pinned our faith to machinery. And hitherto we have had no reason to quarrel with the results secured. It is to practices such as these that we owe our great pre-war prosperity. If, in the past, average individual crop yields have not been high, they have been secured at comparatively low cost; and low net returns per acre have been amply compensated for by the large size of individual holdings. In brief, without the aid of artificial tariffs, and frequently in the teeth of hostile ones, we have hitherto been able to dispose of the produce of our fields to our own advantage on the markets of the world; which fact is probably the justification of the methods and practices of the past.

It cannot, however, be disguised that from the point of view of agricultural economics, we have come to the parting of the ways, we stand now, as it were, between extensive and intensive farming; and unless we realise the fact, and welcome it, our agricultural interests, and with them the whole State are likely to be compromised. Indeed, in this direction there are several factors which are goading us forward overwhelmingly, if slowly; and the disbandment of soldiers, as soon as we shall have attained to glorious peace, will but lend added impetus to the pressure of economic events.

I have already stated that we have practically overtaken the supply of vacant land adapted to agricultural purposes; and the inference is that unless as a community we can acquiesce in stagnation—which is unthinkable—we shall have to set about retracing our steps, and subdividing land which is at present ineffectually occupied. In our best districts, presentday large farms will have to disappear, or else be held co-operatively by several owners. We shall have to modify our ideas as to what is an average-size farm; and in ever-increasing numbers, wherever conditions permit of it, we shall have to build up profitable small farms.

But it is not only lack of available land, and redundance of prospective settlers, which are driving us forwards concentrating our energies on smaller individual areas; equally impelling us thereto are other powerful economic factors, such as the rise in land values and in the costs of production, which are slowly whittling away the narrow margin of net profit hitherto available.

The Economics of Wheat Growing.

Let me illustrate this point from the present position of wheat growing, which has hitherto absorbed nine-tenths of our agricultural effort. Whether wheat growing pure and simple can be profitably followed as a calling depends on a series of economic factors, which can be summarised as follows:—

1. Rent, or interest on capital value of land.
2. Cost of production and delivery to market.

3. Average grain yields, since with us, in average circumstances, straw has no market value.

4. Local market value of the grain raised.

Each one of these factors can, individually or jointly determine the profitableness, or the lack of it, in wheat growing.

If we assume cost of production, yields and prices to remain stationary, then beyond certain limits increase in land values, can by its solitary action drive the wheatgrower off the land. For the sake of argument, we may assume cost of production, inclusive of interest and depreciation of working capital, taxes, general expenses, &c., to be represented by 35s. an acre; and 15 bush. at 3s. 6d. a bushel, to represent average yields and prices. Exclusive of rent, this would represent a net return of 17s. 6d. an acre every other year, since in our present practice wheat is almost invariably preceded by one year of non-revenue yielding, bare fallow, or a net return of 8s. 9d. per annum, which is 5 per cont. on the capital value of land worth £8. 15s. an acre. Now, if other factors remain stationary, and land values rise above this figure, wheat can no longer be said to be paying reasonable interest on the capital value of the land.

We have undoubtedly had instances of this kind in the past, and it is certain that they will present themselves in ever-increasing numbers in the immediate future. The position, that there are men in our midst, limited in number, perhaps, who are growing wheat, the returns from which do not pay interest on the capital value of the land; and it may be asked, short of bankruptcy, how can this be done? The factors supporting this uneconomic structure are not far to seek. In the first place, many farmers employ practically no paid labour; the farm is worked by their own strong arms and those of their immediate household. Hence, there are no outgoing expenses in the form of labour sheet; and hence—such is human inertia—no critical

balancing of accounts, nor determination of real cost of production. Hence, again, we see farmers so circumstanced continuing on the land, outwardly solvent; they cannot, however, escape the inexorable claims of rent or interest; and when, in reflective moments, they probe into their positions, they must conclude that in return for their independence—which they rightly prize—wheat frequently remunerates them at rates which would never be accepted by an equitable Wages Board; or else, that capital invested in land returns interest which elsewhere would be considered wholly inadequate.

Secondly, and from another point of view altogether, minor industries and occupations, such as a cow or two, poultry keeping, road work, and carting in unoccupied hours, &c., frequently serve to mask the economic situation and to keep the farmer on the land.

I fear that details such as these must prove wearisome to a general audience. I have deemed them unavoidable, however, in order to justify the statement that, in many cases, farming practices which in the past have borne us triumphantly along, stand in need of radical modification to-day.

What, then, is the remedy? How are we, as a people, to meet this threatened change in economic conditions? Cost of production is not likely to recede, rather the contrary; and prices are at all times on the knees of the gods; we can but hope that they continue favourable. Hence, in ultimate analysis, there remains but the possibility of improvement in general average yields. On this point I could say much, but shall refrain for fear of straying too far a field. I must content myself with the statement that the gradual reclamation of new land hitherto very imperfectly farmed, coupled with the anticipated improvement in the practices of many who in the past have lagged behind, must in the end lead to appreciable improvement in general

State wheat averages. But, given continued identity of practice, I doubt much that the present average yields of our best farmers, are capable of being improved upon in the future. In other words, I am of the opinion that in the matter of wheat averages the best exponents of present-day farming have probably reached limits beyond which climatic conditions effectively bar the way.

Let us recapitulate: The average margin of profit on present-day farming—which is wheat growing in overwhelming proportion—is exiguous; nor can it realise average home comforts unless associated with abnormally large holdings; for small land owners, in many instances, the price of independence is low wages and poor living; the cost of production cannot recede; grain prices are vacillating and undependable; improvement in yields is probable, but not to an extent to affect the general economic position; whilst, on the other hand, the available supply of arable land is well nigh exhausted, and the voices of those crying for land are multitudinous.

Complex Husbandry Essential.

What then? It is idle to suppose that future progress can be made to depend on material increases in the yields of individual crops—although under altered practice this is not an ideal altogether impossible of attainment—but rather on the increased general productiveness of small holdings, and the adoption of more complex forms of husbandry, leading to wider live stock operations, and the intimate association of the latter with the growing of crops. An ideal such as this implies a complete revolution both in practice and mental outlook, which normally can be realised only slowly and progressively. Our material interests, however, clamour for progress that shall be both rapid and smooth. There are many things that we shall have to learn in adapting ourselves to the circumstances that are ahead of us; and among them that, in the end, it is best for the individual, as it is for the State, that human effort should be concentrated on relatively small areas rather than wastefully dissipated over the wilderness: and that, independently of anticipated increase in gross returns, concentration of effort will help to blot out from our midst that isolation, and the distrust engendered by it, which have hitherto barred the way to successful co-operative effort among South Australian farmers.

Future of Agricultural Training.

And what part shall training play in the changes we see ahead of us? If we are wise, it seems to me, and allow it unhampered action, training will do much towards softening the asperities of sudden change in practice and outlook; it will, at an early date, lead to a degree of efficiency which could not otherwise be reached except by long and costly effort, blindly groping after results and overwhelming many in fruitless endeavour. It is not suggested that farmers, as a whole, should be put to school to learn a new trade apart from its impossibility, there would, in any circumstances, be little to be gained by it. Our farmers are an intelligent body of men, who on various occasions have already shown their willingness to modify practice in directions that could be shown to be materially advantageous. And I have good reason to believe that, as in the past, so in the future, they will follow the lead of successful pioneers in any new movement. Moreover, in the Agricultural Bureau system South Australia has an invaluable educational instrument, capable of spreading far and wide the new gospel, and even of enforcing it.

Training, therefore, must in the first place reach the leaders and the new settlers; and, although on the different lines, to an equal degree, perhaps, those who in subordinate roles will contribute to the success of the new movement; in the end those able to acquire training will prove the leaven which will leaven the whole. I now propose sketching out in rough outline

how I conceive that this influence of training can be brought to bear on our future agricultural progress; and in doing so I shall not be unmindful of the fact that our ideal of efficiency embraces every rung in the ladder of agricultural workers.

(To be continued.)

Grape Vine Cultivation at Penukonda.

The cultivation of grape is practically confined within the four walls of the old fort the remnants of which are to be seen preserved even to this day.

Season. The local cultivator is of opinion that there is no definite season of planting. It is planted either in summer or in winter. But it is recognised that planting a month before spring facilitates fresh vigorous growth of the vines which produce buds in profusion quickly.

Soil. The general description of soils where this vine is grown is ashy coloured loams. It is to all appearances like patimannu, in fact, it is patimannu itself.

Cultivation. Pits $2' \times 2' \times 5'$ are dug a month previous to planting. Half the pit is filled in, mixed with the earth removed and sheep or cattle manure in equal proportions.

Vine bits, each about 2 or $2\frac{1}{2}$ yards in length, are cut out of old stock from the same village ordinarily and these bits are wound round their own axes three to fives times and these are inserted into the soil in the pit taking care that the two free ends are exposed and the vines are watered daily. Fresh leaf buds are formed from one to one and a half months after planting. As the vines grow, supports of sticks about five feet long are planted in the pit for the vine to creep up.

As the vine grows up, a pandal about five to six feet in height is erected to help the vines to creep and spread on. Vines from four pits are trained over the same pandal.

Manure. Cattle or sheep manure invariably mixed with earth preferably red earth or anthill earth (manure is never applied lest it should generate heat) is applied once a year in December. The vine begins to yield from the second year but it comes to yield better from the third year.

Pruning. In the fourth year in December pruning is done. The props are all knocked off and the vines brought down, tender vines and old leaves having been all carefully removed and thrown away.

The pandal is remade and the vines are again placed on top of it. Directly shoot pruning is done and when the vines come down and go up root pruning is done. A pit to a depth of five feet is dug all round the vine and the roots are exposed. Small roots and big ones here and there are all cut off. Watering is withheld a fortnight previous to pruning. Then a *masala* (a mixture consisting of Dikkamalli, one seer, Rs. 20 weight; Asafoetida, one tola; and Toddy, 4 seers) is rubbed over all the cut ends of the roots. This is done, it is said, to prevent the attack of white ants etc.; presumably this might also stimulate the growth of fresh flower-buds which ultimately increase the yield.

The roots are thus exposed for a few hours. The pit is now filled in as above with cattle or sheep manure mixed with earth. Four days previous to the overhauling of the pandal and subsequent to pruning operations, four visses of gingelly cake are powdered and pickled in butter milk. This lasts for four days. This mixure is poured in a circular pit made purposely for this round the stem. When the mixture has well soaked in the pit, it is covered by a thin layer of earth. Watering is done from the next day onwards. A month after the operations, fresh shoots and buds are put forth. This is about January. The fruits mature in April. One vine yields four to five maunds of fruits.

Diseases: Gazupurugu. Green bug like insects damage the vines to some extent.

Booditha rogam. The leaves put on ashy appearance and dry away.

Remedies. Bat guano and chilli powder are burnt and the smoke is said to be a remedy for the *gazu purugu* which dies off.

Duration of plant. A vine is said to live and yield for thirty years. From the tenth year onwards the vine begins to yield best up to about twenty years. The variety that is grown here is the purple one. It is considered better and more delicious than the green one. This is valued better in the Madras markets. The vines are grown along with pomegranates in the same garden. In all, there are about forty gardens in this town.

V. Ratnaji Rao,
Agricultural Demonstrator, Cumbum.

Extracts.

Effect of feed on the quality of milk in cows. Many people believe that it is possible to water the milk by giving large quantities of water to the cow. The Agricultural Gazette of New South Wales, November 2, 1918, draws attention to this belief, and states that M. Porcher, Professor of the Veterinary School of Lyons, has recently drawn attention to the researches and conclusions of several investigators on this point. The Professor concludes that the idea of watering the milk through the cow is nonsense, and that it could not be used as the basis for any reasonable judicial decision against a dairy farmer.

(Extract from the Agricultural News dated 5th April 1919).

T. S. V.

A possible factor in coconut beetle control. A natural enemy of the coconut beetle (Oryctes) in the Philippines has been found by Mr. F. Warner in the island of Bohol. This is a flying lemur, Galeopitheous Sp., which has been domesticated by the Filipinos and bred, partly for the value of its skin which is used for the

making of hats, and partly for catching coconut beetles. This small animal is insectivorous and harmless. The only vegetation eaten by it being the leaves of the Jack (Artocarpus integrifolia). Nothing is known of its breeding habits. Its flesh is said to be poisonous which renders it likely to have many natural enemies, so that, if it can be multiplied rapidly and if, as reported, it is of a non-roving disposition it should prove of value in the control of the beetle.

(Review of applied Entomology Vol. VI, Part 5).

C. T.

"*The Conservation of our Cereal Reserves.*" Stored grain is exposed to the attacks of rats and mice, insects and mites, moulds and bacteria and to a process known as "heating."

Air-tight storage and ventilation have been found efficacious in combating these evils. The latter is resorted to when grain gets heated. Since access to air favours the growth of moulds bacteria and insects, it necessarily follows that when air is cut off, no damage need be feared.

Experiments. At about 28°C, a pair of weevils increased about seven hundred-fold in four months; the excreta and its decomposition naturally damaged the grain.

Carbon-dioxide has a poisonous effect upon weevils. These have been found motionless in pure moist gas within 3 minutes. A mixture of this gas with 20% of oxygen is far more fatal than pure CO_2.

Since carbon-dioxide accumulates in hermetically stored grain owing to respiration, there appears to be no necessity of artificial addition of this gas for destroying weevils. The storage of grain in air-tight receptacles is advantageous in time of need as war and failure of crops; besides, it is possible to equalise shipments all the year round.

(Extracts from Nature March 20, 1918). B. D. S.

The Fat of the Residue of the Decortication of Rice. The annual production of rice in Italy exceeds 11760000 cwt., the residue from decortication ("pula di riso") represents 980000 cwt. and contains about 147000 cwt. of oil. This residue is composed of the perisperm, embryo and part of the outermost starch layers of the caryopsis, to which, in the trade, are added varying quantities of husks. Without the husks it represents 7 to 8% of the weight of the rough rice, but the commercial type represents about 10% of this weight. Up to the present it has been only utilised in part as a food for cattle, and before the war, the greater part of it was exported (chiefly to Switzerland and Germany) and sold on a basis of its total fat protein content, which varied from 15 or 16% to 24 or 26%.

By removing the fat from this product, its keeping quality is improved, it is made more healthy (the fat is slightly irritating and relaxing) and easy to transport. The extract is of great value, especially at this moment when all the war industries require so much fat. Experiments on the extraction of this fat were, therefore, made.

Repeated pressure under 300 atmospheres each of nearly 2 cwt. of meal, previously moistened and heated, gave an average yield of 6·5% of crude oil. The properties and characters of the fat vary greatly, especially according to the state of preservation of the residue, and also according to the method of preparation (by compression of volatile solvents). That prepared by compression is liquid at ordinary temperatures; it is a true oil, with a density of 0·912, of a greenish-gray colour. The cake obtained by this method is similar in appearance to that of sesame seed.

The crude residue of decortication contains 2·38% of nitrogen, corresponding to 14·87% of crude protein which, together with 15·23% of fat, gives a total value of 30·1%. In the dried cake this value is 33·8% (16·7% of crude protein and 17·1% of fat).

The extraction of this fat is of great value and should be started immediately, leaving till later a detailed study of the possibility of complete extraction by volatile solvents. By the compression method it would be possible to obtain 39200 to 58800 cwt. of excellent oil for the manufacture of soap, fatty acids and glycerine.

(Extract from the International Review of the Science and Practice of Agriculture Year IX—No. 8 of August 1918 (P. 980).

C. T.

Departmental Notes.—(May and June).

Appointments etc :—

Definite information has been received that Roger Thomas Esq., Deputy Director of Agriculture will not return to Madras Department of Agriculture for six or more, probably six, months from April 1919.

Mr. M. Anandhan, L. Ag., Farm Manager V grade on probation from 1st May 1919 to be Assistant in Economic Botany on Rs. 75, 75, 75-5-125, on probation with effect from 11th June 1919.

Mr D. P. Chellam Ayyangar, Assistant Farm Manager on probation to be Farm Manager V grade on probation on Rs. 50-5-100 with effect from 11th June 1919 in an existing vacancy. To work at Palur Farm.

Mr S. Krishnaswami, supervisor I grade, on probation is appointed to be in charge of Pumping and Boring section IV (a) circle *vice* Mr. S. Rajagopal Nayudu.

Mr. K. Avudainayagam Pillai, to be Assistant Farm Manager on probation on Rs. 35-2½-75. To join at Samalkota Farm for training.

Mr. M. Krishna Rao Naidu to be Assistant Farm Manager on probation on Rs. 35-2½-75. To join Samalkota Farm for training.

Mr. V. Subbanna Char to be Assistant Farm Manager, on probation on Rs. 35-2½-75. To join at Nandyal Farm for training.

Mr. M. P. Gourisankara Ayyar to act as Assistant in Botany, Government Sugarcane Expert's section, Coimbatore.

Mr. P. Abhishekanatha Pillai to be Assistant Farm Manager on Rs. 35-2½-75 on probation. To join at Koilpatti Farm for training.

Mr. S. Ramachandra Ayyar to be Assistant Agricultural Demonstrator on probation on Rs. 35-2½-75. To join at Trichinopoly for training in district work under M. R. Ry. C. V. Seshachari, Agricultural Demonstrator.

Mr. T. G. Muthuswami Ayyar to be Assistant Farm Manager on probation on Rs. 35-2½-75. To join at Manganallur Farm for training.

Mr. J. A. Muliyil, acting Assistant in Entomology IV grade, to be Assistant in Entomology IV grade on probation from 15th April 1919.

The following are appointed as IV grade Lower Subordinates and are posted as below :—

Mr. C. Appadurai Pillai, to the VI Circle.

Mr. P. V. Sambasiva Rao Naidu to the I Circle.

Mr. V. M. Ramunni Kidavu to the D. D. Planting Districts.

Mr. P. S. Srinivasa Ayyar to the IV Circle.

Mr. K. Satyanarayana Gupta to the I Circle.

Mr. Samuel Nallatambi to be Sub-assistant in the Government Economic Botanist's Office and to join forthwith.

Mr. S. Kasinathan, B. A., Assistant in the Chemical Examiner's Laboratory (Customs and Excise) is appointed as Assistant in Chemistry on probation for 2 years in the office of the Government Agricultural Chemist, Coimbatore on Rs. 75, 75, 75-5-125 per month.

Assistant Farm Manager Mr. K. Mahadala Rao having overstopped his leave and absented himself from his duties, his services are dispensed with.

Leave :—

Mr. T. Lakshman Rao, Assistant in Chemistry, privilege leave for six weeks from date of relief.

Mr. S. Rajagopal Nayudu, supervisor II grade, privilege leave for two months and a half from date of relief.

Mr. E. S. Viswanatha Ayyar, Assistant Agricultural Demonstrator, is granted extension of leave on medical certificate for one month in continuation of 6 weeks combined leave already granted.

Mr. L. Narasimhachari Agricultural Demonstrator is granted privilege leave for one month from or after 15th July 1919.

Mr. P. Janakirama Ayyar is granted privilege leave for one month from or after 5th June 1919.

Mr. K. T. Bhandari, teaching assistant, College of Agriculture, Coimbatore is

Postings :—

Mr. K. Unnikrishna Menon, Farm Manager, Palur Farm and Mr. M. K. Nambiar, Farm Manager, Central Farm Coimbatore to undergo training in the Teacher's College, Saidapet from 1st July 1919.

Mr. L. S. Natesa Ayyar, Farm Manager will be in charge of the Central Farm during the absence of Mr. M. K. Nambiar.

Mr. R. Chokkalingam Pillai, Farm Manager posted to Coimbatore for dairy work.

Promotions:—

Mr. K. T. Alwa, Agricultural Demonstrator, from the III grade to the II grade

Mr. K. Unnikrishna Menon, Farm Manager, from the IV grade to the III grade.

Mr. K. Raghavachari, Teaching Assistant, from V grade to IV grade.

Mr. K. Gopalakrishna Raju, V grade to IV grade.

Mr. T. Budhavidaya Row, Farm Manager, from V grade to IV grade.

Mr. M. K. Nambiar, Farm Manager, from V grade to IV grade.

Mr. C. V. Seshadri, Agricultural Demonstrator, from V grade to IV grade.

Mr. W. Raghavachari, Agricultural Demonstrator, from V grade to IV grade

Mr. A. Chinnathambi Pillai, Agricultural Demonstrator, from V grade to IV grade.

Mr. S. Sitarama Patrudu, Agricultural Demonstrator from V grade to IV grade.

Mr. M. V. Raghavulu Naidu, Farm Manager from V grade to IV grade.

Mr. V. S. Narayanaswami, Assistant Agricultural Demonstrator from Lower Division to Upper Division, IV grade.

Mr. T. A. Krishna Ayyar, Assistant Agricultural Demonstrator, from Lower Division to Upper Division, V grade.

Mr. D. Panakala Rao, Assistant Farm Manager, from Lower Division to Upper Division V grade.

Mr. V. Ratnaji Row, Assistant Farm Manager, from Lower Division to Upper Division, V grade.

Mr. A. Gopalakrishnayya, Assistant Farm Manager, from Lower Division to Upper Division, V grade.

Mr. A. Gopalan Nair, Assistant Farm Manager, from Lower Division to Upper Division, V grade.

Mr. K. Ramanujachari, Sub-Assistant, Government Economic Botanist's section from Lower Division to Upper Division, V grade.

Mr. L. S. Natesa Ayyer, I grade Lower Division from 1-4-1919.

Mr. T. R. Vencaswami Row, II grade Lower Division from 1-4-1919.

Mr. N. Sitaramaswami Naidu, II grade Lower Division from 1-4-1919.

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Editorial Notes.

Peace.

The signing of Peace by Germany on the 28th June brings to a welcome close, the terrible sufferings of nations throughout the world during these five long years. It is unnecessary at this stage to deal with either the righteous aims that led us into the war or the various events that took place during this period. We hope that it will never be our lot to record again events of such a nature in the columns of our journal. We will only remind our readers, ere we drink in full measure the cup of tranquility that this Peace will bring us, of the full significance of the stupendous sacrifice of such a large number of young and heroic lives, but for which, we would never have had such an honourable and glorious peace. If it were only possible to have prevented this terrible carnage and heavy sacrifice, the world would not have been so poor of such a vast number of brave and noble lives, as it is today.

The joy of peace will necessarily be tempered with this sad thought, and may the aggressiveness of Germany always warn us against greed of power and land, and may her signing the peace terms herald an era of lasting and real peace and steady progress in the betterment of the peoples of the world !

The Late Mr. S. L. D'Silva.

On Friday the 13th June passed away in his residence at Guindy, near Madras, a noble soul in the person of Mr. S. L. D'Silva, one of the ex-Vice Presidents of the Madras Agricultural Students' Union. He had an attack of influenza and the complications that set in as a result of it culminated in his death.

He was a native of South Canara and came of a respectable Catholic family. He joined the Madras College of Agriculture, Saidapet, in 1881 and finished his course in 1883. Through his natural abilities and steady application to work, he was easily the first amongst several batches of students. His pleasant humour and infinite fund of common sense endeared him to the late Mr. W. R. Robertson, the pioneer of agricultural education in South India. He took service under government in 1884 as Cattle Disease Inspector and was acting Deputy Superintendent of the Saidapet Farm from 1884 to 86, when Mr. C. Benson went on leave. In 1888 he joined the staff of the College and in addition to his being made a Lecturer in Veterinary Science and Live-Stock, was placed in sole charge of the only Government Veterinary Hospital at Saidapet. He soon became very popular and for over 25 years, it is not an exaggeration to say that there was not

an owner of a cow, a dog or a horse in Madras, who did not know him and count him as his best friend. His conspicuous abilities carried for him the approbation and high regard of Dr. Mills, Lieut-Col. Hazelton, the late Dr. J. D. E. Holmes, and Lieut-Col. Gunn—authorities on Indian Cattle Diseases in their time. When Mr. Kees left Saidapet in 1906, Mr. D'Silva was made Acting Principal; and in this capacity "did excellent work in difficult circumstances," especially at a time when the control of agricultural education was passing out of the hands of the Director of Public Instruction. On the abolition of the Saidapet College, he went on long leave and on its expiry joined the new institution at Coimbatore as Assistant in Veterinary Science. His long experience and intimate knowledge of animal diseases stood him in good stead here and he was most helpful to Mr. Wood in the management of Live Stock in the Central Farm. He was one of the founders of the Union, and was successively resident Vice President for several years. He was a good penman and the first set of rules for our Union for the drawing up of which he was responsible, has needed but little alteration since. He was a good classical scholar and had specialised in Latin, to which and to astronomy he was devoting all his leisure in the closing years of his life. He retired in 1915 in his 55th year. It was hoped that he would enjoy his well earned rest for several years, but God had decreed otherwise. A pious Christian, a sincere friend, a devoted husband, and a practical philosopher, the late Mr. D'Silva was an ornament to Society. His loss we all deeply mourn.

"Training and Research illustrated from the Agricultural view point."

(An address delivered at the University of Adelaide by A. J. Perkins, the Director of Agriculture, Adelaide 1917).

(Continued from last issue.)

Present Lack of Competent Farm Laborers.

Hence, at the outset, I shall point to the common complaint that here in south Australia, whose national wealth is mainly drawn from rural enterprises, competent farm hands when called for are practically not to be had; and I shall add that the complaint is well grounded on fact. But under-present circumstances, how indeed could it be otherwise? It is only long practice, life's work, that can confer any satisfactory degree of manual efficiency; and how can we look for it among the lacklands, when ninety-nine hundredths of the farm work of the country is carried out by the landowners themselves? This is not the recital of a grievance, but a statement of fact, for which general economic conditions can all alone be held responsible.

But if ever, in days gone by, at harvest time and at other busy moments, farmers have had occasion to deplore both the scarcity and the unsuitability of available labor, unless in the interval radical change supervenes, their cry in the future is likely to be equally frequent and acute. We shall have to realise that intensive farming implies the concentration of capital on small areas, the bulk of which will be absorbed in labor; that high gross returns cannot be secured except by corresponding outgoing expenditure, chiefly in the shape of labor. And when large farms, on which at the present time little or no outside labor is being employed, come to be split up into smaller units, it will be found that several permanent hands will be absorbed by individual subdivisions, worked on more intensive principles.

How to Attract Labor to the Land.

How are we to secure this absolutely essential farm labor, without which there can be no great agricultural progress? We shall have to attract to rural occupations a reasonable proportion of the rising generation; we shall have to persuade the majority of those reared in the country that it is to their interest to continue there; we shall have to bring under the notice of those born in the cities but hankering after open spaces, that there are open to them in the country careers quite as attractive as those offered by city shops and factories and streets. Questions of this character admit of discussion at great length; but as they are only incidental to my subject matter, I shall confine myself to the enumeration of a few propositions bearing, as it appears to me, on the main issues at stake.

1. Future closer settlement and intensive farming operations should tend to cluster our rural population into important social groups, which should destroy the loneliness of empty spaces and help to neutralise the attraction of city centres.

2. Intensive farming should offer continuance of employment over the greater portion of the year.

3. Both wages and working hours would need to be based on equitable lines corresponding to those in force in other forms of employment.

4. Housing of farm hands and board, when provided, would need to be reasonably good.

5. Rural centres should be provided, with facilities for self-improvement and for general social relaxations.

6. The old custom of competitive tests of skill in rural manual operations should be revived in all country centres.

7. Both with a view to home creation, and as a means of tiding over temporary unemployment, the acquisition of small blocks of lands by rural workers should be encouraged in every way.

8. Thrift and industry should be promoted to the end that every rural worker of moderate attainments may, if he choses become ultimately a farmer himself.

Means such as these, and others which I have properly overlooked, should serve to check the regrettable exodus of country youths towards the cities, and in many instances will perhaps set up a counter current countrywards.

Training of Farm Hands.

Now, as to the training in manual deftness, I see absolutely no reason why youths wishing to qualify for rural occupations should not under suitable guarantees and the supervision of State authorities, indenture themselves as apprentices to approved farmers. Remuneration and conditions might be mutually agreed upon, or, preferably, be determined by law imposing effective guarantees on either side. Something in this direction I have already endeavoured to do on our Government farms, not with much success hitherto, it must be confessed; mainly, however, because of the disturbed condition of times; and I hope for better things as our affairs improve.

Finally, I am sufficiently sanguine to anticipate the times when attendance at High Schools or at technical classes will be compulsory upon farm apprentices, as it is intended that it should be for the trade apprentices of the cities.

Agricultural College Training.

But it must be clear that all the acquired cunning that the hand can command is of little avail unless under the direction of the well trained mind able effectively to register and analyse the daily happenings of life. If, therefore, we are ready to supply the skilled laborer, it behoves us to make equal provision for those who must map out and direct his activities. In this connection it is not vitally essential that the leader, or farmer, should have acquired the same degree of manual skill as the man whose special business it is to carry out the work: it is, however, of immense advantage to him to be intimately acquainted with all the minutes of the operations in which may be engaged those under his direction; indeed, hitherto

knowledge of this kind has frequently represented the deciding factor in success. And it is for reasons of this kind that we see all Australian Agricultural Colleges attaching paramount importance to farm manual operations, they have been looked upon as typifying the immediately practical side of the farmer's business; and such indeed they are, and will continue to be so long as with unaided hands the farmer carries on the great bulk of the farm work. It does not follow however, that this stage of affairs must continue indefinitely; indeed, already in our midst there are many exceptions to the general rule; and it seems likely that the "practical" man of the future will be the master mind who directs and instructs his men, and manages the business of the farm. Come what may, farm manual training cannot with safety be overlooked in any Agricultural College; in giving to it full weight, however, we are not necessarily bound down to the methods hitherto adopted in Australia.

From our present view point I shall now draw attention to two drawbacks, attaching to the type of training hitherto unvoidable in all Australian Agricultural Colleges. The fact that fully half the time of students is absorbed in direct manual operations curtails very seriously the time available for theoretical and professional training; and a three years' training in essential fundamental principles. Hence, if consideration be taken of the range of subjects—both auxiliary and technical—which must be covered during these mutilated three years, and of the inadequate early grounding of most of those attending Agricultural Colleges, I am compelled to admit as a matter of personal experience, that this three years' course is all too short: and unfortunately, in many cases it is even reduced to two.

Another disadvantage of the present system, if conscientiously administered, is that it sets very rigid limits to the number of students whom it is possible to admit at any one time. If, in your training you are aiming at manual efficiency, it is clear that this efficiency cannot possibly be attained unless the number of students present is strictly proportional to the area of the farm on which it is proposed to train them, and should students be enrolled in excessive numbers,

the opportunity for acquiring manual efficiency must *ipso facto* disappear, and with it the foundation on which college training has hitherto been ostensibly based. On the other hand, it is easily understood that an indefinite extension of College Farm areas is one out of the question; hence it may be stated very definitely that no single college can pretend to offer adequate facilities for farm manual training, whose average enrolment exceeds 99 to 100 students in any one year; and even this number would prove difficult to handle in adequate manner.

It would seem, therefore, that if greater numbers than hitherto are to be attracted to our Agricultural colleges—and in the future there is likely, in my view, to be urgent need of it—drastic changes in policy and methods may prove unavoidable. It may even be possible, without detriment to the student's ultimate training, to eliminate ordinary farm work altogether from the College curriculum, and ensure professional training extending over not less than two complete years, equivalent to a four-years' course as at present conducted. It should be added that dispensation from the actual routine of farm work does not imply the doing away with all practical work. Instruction in the latter could still be imparted through the medium of the usual practical and field demonstrations.

I anticipate a chorus of disapproval to a proposal which will be said to sap the foundations of methods and practices which have proved eminently successful in the past; and, although this objection cannot be disputed, I am fain to reply that the dead must bury their dead, since no other means of throwing open to all comers the portals of agricultural training are financially feasible.

Let me not be misunderstood, however, I am far from undervaluing efficiency in manual operations. I believe that every farmer should possess of it as much as he can secure. But it does not follow that an Agricultural College is the best place in which to acquire it; rather the contrary, perhaps because of the artificial character of many operations in which a College may be involved. Let us take the case of a farmer's son, born and reared on a farm intimately acquainted from his earliest days with farm operations,

in which indeed, he will almost invariably have taken part. Is not such a youth more or less wasting his time when he assists in the routine of farm work on an Agricultural College farm? Would he not be better employed in acquiring additional technical and professional insight into matters pertaining to his future calling? It will perhaps be admitted that the omission of farm work from the course of training cannot seriously impair the future efficiency of the farmer's son. But what of the city-bred lad who wishes to go on the land? In his case, manual efficiency can be provided for in other ways than by absorbing half of his time in farm, at the expense of his professional training at an institution, the upkeep of which is always unavoidably costly.

It is true that a limited number of novices could always be accepted for manual training on the farm of the Agricultural College itself; and perhaps combining with it the while a certain amount of instruction in sciences. They should not, however, be admitted to technical training until resonably imbued with the atmosphere of agricultural operations and versed in the routine of farm work. Some could be admitted for similar training on the various Government farms; others again could serve a period of apprenticeship with approved farmers. In short, none need enter upon a course of technical training without some preliminary acquaintance with farm operations and work. Nor should diploma of general proficiency be awarded except to the complete satisfaction of those best able to judge in the matter of general manual work. In Engineering degrees, it is, I believe, customary to suspend the issue of official diplomas until such time as evidence can be produced of practical work actually accomplished. From the view point of agricultural training, however, it would be a fatal error to make practical work a post-degree affair; half the value of the training would be lost unless the student can bring with him to college, as an essential part of himself, the atmosphere of the farm; and this, in my view, should at all times be insisted upon.

The elimination of compulsory farm work from an Agricultural College curriculum would open the door to-day to students, who could

find their board elsewhere, and in this manner immeasurably increase the number of those who could take advantage of the training offered, and this without great cost to the State.

In putting forth this proposal I can sympathise with the heathen Clovis when compelled to burn the gods he had once worshipped and to worship those whom erstwhile he had burnt. It has been no small surrender to make; but in our probable need, I see no alternative if, indeed, in the near future, we offer to the rising generation adequate facilities for acquiring technical agricultural training.

University Training.

The University of Adelaide, although conferring a degree in Agriculture, has hitherto abstained from imparting direct technical training in Agriculture itself; it has instead accepted the training given at the Roseworthy Agricultural College, and contented itself with insisting upon a higher degree of competency in the auxiliary sciences. This moderation has not been copied by the sister Universities of the neighbouring State, who have boldly established Chairs of Agriculture in their midst.

If the respective effort and achievements of the past were to be balanced up to-day, it is a moot point as to whether after all our past policy would not prove to have been the wiser course; but concerning the future orientation of our policy it would perhaps be rash to speculate. Nevertheless, in this connection it must be admitted that, in measure, fate has already been forestalled by private munificence. Mr. Fetter Wait's public-spiritedness has cut the Gordian knot and definitely committed the University to an Agricultural Experiment Station; and it seems almost inevitable that such an institution should eventually be followed by a Chair of Agriculture. I entertain no doubts as to the potential value of an Experiment Station, nor, given the soundness of its human material, as to its ultimate success. Of the prospects of lectures from the Chair, on the other hand, I am more dubious, particularly if for that purpose it were to be borne out of due season, in which case I fear it would be easier to found the Chair than to find the students.

University Agricultural Experiment Station.

Hence, I deem it both logical and expedient that in point of time the Agricultural Experiment Station should precede lectures from a Chair of Agriculture; the former will pave the way for the latter. The main purpose of an Experiment Station would be RESEARCH WORK, and here, with deference, I suggest that purists may have to revise the conventional limits they have ascribed to research, and to recognise that research is still research, even though undertaken for purely utilitarian ends. Research work at an Agricultural Station, although not exclusively so, would have a strong utilitarian bent; and I hazard the opinion that it could but add lustre to any institution with which it happened to be connected.

Where, it may presently be asked, is the particular need for agricultural research? And, assuredly, such inquiries will find no echo in University circles; they know too well that research is free as air; that it bloweth where it listeth, that it concerns the stars, the earth, the ponderable, the imponderable, the finite, the infinite; that it knows no limits but man's choice. There are none to-day who would care to maintain that the last word has been said in any line of human activity; and that I take it, is the best justification of research in any department. But apart from its purely subjective interest, agricultural research is likely to have a very direct bearing on mundane affairs. And particularly is this likely to be the case when the intensive farming flood, which we see gradually gaining strength, is at its height; questions innumerable will arise on all sides; and if your untrodden tracks are to be dimly lighted by beacons trimmed elsewhere, there are many who will be led astray. There is room, then, in our midst for an Experiment Station, which, in matters of agricultural moment, can take a coldly impartial stand, and weigh in the balance the hasty judgments of men.

Imagine an experiment Station under able and imaginative leadership; a beehive of industry delving into questions vexing the souls of men from the more militant walks of like; in the world, but not of it, and yet in sympathy not detached from it. Follow the issue of

periodical statements of work achieved, meagre at first, but gradually swelling in importance; valued, first at home, catching the world's attention in time. I have already expressed doubts as to the probable success of a local Chair of Agriculture; such doubts are inadmissible should the experiment Station succeed: the success of the one would be but the prelude to the success of the other. Let but the work of the Experiment Station develop, let its reputation be built up by patient and diligent endeavour, and just as, in the Middle Ages, it was the men—or rather, their works which drew students from all part of the civilized world, and not mouldering walls, so we may anticipate that without intentional effort, and of their own initiative, those we need most will be attracted to the University. In other words, we shall need Agricultural leadership in the future: let the University prepare the way for it.

University Research.

And now, although I am shocked at my own temerity, I propose dropping the particular and taking up the general. With due deference, but with unpardonable liberty, perhaps, I am about to extend conclusions drawn from a consideration of questions purely bucolic to University matters in general. And I shall ask, is not a University maimed and cut off from the source of inspiration that is not steeped in research work? Is it any better than a glorified High School? Is it helping to extend knowledge as well as passing it on? And if not, is not the act of passing it on in danger of becoming altogether mechanical and perfunctory? I have heard of the many obstacles that lie in the way of research; of the inadequate buildings, the lack of funds, public apathy, and what not; I have heard, of these, I say, nor can any one doubt their validity. It is a matter of experience, however, that some obstacles are easiest circumvented by ignoring them, and I am persuaded that neither penury nor lack of equipment could have held back those mainly responsible for the unprecedented material progress of the nineteenth century. As a matter of blunt fact it is not buildings that make research, nor equipment, nor abundant capital, nor even exceptional attainments, so much as the humble determination to do and to achieve. The University stands in need of things to-

day: that this is realized and that redress is sought, is of the very essence of progress; in the end however, only realization expressed in deeds can control events. I fear much that a parade of poverty cannot help us to riches; not even a glittering display of good intentions, had we but the means to compass them: but rather discreet emphasis on what has already been done, and is being done at the present time. Let us show unmistakably that we have deserved, and do deserve, support, and eventually we shall command it.

The Essentialness of Publicity.

This humble suggestion raises an important issue, happily the last for which I shall crave your attention. I have gently hinted at need—the urgent need, as it appears to me—of greater publicity in University work. And in stressing this point I feel that I am perhaps treading on delicate ground; nor am I unaware of the instinctive repugnance of many to anything savouring of self-advertisement. Neverthless and here I stand on firmer ground, the University, although a cluster of gifted individuals, has as an in ultimate resort a public, whose support is essential to its continued existence. A craving for the limelight may be a detestable weakness; work may be its own reward; the seeker after truth may be careless of the approval of any but his peers: research work may be more or less a matter of lonely furrows—all this and more may be true, indeed praiseworthy from the individual viewpoint. But it leaves untouched those particular University needs which strong local approval can alone satisfy. Let the lonely furrows carefully drawn out in seclusion be as numerous as they may, of what avail are they in what immediately concerns us, unless from neighbouring highways and byways plainly visible to the owners of the enclosure? In fine, if the active support of the public is to be enlisted, it must be given periodical reports of what is being done. Doubtless individual distinction can come to those whose doings are chronicled in the specialist pages of the periodicals of the world. Division, dispersal, however, never yet made for strength, and the scattered individual efforts of a young University can make but a poor showing. Gather together on the other hand, present them periodically in a body as the work of the University, and

like drops of water whose persistence eventually wears away the hardest rock surface, they will at first attract the attention, and in the end the strong support of those for whom the University was brought into existence.

Conclusion.

We have been in pursuit of efficiency, material and moral, and the course has been long and devious; nor can I be sure that I have lighted the landscape to best advantage. Shall I add that we have not even caught fitful glimpses of our quarry, and if so, it rests very largely with ourselves whether they shall ever materialise. This chase after betterment, however, is no very modern task; it is as old as the consciousness of the human race; indeed, when the world was young it probably carried with it greater zest. Let me quote to you the blind bard's saying of over three thousand years ago: "Skill is of greater avail to the woodman than strength; skill steers the vessel in the teeth of the gale; skill is triumphant in the chariot race." We cannot improve upon the mental attitude that is implied in these words; we cannot make it our own. As for me, however much I may have failed to make it clear I have endeavuored to-night to keep steadily before me two essential points; the good of the country which has now sheltered me for over a quarter of a century, and the good of the University which has honored me with a seat on its Council. The first I believe to be chiefly dependent on energetic concentration of efforts towards greatly increased soil production; and success in this direction will, in my judgment, be very largely a factor of judiciously conceived education system, with an inspiring rather than a levelling influence, and offering to all a fair start in the race of life. What I conceive to be the good of the University has been so admirably expressed by another that I make no apology for closing with the following quotations:—"The ideal University," says Brereton, "should be in the world, but not of it; a cloister to which all the world can come, which contains alike recluses and friars —recluses who pursue knowledge for its own sake, carrying their knowledge to the skies; and friars who carry it to the market place a miniature of the world, or, rather an ideal of the world, while the world should be the realization of the University."

A Provincial Board of Agriculture.

"The Council recommends to the Governor in Council that a Board of Agriculture be established for this Province". Such was the resolution that the Hon'ble Dewan Bahadur M. Ramachandra Rao placed before the meeting of the Legeslative Council held on the 5th April 1919.

This resolution owes its source to a circular of the Government of India to local Governments, suggesting for their consideration the advisability of inaugurating Provincial Boards of Agriculture to discuss annually on matters agricultural which are of purely local importance, on which the local Government would be more competent to discuss. In making this suggestion, it is stated that the Government of India had in view the possibility of enlisting the co-operation of non-officials like large landholders, representative agriculturists, and others interested in rural development. The objects of such a Board seem to have been to develop agricultural research, to organise agricultural experiments and to enlist the co-operation of those interested in Scientific Agriculture. The circular also suggested the advisability of the Agricultural Adviser presiding at the Provincial Board meetings occasionally in view of his wider experience in the development of agriculture.

The matter was referred by the Government to the Director of Agriculture who consulted the Imperial Officers of the Department and discussed the matter with heads of sections at Coimbatore, and came to the conclusion that such a Board was unnecessary, which the Government accepted. The Hon'ble member in proposing the above resolution criticised at length the various objections raised by the Director of Agriculture.

One of the reasons why such a Board was found unnecessary was that the formation of such a Board would entail dislocation of the work of the officers concerned, and the result would not be commensurate with the time occupied. The Hon'ble member took exception to this reason, because he thought that one of the objects desired by the Government of India was lost sight of by the Director, namely,

the securing of the active support in modern agricultural methods of the large landed proprietors. Mr. Ramachandra Rao was not prepared to accept the view of the average official, who, according to him, seems to have very little to do "with district Boards,, Municipalities, and Taluk Boards if he can help it or with any form of association or with any other non-official organisation such as this."

Although we are in general agreement with the Hon'ble member regarding the co-operation between the officers and agriculturists which he thinks is essential for modern improvements to be introduced into the country, we believe we see practical difficulties, which Mr. Ramachandra Rao does not, in the accomplishment of such an object. Two points need to be cleared first. If such a board came into being, who are the landholders that will co-operate and how will they help in the development of agricultural research and organise agricultural experiment? We fear that it is most difficult to appeal to the right sort of men. The landed aristocracy, who ought to be a source of strength in the dissemination of knowledge on agricultural improvements, are sadly lacking in practical experience of farming. A few possess home-farms, no doubt, in which they carry on improvements at the suggestion of the department, but the bulk of them are not yet sufficiently interested in agriculture. The people that would be most profited by such a Board would be the actual cultivators, who, however, are beset with the language barrier. Yet, there are a large number of absentee land-lords whose vocation is law, and who have sunk their savings on land, but who have not much knowledge of the practical difficulties. They cannot pretend to be the spokesmen of the ryots, because they have no first-hand knowledge and their advice is scoffed at when proffered.

The Hon'ble member remarks that the Director of Agriculture stated that an informal Agricultural Conference is held every year under the auspices of the Madras Agricultural Students' Union at the time of the College Day. Mr. Ramachandra Rao assumes that College days generally are matters of merry-making and infers that the conferences which follow them must necessarily be the same. Mr. Ramachandra Rao has, we believe, never paid a visit to a Conference under

the auspices of the Madras Agricultural Students' Union, and if our memory fails not, he excused himself from reading a paper at the Conference when requested to do so not long ago. Still, we can assure Mr. Ramachaudra Rao that if he accepts the challenge and attends the College Day and Conference next December, we are sure he would withdraw his sweeping remarks. We are, however, not prepared to say that this Conference takes the place of a Board such as the Government of India contemplated. Its usefulness is limited and at best it can touch only a few. The Board should be held, if the Government on reconsideration think it might, at a place more convenient than Coimbatore. If the people are carefully selected, and a definite programme previously laid down, we do not see any reason why such a Board should not serve a useful purpose. We would go a step further and suggest that the Board might hold its sittings at different farms, so that people of that locality might visit in large numbers and discuss problems affecting them most. If the language difficulty is got over, we are sure such a Conference is pregnant with great potentiality for usefulness. This at once points to the desirability of all the Imperial Agricultural Officers to be able to converse freely in the vernaculars.

In his reply to the Government, the Director of Agriculture suggests the substitution of Inter-departmental Conferences in the place of a Provincial Board. This is, in our opinion, begging the question. Mr. Ramachandra Rao is of the opinion that a Board similar to that of the Board of Agriculture in Britain should be established if necessary on statutory basis as an administrative body. We do not think conditions here are similar to permit of such an undertaking at present. A beginning can however be made, and we do not think that such an important question should be summarily shelved. We take the liberty to advise the large landholders to evince more interest on land and its improvement for which the Agricultural Department exists, and the departmental officers to make every effort on their part to make such confefences a realisation, in order to see how far they would tend to expand research and advance agricultural experiment.

Contributed.

More Trees for Farms.

In some respects trees may be regarded as crop and their culture Agriculture. Their haphazard introduction in our Farms without any consideration of their actual needs and of the conditions prevailing in the locality may often end in failure. Various factors govern their distribution of which the most important is the amount of moisture in the soil. With reference to this factor trees may be easily grouped into (1) those which love moisture and (2) those which can resist drought either of a periodic or permanent nature. As a rule trees flourish well in places that receive a large amount of rainfall and a careful selection is therefore necessary only of those that can endure drought due to low annual rainfall and high temperature. Intensity of light has also to be considered.

The loss of water from plants occurs mainly through leaves and it is well known that there are numerous devices by which drought resistants are able to check too much loss of water and thereby manage to flourish with a scanty supply. Some of these devices are seen in the diminution of leaf surface, strong development of cuticle, sunken stomata and presence of hairs and an examination of the leaves for the above points is sure to be of value in determining the suitability of the plant for a new region.

With prolonged exposure to intense light the green colour, chlorophyll, is likely to be decomposed and this difficulty is obviated to a considerable extent by the strong reflection of light from the leaf surface or by movements of leaflets in the case of pinnate-leaved plants. This latter peculiarity is seen in many of the Leguminosæ and it is no wonder that some of our most successful avenue trees belong to this class of plants (e. g. the Rain Tree, Tamarind, Goldmohur etc.) The drooping of leaves and leaflets in the case of some of the Leguminosæ which results in the so-called "sleep movements" also serves the same purpose.

The choice of particular species of trees will largely be a matter of personal preference and will also depend on the special purpose for which they are to be planted, whether for shade and avenue, for serving as wind break, for screening, for any incidental economic use as well e. g. timber and firewood, or for mere aesthetic effect. There can be no doubt that evergreens should largely be preferred to deciduous trees for shade and avenue planting or for beautiful effect. An ever green may be defined as a plant in which the older leaves are not shed when the new leaves unfold. But this varies according to situations so that evergreens have a tendency to shed their leaves when under extreme drought.

I have tried to bring below into greater prominence a few trees that deserve to be more generally cultivated in our Farms because of their several good qualities.

(1) Azadirachta indica (Nim or Margosa) :—a tree eminently suited for planting in all situations. Branches, intricate and horizontal. The light green sickle-shaped leaflets rustling in the air produce a most delightful and refreshing breeze. It has an excellent appearence when it is grown to a low form on lawns. The trunk is rarely straight which makes it unfit for continuous avenues but it has a beautiful effect when planted singly or in groups. The trees are affected by an insect pest (Helopeltis antonii) in the dry season as shown by Mr. Y. Ramachandra Rao (Vide Agriculture Journal of India Vol. X page 412) and present a most distressing aspect with leaves looking as if scorched by sun, though they recover after somemonths. Young trees may perhaps be protected wherever possible by copious watering. Flowering commences in March.

(2) Peltophorum ferrugineum:—A hardy and drought resistant tree. Its branches arise about 7 feet above ground. The tree always has a charming appearence when in flower which is independant of the seasons. The smooth bark, the ever-green nature of the tree, together with the branching make it one of the most successful of

trees for planting in narrow avenues and streets. They must be planted about 15 feet apart.

(3) Pithecolobium saman :—(Rain Tree). A well-known tree quick growing when young and very responsive to moisture. When planted in rows it forms an "effective grand arch of considerable beauty." Its branches make an angle of about 45° with the axes. The roots extend superficially for a great distance in the soil so that for plants with similar superficial root system the tree is injurious. The pods are said to have considerable nutrition as fodder for cattle. The leaflets droop at about 2 or 3 P. M. and come in contact towards the upper surface exposing only the lower to light. This is covered with fine hairs which keep off the heat of the sun thus protecting the inner tissue. It is also interesting to note that owing to exposure to light the lower moiety of the leaf develops a palisade tissue similar to the one towards the upper surface.

P. S. Jivanna Rao.

(To be continued.)

Reviews.

The Indian Science Congress Number 1919.

The 1919 Indian Science Congress Number of the Pusa Agricultural Journal, published as Vol. XIV Part III, is a bulky volume running to nearly 140 pages and is interesting reading. It opens with a very interesting article, by the President of the Agricultural Section, entitled "Economic factors of Agricultural Progress." For rapid agricultural progress, the Hon'ble Mr. G. F. Keatinge C. I. E., I. C. S., considers, that the farm should be a fixed and permanent unit, to admit of permanent and contiuuous improvement; and the farmer "a fluid and movable unit," so that the fittest man may get into the job. In India the conditions are exactly the reverse of the above. The frequent

fragmentation of holdings, by constant divisions and sub-divisions among the inheritors of the property, makes it impossible to carry out any orderly development; while, the laws of inheritence, the prevalent easy-going tolerance, and the elastic joint-family system, tend to keep persons at the farm, whether they be fit, indifferent or thoroughly incompetent. He is unable to suggest any remedies but averrs, that, till this condition of affairs, is considerably altered, we cannot hope to make any rapid progress. The Howards contribute a very interesting article on "Drainage and Crop Production." Various other interesting articles follow which space forbids us to review in the pages of this journal. There are three articles, all illustrated, from the staff of our college.

1. Studies in the Chemistry of Sugar cane by *B. V. Nath.*
2. Effect of Salinity on the Growth and Composition of Sugarcane Varieties by *K. Krishnamurthy Rao* and
3. Some Foreign Insects which we do not want in India by *T. V. Ramakrishna Iyer.*

The Editor in the preface remarks that space does not allow the publication of all the papers read at the agricultural section, and we are reminded of the complaint by a previous governor of Madras, that, in the session of the congress at Madras, in the year 1915, there was a scarcity of papers in the Agricultural section. We hope, that, when next the congress comes to Madras, there will be a need to issue a double number.

T. S. V.

Extracts.

Responsibilities of Botanical Science.

"Some Responsibilities of Botanical Science" is the subject of Prof. B. E. Livingston's address to the Botany Section of the American Association for the Advancement of Science meeting

at Baltimore last December (Science, February 28, 1919). The work of botanical science is at present carried on by a sort of guerrilla warfare, each man for himself; for a planned and productive campaign co-operation is necessary. The objects to be attained are twofold. The first is the conservation of knowledge already attained. The existing means for presenting botanical abstracts and resumes are merely makeshifts; there is need for a national or international institute for the furnishing of bibliographical information on request. Such an institute would be a great undertaking, with a permanent staff of departmental heads and a corps of bibliographical assistants; but it would seek the co-operation of all men of science. It would avoid enormous waste of time and energy on the part of scientific workers and research institutions, and give congenial employment to many who wish to serve in scientific work, but may not find their best places as teachers or research workers.

The second object is botanical research, which is considered under three heads: the planning of research, the procuring of data and the interpretation and presentation of results. Prof. Livingston emphasises the absence of any recognition of the investigator as such and the striking charateristic that most of the published work appears to be done by apprentices. The planning of scientific investigation deserves much more attention than it generally receives, and our selection of problems and planning of projected investigations would be greatly improved if co-operation between competent thinkers were more in vogue. The securing of the requisite observational or experimental data is the easiest part of investigation, but comparatively few writers trouble to interpret their results in a logically complete manner. A discussion is written from the point of view of one out of several or many logically possible hypotheses, and one of the greatest wastes in biological research lies in the publication of so many uninterpreted observations. Finally, there are the responsibilities

towards applied botanical science, not only the practical applications in the arts, but also the philosophical applications to other branches of science.

(Extract from "Nature" April 24, 1919, No. 2582, Vol. 103.)

T. S. V.

The Water Hyacinth—A new textile plant.

The Chamber of Commerce at Saigon (capital of French Cochin China) made a report of the occurrence of this plant in Further India to the French Professor M. Perrot who thereby laid the foundation of a new industry. This aquatic weed was spreading very rapidly in that country and in a short period covered all the ponds and lakes to such an extent that it soon came to be regarded as a serious pest. It was noticed in Cambodia about 1902 and appears to have arrived there from the Philippines or from Java or probably from Japan. Since that time it spread so enormously that the authorities became anxious lest it should hinder navigation. The natives were advised to collect and burn the plants and the province of Battanbang had to sacrifice a considerable sum of money for this purpose. Perrot found that the plant possessed strong fibre which may doubtless be turned to good account as fibre. He removed the leaves and crushed the stalks in a machine so as to clear the fibres. After drying in the shade he was satisfied about the strength and flexibility of the fibre and found it suitable for cords, binding threads and larger ropes and also for woven mats and sail cloths. It was found to be specially suited for chair bottoms in place of cane work. Of more local interest was its use in the manufacture of rice gunnies for which it was shown to be excellent. For chairs usually used in Cambodia, the fibre was of sufficient flexibility and strength similar to jute. Its specific gravity is also same but it can be diminished by treatment with solution of chrome-alum whereby the pores are closed and the

material is rendered impenetrable to water. The fibre takes any kind of colour and its firmness and strength have also been proved to be satisfactory. According to Perrot's process which can be carried out by native workmen 100 kg of green stalks will yield 4·5 kg of perfect fibre. The thread may be compressed into small balls by means of the usual presses and exported to the thread manufactories of Europe, of course in small quantities at present.

(Der Tropenpflanzen 1913).

"Leucas."

A great future for Ximenia Americana.

Ximenia Americana is a large thorny shrub or a low tree belonging to the Olacaceæ family and not Oleaceæ as mentioned in the International Review, year 9, number 9, September 1918 and is a cosmopolitan tropical plant. It is said to be particularly abundant in America and the west coast of Africa and is also said to occur on the coasts of Tenasserim, the Andamans and the Malayan Archepelago. It is commonly found in this Presidency in the Circars in the dry parts of Vizagapatam and Godavari Districts, in Deccan in the Hills of Bellary, Nallamalais of Kurnool, Ballepalli of Cuddapah, Walliar jungles of Coimbatore; and Chinnar in Travancore and Somanathpur and Shimoga in Mysore.

It is a root parasite with small ovate obtuse leaves, often appearing folded lengthwise when young, bright orange scarlet, edible, one seeded fruit and yellowish red, hard, close grained wood, sometimes used as a substitute for sandal. Kernel is also said to be eaten.

It was successfully proved in the year 1906 to be parasitic in nature and its haustoria are distinguished by their large size and "their great enveloping growth frequently hiding the host's root in their embrace". It is known as "Nakkira or Uranakkira" in Telugu "Cheru Elandai" in Tamil, "Pinle Kayin" in Burma and is called "mountain plum" or "sea plum" in Jamaica and "Zuur pruin" (acid plum) in South Africa.

The value of the fruit is said to lie particularly in the high oil content of its seed. In all probability the plant may be largely used commercially as soon as it is better known and cultivated more carefully and intensively.

Among the new properties found in it, particular attention is drawn to the hexabromide test and the special properties of the solid acids. According to its percentage of bromine derivations insoluble in ether, Ximenia should come immediately after linseed and candle-nut oil in the list of siccative oils, with respect to the linoleic acid content.

The oil extracted from this plant is said to be used by the South African natives to make candles and to anoint their bodies. The fruit is said to make excellent preserves.

(International Review of the Science and Practice of Agriculture dated 1st March 1919). C. T.

The Development of Agricultural Research and Education in Great Britain.

So little attention seems to have been paid for a long time to agricultural research and education in Great Britain that a number of capable men were obliged to seek employment abroad. The first attempt to remedy this was made by Mr. Lloyd George in 1910 by starting the Development Commission which was provided with funds for the promotion of agricultural industry. The Commission gave a grant of £ 50,000 for a scheme of the Board of Agriculture for the promotion of agricultural research and education, and the latter distributed the amount to various institutions and one of the conditions was that the Board should be supplied with a report on the work done. As a result, the laboratories were very much improved, staffs were strengthened so that a considerable amount of technical knowledge was obtained to tackle agricultural problems.

After eight years' work, the Board was fully satisfied with the results obtained and so it now proposes for further development. Its scheme involves an expenditure of £ 400,000, of which colleges are to be subsi-

dised by £ 40,000, research by £ 100,000 and the remainder to country and other work. The scheme emphasises on more country work, more farm institutes and more experimental stations. It proposes to give scholarships to a larger number of men who have distinguished themselves at the Universities in natural science, to specialise in agricultural science to qualify them for appointments in research institutions. A scholarship system is already in existence in which there are only 40 permanent research posts; but it is proposed to raise these to 150. The striking feature is that the teacher is made responsible to the candidate whom he nominates. This makes it possible to get none but the best men.

Increase of agricultural education is proposed to be done by giving grants to the existing schools and colleges to develop on more extensive lines. Work of the colleges is to be of use to farmers who must be brought into contact with demonstration farms and such other organisations. It is also proposed to increase farm institutions where sons of farmers and labourers could send their sons, if schools and colleges are not possible. Lastly, there is to be provision for giving short courses to school teachers from rural districts.

(Extract from Nature, May 22nd 1919).

U. V. R.

Notes and News.

With a gift of 50 Rupees received from Mr. D. T. Chadwick a tug-of-war rope has been purchased. It was used for the first time during the peace celebrations at College when Dr. Norris' wards won the intertutorial match and the farm staff beat the College staff. We tender our best thanks to Mr. Chadwick for this most useful gift.

Estate News.

During the first half of June Mr. Niccols, the Government Architect paid a second visit to the college, we understand, in

nnection with the location of the new "Teaching College." his is to be a tiled building and placed to the south west of the esent building. We further learn that later on similar construcns are projected at the other three corners as well. What will ese be?

The Director of Agriculture stayed at the college for about a ek and Mr. Wynne Sayer, Secretary of the newly organized gar Bureau, visited the Sugarcane Breeding Station.

We are soon to have an extension of quarters on the estate, vernment recently sanctioning 3 Provincial quarters, 3 A's, 5 B's. C's and 24 intermediate quarters. These we learn, are likely be built on land newly to be acquired to the south east of the tate. The intermediate quarters are a new innovation, first roduced into the estate by the Government Sugarcane Expert d are to be allotted to officers drawing upto Rs. 30.

We are glad to learn that a building for locating a mess where officers on the estate can have boarding has been sanctioned by vernment at a cost of Rs. 2000. It is proposed to find accommodan for a few officers to lodge therein as well and it will be a great nvenience. It is to be located behind the present Officers' Club d is to be under the management of that body.

Students' Corner.

ADMISSION OF NEW STUDENTS.

Admission of students for the short course went on briskly ring the month. Mr. McRae and Mr. Ananda Rao spared no ins in conducting a suitable preliminary test. 50 students were lected. On the 16th instant, when the class assembled it was und that half a dozen had dropped off. This has been made od since. Most districts are represented.

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Editorial Notes.

The Pest Act.

We publish, elsewhere, a notice which was widely circulated in the District of Coimbatore regarding the enforcement of the Pest Act in relation to the "Pink Boll Worm" and "The Stem Weevil" on Cambodia cotton in that District. Just now such a measure will come as a shock to most growers of Cambodia, as the plants are still in bearing but the Government is compelled to enforce this, in the larger interests of cotton growing in general in the District. We will only remind our readers that similar acts are in operation in the other countries of the world and that the sacrifice of purely individual interests to the larger interests of the community is an indication of a higher type of civilization. We can do no better service to the country than to explain to the discontented the paramount need for such a measure.

We publish, elsewhere, details of the preliminary Peace Celebrations at the college. We desire to invite attention of our readers to that portion of the proceedings of the committee whereby they set apart a sum of Rs. 300 for forming the nucleus for a scholarship to be called "The Peace Scholarship" and to be given to one of the students at this college. We can assure the Peace Celebration Committee that they could not think of a more peaceful object than this. Agriculture is essentially a profession of peace.

The Peace Scholarship.

We publish, elsewhere, details of an industrial laboratory proposed to be started at Coonoor by Sir Frederick Nicholson, the Hony. Director of Government Fisheries. Sir Frederick has become a name to conjure with, in this Presidency and the fact that the scheme has been launched by him is a sure guarantee of success. We invite his attention to the Bulletin shortly to be published and entitled, "Exhibit of food and Industrial Products made from Local Agricultural Produce at the Madras Industrial Exhibition, December 1917" as it contains work of parallel nature carried out in this college.

An Industrial Laboratory at Coonoor.

We would remind our readers of the advertisement which appeared in the issue of the Journal for August 1918, in which Messrs. Ranga Raju Bros. offered a handsome prize of Rs. 250 for an experiment on the cultivation of Avasarasambha, a short duration paddy. We have now received the report of the Judges who declare that M. R. Ry., K. S.

Ranga Raju Prize Essay.

Sankaran Pillai, L. Ag., Farm Manager, Koilpatti, has won the prize. The committee consider that the "competitor had taken a good deal of trouble over the experiment, and that it represented an honest endeavour to fulfil the conditions laid down" and that the "essay showed signs of considerable care both in the execution of the experiment and the maintenance of the necessary records." In the opinion of the Committee, the experiment showed signs of immaturity, and it recommended the awarding of Rs. 150 only to which the donors have consented. We offer our hearty congratulations to Mr. Sankaran Pillai on the well deserved prize and also take this opportunity of offering our thanks to Messrs. Ranga Raju Bros. for coming forward to offer such an excellent prize and to Messrs. R. C. Wood, D. Balakrishnamoorthy and D. Ananda Rao for having acted as Judges.

We should like to record here, our regret and that of the committee of Judges, that only one should have competed in the whole of this Presidency, for such a valuable prize and to take to ourselves the warning, that, unless competitors come forward in much larger numbers and evince more interest than they do at present, we should lose the support of the generous members of the Union in such laudable objects. We hope our members will help us out of such a predicament.

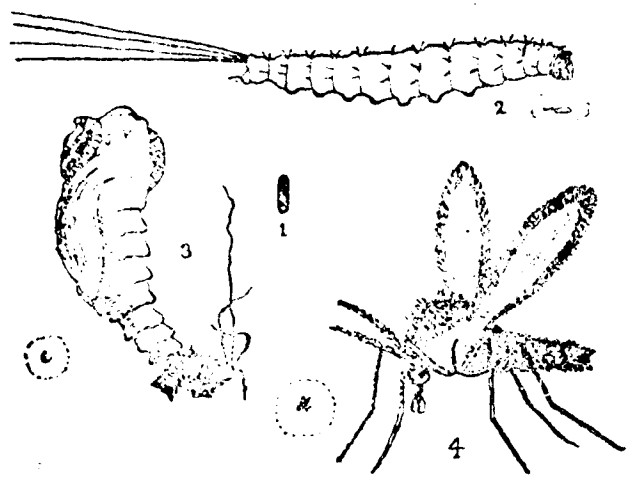
Some Blood-sucking Insects.

Chief among the blood-sucking insects are mosquitoes, sandflies, bed-bugs and head-lice.

A knowledge of the life history of these insects would be of great help in dealing successfully with their extermination or diminution. Mosquitoes, as is well known, breed in stagnant water. The females lay a number of floating eggs raft-fashion closely-packed on the surface of stagnant water, the requisite condition being the presence of sufficient algæ as food for the offspring. From the eggs hatch out "wrigglers" which after undergoing the final moult turn into pupæ. The pupal stage lasts but for about 48 hours, when the mature insect emerges. The whole life-cycle from egg to mosquito is completed in about 10 days. The popular belief is that mosquitoes breed only in ill-drained marshes and swampy jungles and ponds or any other large reservoir of water, but occurrence of mosquito larvae has been commonly noted not only in large stagnating sheets of water, but also in gutters, in and outside houses, under culverts, in broken pots and vessels, in leaf sheaths, and even in tin trays used for the stands of cots or meat-safes, and in short, wherever there is sufficient water and the requisite conditions. If a careful search is made, the breeding places may, with few exceptions, be successfully traced out. In the case of large permanent reservoirs of water in the vicinity of our homesteads, great care should be taken that the water does not tend to stagnate. Wells should be kept clean. Small ponds for irrigation purposes in gardens, which offer excellent breeding places for mosquitoes may very well be treated once a week or even more frequently with a surface film of kerosene, or any mineral oil which will spread evenly over the surface and prevent the larvæ from breathing. If there is an undesirable marsh in the neighbourhood of inhabited quarters every effort should be made to drain it. It is certainly easier to cope with breeding places at home. Gutters in a backyard are very likely breeding places and should therefore be regularly disinfected and the water baled out, at least once a week, considering that from the oviposition to the emergence of the mosquito, there is an interval of ten days. Water in tin-trays used to isolate bedsteads or other furniture should have an application of kerosene or tar to keep away the female mosquitoes from ovipositing therein. When it is known that such terrible, yet common, diseases as malaria and elephantiasis

are carried by mosquitoes, it is needless to impress upon the importance of keeping away mosquitoes from our homes and the better method is to lay the axe at the root—destroying these unwelcome visitors in their harmless infancy.

Another little suspected and little known intruder in our homes is the sand-fly which no mosquito-curtain can keep out. The sand-flies are very tiny moth-like creatures, and are often found resting by day in damp places such as bath-room walls or shady corners. Their bite is pungent, and causes an almost immediate irritation. They are technically known as *Phlebotomus*, and very little is known of their life history but they have been observed in India, to breed among wet bricks and other convenient damp places and in Egpyt, in the loam-soil of the Nile. These tiny insects are suspected to be the carriers of rheumatic fevers, like Dengue. It is difficult to see one's way through a remedial or preventive measure where nothing or little is known about this insect's life-history and breeding habits; but a general cleanliness in and around houses, especially in bath-rooms tends to minimise the pest in an appreciable degree.



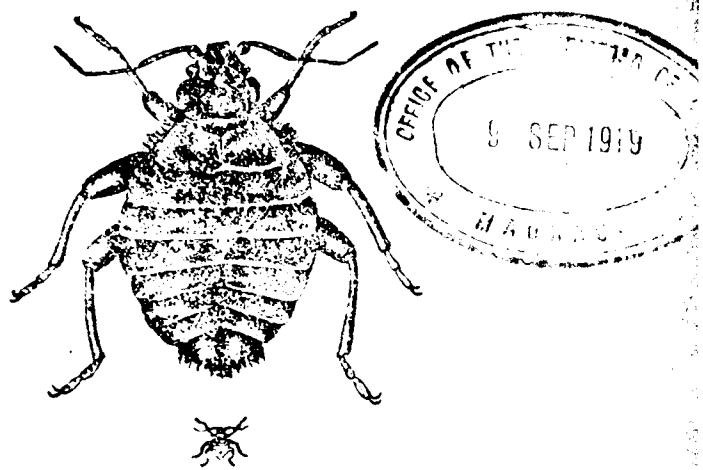
Sand-fly. 1. Egg; 2. Larva; 3. Pupa; 4. Fly. All the figures are considerably magnified, their natural sizes being indicated by the smaller figures inside the dotted lines (After Fletcher).

Fleas, in South India, are a pest with which the inhabitants of the hills have more to do than plainsmen. But elsewhere, in Europe and in higher altitudes, they appear to be very troublesome. King lake's experience of them in Palestine is interesting. "The fleas of all nations were there. The smug, steady, importunate flea from Holywell Street, the pert jumping '*puce*' from hungry France, the wary watchful '*pulce*' with his poisoned stilletto, the vengeful *pulga*,' of Castile with his ugly knife, the German '*floh*' with his knife and fork insatiate, not rising from table, whole swarms from all the Russias and Asiatic hordes unnumbered—all these were there and all rejoiced in one great international feast." At any rate, the plainsfolk of Southern India may rejoice that it is not so bad! The life history of the flea is worth noting. "Eggs are laid on dirty clothes, in birds' nests (occasionally in house sparrows'), or in a dusty corner. After an interval of several days, variable according to climatic conditions, there comes out a tiny vermiform larva provided with a frontal needle-shaped horn, which serves the purpose of breaking open the egg-shell. This larva feeds on all sorts of rubbish, provided a fair quantity of nutritive matter is found therein. At the first moult, it loses its frontal horn and grows fat and stout. Before pupating the larva which had been dirty brown hitherto turns milky white, and seeks a nook where it spins for itself a fine cocoon. The usual metamorphosis takes place and the pupa gradually turns brown and gives birth to the perfect insect." A general cleanliness is necessary to prevent the overmultiplication of this pest. Bed clothes and all night apparel should be kept well-aired and exceptionally clean. Washing the floor, window sills, and old corners in the house with tar-soap or phenyl at regular intervals and dusting likely breeding places with pyrethrum powder, has been known to keep down this troublesome insect.

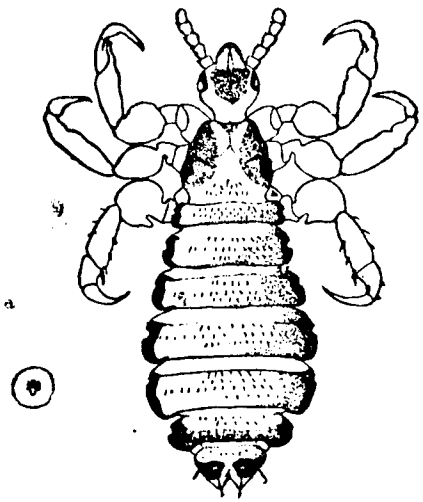
The bed-bug is another of these unwelcome vermin. It is all the more so, because of its baffling all honest control measures and holding its own. Curious stories about the subtlety of this bug in

*Extract from "Insects as Carriers of Disease" an article contributed by the writer to the Magazine of the St. Joseph's College, Trichinopoly for March 1911.

dropping from the ceiling right on to its victim, and copious literature have sprung upon this loathsome inhabitant of our homes; however curious may be the other stories about this pest, yet its tenacity of life is irrefutable. Its bloodthirsty habits are a matter of daily experience to many. The eggs of the bed-bug are laid in cracks and crannies in walls and furniture. Four or five moults are undergone before the bug attains maturity. The fully developed bug is as bloodthirsty as the little nymph. The nymphs as well as the adults are wingless. While sucking, the bug injects into the skin of its victim an irritant liquid, whence the itching. The bed-bug is capable of transmitting the parasite of kala-azar, an intermittent fever. Thorough cleansing with boiling water after using pyrethrum (Keating's) powder or petroleum or strong tobacco infusion seems to be an effective method. The Railways facilitate the spread of this noxious insect; it would, no doubt, be a good thing if railway carriages and other locomotive conveyances, in the interests of the public, were periodically disinfected, in airtight fumigating chambers with carbon bisulphide or Hydrocyanogen gas, under expert supervision.



Bed-bug. The small figure shows the natural size. (After Fletcher).



Head-louse. The small figure within the dotted circle shows the natural size. (After Fletcher).

Last of all the blood-sucking insects, comes the head-louse. This insect is the result of the want of personal cleanliness in man. Rub the infected head with :—

Kerosene or Camphor oil—2 parts.

Olive or Gingelly oil—1 part.

and wash with Carbolic soap or dilute phenyl. Application of warm vinegar is advocated as a sure destructive agent of the eggs of the head-louse.

P. Susainathan.
Sub-Assistant in Entomology.

The Tiruppur Cattle Show, 1919.

The Fair at Tiruppur was instituted by some pious people of old in connection with the car festival for the Deity there. People from different part of India flock there once a year with the double purpose of worshipping the Deity in the temple and

for buying and selling animals. It was a disappointment to the devotees this year that owing to the faction amongst the managers of the temple the idol was denied the pleasure of being pulled round the streets in a car. But this did not affect the show in the least, which was held on 12th, 13th and 14th June. This was first started by the Government at the suggestion of Lieut.-Col. Gunn, the late Superintendent of the Civil Veterinary Department with a view to encourage pony and cattle breeding in different parts of Southern India. The officers responsible for the Tiruppur show this year worked with great enthusiasm expecting His Excellency the Governor. The route from the railway station to the show ground was decorated with arches and apt aphorisms. The main road never presented a prettier sight with greens and buntings. The painting and the inscription on the last arch were worth noticing. A poor farmer and a pair of bullocks toiling hard at a plough were proclaiming to the public passing under the arch "We pay you all." There were a number of cattle and ponies at the show which were brought from different places. The latter were not well represented and the horse dealers brought in poor specimens even from Ahmadabad. The few ponies worth looking at were the offspring of the Government Stud at Kangayam.

The cattle were well represented, specially the Kangayam bulls and bullocks, so much so, that some pairs fetched as high a price as Rs. 1,200.

There were some typical Kangayam bulls at the show and the College stud bull, Gangan, of the Malabar fame keenly competed.

Only a few cows were brought in for the show though a special prize was offered by His Excellency the Governor. Unfortunately the evil eye is always against this class and amongst the small number that competed Rani and Sakunthala of the

College Farm won quite easily the blue and green ribbons. The prize was given more for the appearance than for the yield. The coveted prize of His Excellency the Governor for the best cow at the market was won by Mr. Ranga Raju's cow of Saidapet Kerry strain. This has been purchased for the Farm and it ought to be an acquisition for the College Dairy.

Out of the prizes allotted for the creations of Viswamitra, the Farm halfbred Delhi buffalos won the first and second prizes. Against their habit, dhobies were punctual on that day with their steeds and one of the donkeys trotted away with the only prize offered for that class. There were only two wool bearing sheep out of the half a dozen that appeared on the show ground. The next class was the arch enemy of the Forest. It was evident from the type represented that sufficient encouragement is not given to goat rearing and breeding. Our Farm friend came out with a yellow ribbon.

There were ploughing demonstrations for the ryots to see and magic lantern lectures for the benefit of the hearers and the spectators. At the appointed time, His Excellency the Governor arrived at the dais erected in the show ground for the occasion. Having introduced himself as a farmer and cattle breeder, His Excellency gave some sound and practical suggestions to the cattle owners and distributed the prizes to the winners. His Excellency evinced great interest in all that he saw at the Show.

A. M. Richards.

Pulse Beetles (a review).

Bulletin No. 6, Entomological Series, of the Mysore Agricultural Department, by Mr. Kunhikannan, M. A., F. E. S., Senior Assistant Entomologist, Bangalore, treats about the pulse beetles attacking stored pulses. The first part of the Bulletin deals with the

details of life-history and with the habits of one of the principal puls beetles The function of the prothoracic plate found in the newl hatched grub was till now more or less obscure, but Mr. Kunhi kannan's observations on this point give a definite explanation as t the exact purpose served by that structure. There are variou other points which bear evidence to the accuracy of the work, but it is to be feared, will be uninteresting to non-entomological readers However, the latter part of the paper which mainly deals with hi very interesting observations and experiments regarding certai new methods of control of store pests will not fail to arrest th attention of any reader—least of all that of the practical agri culturist. Above all, it will serve to teach a lesson to some of us who, with the half-knowledge resulting from the grafting of western thought on an eastern mind, are supercilious enough to speak o the ryot as steeped in ignorance and of his methods as effete an useless, for his experiments were devised to test the general prac tices and beliefs in vogue among the Mysore ryots and have ampl erved to show that the ryot—ignorant though he be accordin to western ideas—is yet the inheritor—an unreasoning inheritor, i you like—of the traditions of an experience and a wisdom datin back to unknown centuries.

The remedy universally suggested by Entomologists for con trolling the pulse beetles is fumigation of the seed before storage o whenever it was found infested. The chemicals generally used fo fumigation are either Hydrocyanic acid gas or Carbonbisulphide the one a dangerous explosive and the other a deadly poison; both of them were therefore thought unsafe to be recommended for th use of the ryots who are as a rule small producers and store thei pulses through the year in their huts for purposes of seed or con sumption. It was therefore felt necessary that remedies should b devised that were less expensive and more suited to the condition of the ryot. With this object in view, the author studied th practices already in vogue among the Mysore ryots.

He found the following methods in practice :—

In all cases the ryots store their pulses after thoroughly drying in the sun for three days.

1. The pulses are stored in earthern pots or in large bamboo bins smeared with clay. After storing, the lid is not opened and the grain is drawn off when wanted from a hole at the bottom which can be closed by a coconut shell from within. The top layer is by this arrangement not much disturbed.

2. The pulses may be stored in gunny bags tightly filled up or in "moodais" which are spherical bundles of grain encased by ropes of straw.

3. The surface layer pulses may be treated with castor oil or the surface may be covered by a top layer of ragi or samai several inches deep.

4. The storage of pulses with a few drops of mercury placed in a soapnut shell.

All these methods were tried by the author at the Insectary at Bangalore. He found that the first three methods though not absolutely effective, were on the whole sufficiently efficacious in practice. During the course of certain experiments he made in connection with a test of these methods, he accidentally discovered the principle underlying all of them, whereby (he declares) "the wisdom of the methods of the ryot became clear at once." The principle depends upon the habit the beetles have after emerging from the grains—of always trying to force their way up till they reach an open space at the surface. Here they pair and the females lay their eggs on the surface layers. If the pulses are packed tight in a bag or a "moodai" so as to leave no empty space they are unable to pair and hence die without laying fertilised eggs or if the top layer is treated with castor oil or covered by a layer of ragi, the beetles are prevented from going back to the healthy grain below.

Following this principle he advocates the use of a thick layer of sand at the top and the drawing off of the necessary grain from a hole at the bottom. It is interesting to note that a similar discovery has been made simultaneously and independently at Pusa also.

The experiment with mercury appears when tried in small jars holding a few seers to have been a marvellous success. The author declares, however, that in large receptacles holding 100 seers or more it was not so effective "even though emergence was reduced by about three-fourths.

Experiments to find out which stage of the insect was affected showed that the effect was on eggs in which the protoplasm was observed to become disintegrated. How mercury effects the eggs, whether this property is due to its vapour or whether the phenomenon is of an electric nature or one connected with emanations as in radium, are all problems to be solved by a trained Bio-Chemist. Is it not wonderful that a few drops of mercury should have the property of affecting the eggs of an insect? Is it not even more surprising that this interesting piece of knowledge should have been derived from the ignorant ryot?

Y. R.

Extracts.

The Government of Madras have approved of starting an industrial laboratory at Coonoor and sanction for a period of one year the following staff for the laboratory :—

(1) One chemical assistant on a pay not exceeding Rs. 150 per mensum.

(2) One laboratory attendant on Rs. 20 per mensem,

(3) One clerk-accountant on Rs. 30 per mensem and

(4) Two lascars on Rs. 10 per mensem.

A sum of Rs. 6,000 will be placed at the disposal of Sir Frederick Nicholson for capital expenditure on laboratory and plant and on working expenses for the purchase of raw material, subject to the condition that the usual accounts are kept.

Letter from Sir Frederick Nicholson proposing the Scheme to the Director of Industries.

"I have the honour to make the following suggestions regarding my proposal to employ at Coonoor a young chemist in examining certain minor industries and industrial problems. My proposals for a fruit-preserving factory will follow later; the present letter deals solely with the proposed work for a chemical assistant.

The minor industries include the manufacture of :—

(a) vinegar;
(b) inks;
(c) adhesives;
(d) certain special toilet soaps and the mode of putting them up;
(e) The extraction of certain volatile oils and essenses.

I think you will agree with me that the goods mentioned are desirable products in this Presidency. We have some 45 millions of people without an ink factory, dependent on outside supplies (I have just met with Japanese inks in 'penny' bottles, sold in the Coonoor bazaar at 3 annas), provided with few adhesives and only at exorbitant prices (e.g., Rs. 1-4-0 per small bottle of office gum) or of poor quality; vinegar is much in demand and should not, being a very cheap product, have to bear the relatively enormous cost of transport from England, while toddy or other country vinegar is ordinarily neither good nor cheap nor palatable. As regards toilet soap preparations, I propose to obtain toilet bases from the Calicut Factory and experiment in working them up on recipes known to me or with certain experimental additions and methods; any success will of course be communicated to you for

the soap factory. It also seems to me worth while to attempt the extraction of essential oils, etc., from various odoriferous plants not yet worked and which grow or will grow profusely and rapidly in this neighbourhood; methods and apparatus, moreover, can be varied, instead of depending solely on the ordinary still. There are other matters for experiment which for years I have had in view, but without chance of attempting them.

Colonel Cornwall has kindly promised me, at all events temporarily and on certain conditions to which I have acceded, the use of vacant laboratory at the Pasteur Institute, and will permit me to put up a temporary shed for coarse work and processes such as the preparation of new materials for inks and adhesives, etc. This will get rid, for the present, of the laboratory difficulty mentioned to you in person, viz., that of building accommodation whether in my own compound or elsewhere.

With this laboratory I can begin work at once without further loss of time. I shall have to order special apparatus from home, but can probably borrow or buy out here enough to begin with. If, therefore, Government will—

(1) Sanction a young chemical assistant with a good knowledge of Chemistry and some manipulative skill, together with a laboratory attendant on about Rs. 30 and a clerk-accountant on the same pay, and two lascars: and

(2) Rs. 6,000 for (a) capital expenditure on laboratory and plant and (b) on working expenses for the purchase of raw material including containers for inks, adhesives, etc., I can begin at once. I do not need any personal allowance since Government have recently granted me, as Honorary Superintendent of Fisheries, a travelling allowance which amply suffices for all personal needs; on the cessation of this allowance when I quit fisheries about August, I can again address you, if necessary, on this point.

The proceeds, if any, of sales of finished goods will of course be paid into the Government treasury, and be set off against ex-

penditure. I do not see why, after six months' experimental and initiatory work, we should not obtain considerable *returns*, if not profits.

(From the Madras Times, 28th July 1919.)

Vitality of seed.

Interesting experiments have recently been made at Rothamsted, to investigate the length of time it is possible for seed of weeds to lie dormant. When, in 1915, it became evident that much grass land would have to be put under cultivation, a field which had been under grass for ten years was chosen, and before the land was broken up, samples of earth were taken inch by inch in succession, down to 12 inches at various points in the field. These samples were at once transferred to sterilised pans and kept moist in a glass house. A number of arable weeds came up from every sample, although the conditions of the experiment were such that these young plants could only have arisen from seeds in the soil dormant as long as the land was in grass. The experiment was then repeated in similar manner on other grass fields of known age and history. Soil from grass fields forty years old gave a copious flora of arable weeds especially at the the depth of six to twelve inches, that from fields sixty years old gave fewer arable weeds, and from fields 200 years old none at all. These observations prove beyond doubt that seed of certain weeds can survive in the soil a very considerable period when deeply buried by the plough.

Extract from Planters' Chronicle, Vol. XIV. No. 17, April, 26 '19.

S. Sundararaman.

Abstracts.

The Founders of the art of Breeding.

The March 1919 number of the Journal of Heredity starts with a very interesting article entitled "The Founders of the art of Breeding." There appears to be evidence, to show, that, the unisexuality of the date palm was known to the Assyrians and the Babylonians, long before the beginning of the Christian era. Kazwini, an arabic writer, who flourished in the B. C's, says of the date, "it is created out of the same substances as Adam, and is the only tree that is artificially fertilised." The first part of the above quotation refers to the varied uses of this tree—over 360 different uses are claimed for the tree—and the second part has an obivious allusion to the methods of cross-pollination which was practised on the tree even in those early years. The lessons taught by the date palm seem, however, to have been subsequently forgotten, till, the existence of sex in plants was subsequently rediscovered by Camararius in 1694, and the subsequent events are modern history and familiar to every breeder.

T. S. V.

The National Research Council of the United States.

One of the effects of the terrific war, which has just been concluded, is the increased attention, which Research, in all its aspects, is receiving at the hands, both of the public and the Government in various countries. In this war, more than in any of the previous ones, Science played a very prominent part, and but for certain recent discoveries, a war of such magnitude would have been impossible. It is pleasant to remember, that, while Science has, of late years, enormously increased the powers of destruction, it has equally increased the powers of protection. It has greatly improved the aircraft, the motor service, and the wireless, while it is believed that great strides have been made in the science of healing and nursing. We Cull the following from NATURE, May 29th, 1919. "After the attack on the *Sussex* in April 1916, the National Academy of the United States offered its services to the President for organising the research facilities of the country in order to prepare for an eventual active part of the United States in the War.....This offer was accepted by the President and "The National Research Council" was constituted. So successfully has this council been

carrying on the duties entrusted to it during the time of war, that it has now been decided to make it a permanent organization, so that its advice and help will now be available."

Thus, the national direction of research work in the United States has become vested in a body of men whose conduct of research work during the war period of that country has shown that they are competent to handle the great problems which go with peace and reconstruction. The scheme is a wise one, because it calls for the closest co-operation between the Government and the research worker, but leaves the decision as to the methods of attacks in the problems involved in the hands of experts.

T. S. V.

Notes and News.

Water culture.

The following is the result of a Water Culture Experiment conducted in the Botanical Laboratory for class IV last year. The plant used was Dolichos Lablab and the solutions were prepared according to the formula of Von Crone Viz.,—

Potassium Nitrate	1·0 grm.
Ferrous phosphate	0·5 grm.
Calcium sulphate	0·25 grm.
Magnesium sulphate	0·25 grm.
Distilled water	2 litres.

The experiment was started on 17-6-18 with seedlings five days old and the final observations were made on 19-7-18. It is interesting to note that similar results have been obtained this year also. The plants are noted according to their ascending order of growth.

1. Distilled water. Very few lateral roots. First leaves alone appeared and remained throughout. No further growth.

2. Minus Calcium. First seedling perished. The second dragged on. First leaves large, the rest (3 or 4) withered and dropped. Root system poor.

3. Minus phosphate. The plant was very stunted. But leaves remained. Root system poor as in 2.

4. Minus nitrate. Roots better than in 3. Plant stunted though healthy but less growth than in 3.

5. Minus iron. First leaves green. Later leaves pale yellow, 4 or 5 leaves remaining. Roots fairly good.

6. Minus magnesium. Roots more copious. Plant well developed with numerous leaves. Did not appear to be very much affected. Leaves larger but spotted, otherwise quite healthy.

7. Minus potassium. Mostly as in 6. Leaves of smaller growth nearly as satisfactory as in 8 (below). Root system quite good but not so copious as in 8.

8. Normal solution. More satisfactory growth of root and shoot than the rest.

Leucas.

Estate News.

The Agricultural College Peace Celebration.

On receipt of information that Germany had signed the Peace Treaty, a meeting of the staff and students of the Agricultural College was held on 30th June 1919 to concert measures for celebrating the peace in a fitting manner. A provisional Committee with power to add was appointed to make necessary arrangements. On 2nd July 1919 there was another meeting at 1 P. M. in the College Hall when Mr. E. Ballard, Mr. Broadfoot and Dr. Norris were introduced to the audience by Mr. McRae, the Principal of the College, as the only members of the

College who had been on active service. They gave short speeches on, the causes of war, the events of war and conditions of the Peace Treaty respectively. Mr. R. D. Anstead made an appeal to the audience to contribute to the One Rupee war fund.

The whole body then adjourned to the sports ground where tug-of-war matches between various teams and relay race among students were arranged.

On Saturday, 19th July 1919, which was a public holiday—the day fixed for Peace Celebrations in the British Empire—1000 poor were sumptuously fed at 12 noon, for this the Collector of Coimbatore, to whom our thanks are due, kindly gave Rs. 100, from the amount sanctioned by the Government to the District. A portion of the feeding expenses was also met from the funds collected at the College. Thus ended the preliminary Peace Celebrations, the bigger portion of it being reserved for the cold weather rejoicings on the dates to be fixed by the Government of India.

A sum of over Rs. 500 was subscribed for in the estate to which the Director of Agriculture, Madras, kindly added a sum of Rs 100. After alloting funds for various items, such as sports entertainments, torchlight procession etc., at a meeting of the Committee held on 14th July 1919, the Committee resolved that the balance of Rs. 300, which will be left over after meeting all the expenses be set a apart to from a nucleus for the "Agricultural College Peace Scholarship Fund." Savings of about Rs. 50 effected by the feeding Committee will be added to the Scholarship Fund.

C. Tadulingam,
Secy : Peace Celebration Committee.

Officers' Club. At a general body meeting held on 17th July the following have been elected office-bearers for the year 1919—20.

Messrs. C. Tadulinga Mudaliar (President). U. Vittal Rao (Secretary), T. S. Alwar Ayyangar (Treasurer), V. Muthuswami Ayyar and T. V. Rajagopalachari, (Members), and the auditors are Messrs. Rao Sahib M. R. Ramaswami Sivan and P. S. Jivanna Rao.

There was an interesting philosophical discourse in Tamil at the Officers' Club on July 27th by M. R. Ry. Sadasiva Chettiar on "God and the Universal creed." The discourse was much appreciated by the members.

Students' Corner.

Students' Club. The sporting activities of the Students' Club have been resumed with reopening of the College. With the passing out of the senior students, the Club lost several of its useful members notably Chellam Ayyangar, Muthuswami Ayyar, and Bhakta. But it is graftifying to see that the gaps so created are being filled up by newcomers of whom Dasappa Malli and Doraiswamy may be mentioned.

About the beginning of the term new office-bearers were elected for 1919—20 as below :—

William Soans	Games Captain.
K. G. S. Bhandary.	Games Secretary.
K. L. Ramakrishna Rao.	Club Secretary.
M. C. Narayana Menon.	Vice-Captain.
V. K. Subbarahmanya Mudaliar.	Representative, Class III.
C. S. Seshagiri Ayyar.	" II.
Thomas Jacob.	" I.

A long list of fixtures has already been drawn up, and this lasts till the end of December. There are 18 matches in Hockey, 10 in Football, 4 in Cricket, of which 22 matches will be played on our ground. The club is specially indebted to Dr. Norris, who is taking

such a keen interest about it. We wish them all success and hope that the Hockey and Football cups which were unfortunately lost last time, will be wrested back.

The following is a list of fixtures for August.

Date.	Game.	Opposing team.	Ground.
August 5	Hockey.	Central Recruit School.	Home.
9	Hockey.	Coimbatore College.	Home.
12	Hockey.	Central Recruit School.	Outside.
16	Football.	Young Mens' Union.	Home.
18	Hockey.	Forest College.	Outside.
23	Football.	London Mission High School.	Home.
26	Hockey.	Forest College.	Home.
30	Hockey.	Reserve Police.	Outside.
31	Cricket.	Forest College.	Home.

A Player.

Notice to all Growers of Cambodia Cotton in Coimbatore District.

It has become a practice among careless and indifferent farmers to leave their Cambodia Cotton on the land for more than one season. In some cases crops even three and four years old are seen. Good and careful farmers do not do this. They realize that some other less exhaustive crop should be grown on the land, and they also realize that such old crops are a serious menace to their new cotton crops as they harbour and breed insect pests and disease.

The two insects which cause greatest loss to the farmer are the **Pink Boll Worm** and the **Cotton Stem Weevil**. The former is the red grub so commonly seen in kappas, especially the kappas of two and three years old crops. This is the cause of all the stain and immature and 'dead' cotton, the presence of which very greatly reduces the value of the kappas. The latter is the white grub

which causes the swelling at the base of the plant and which often causes the cotton plant to die entirely.

The Government of Madras have passed a Law in the Legislative Council '*For the prevention of the spread of insect pests, plant diseases and noxious weeds*' and the Government propose to apply this for removal of all old crops of Cambodia Cotton as they consider that such crops are detrimental to the yield and quality of the cotton grown and therefore against the interest of the growers themselves.

All old crops therefore of Cambodia Cotton in the Coimbatore district are to be pulled out before July 31st, by which time the summer picking will have been completed. Government trust that all farmers in this district will heartily co-operate with the officers of the Agricultural Department by removing their old crops of Combodia Cotton before that date.

When the cotton plants have been pulled out, these should be left spread in the field for a week or ten days. The hot sun will dry up the plants completely and destroy the insect pests which are breeding in them. After this the stalks can be carted and stacked for fuel as usual.

As the sowing season for Cambodia Cotton does not usually commence till September, this removal of the old crop by the 31st July means that all the land is free from cotton for some time and that these insects, not having anything to feed upon or lay their eggs on, will to a great extent die out.

Growers of this cotton should therefore consider this matter and remove such old crops before July 31st and thus protect their own and their neighbours' new sowings. If any ryots do not profit by this warning, the Government will be reluctantly compelled to put the act into force and thus safeguard the general interest of growers of Cambodia Cotton.

Students' Club. Statement of Account for the year ending 30th April 1919.

Receipts.	Rs.	A.	P.	Rs.	A.	P.
Opening balance.				429	15	3
By Subscriptions from students ...	628	0	0			
„ „ „ Officers ...	6	0	0			
„ „ „ Special course students ...	24	0	0			
„ Donations from officers ...	61	0	0			
„ Entrance fees to Tennis Tournament.	5	0	0			
„ Arrears of Tennis Subscription ...	3	12	0			
„ Students' Subscriptions to "Victory Cup"	65	8	0			
By Sale of old newspapers ...	27	15	0			
„ Sale of old balls	9	9	3			
„ Miscellaneous collections ...	33	6	7	864	2	10
				1294	2	1
Total ...				1294	2	1

Agricultural College, Coimbatore.
30th April 1919.

Expenditure.	Rs.	A.	P.	Rs.	A.	P.
Games.						
Tennis	45	1	0			
Football	42	7	5			
Hockey	80	5	0			
Cricket	111	4	10			
Badminton	15	15	7			
Sports entrance fees	11	0	0			
Tiffins, Lime fruits, drinks etc., during matches	73	15	3			
Conveyance charges for matches etc. ...	26	11	0			
Establishment including feeding of the boy	124	4	4			
Repairs to Tennis courts	130	2	2			
Postage	1	3	6	662	6	1
Literary Section.						
Dailies	103	10	0			
Periodicals	35	14	0			
Books for the Library	101	5	6			
Lamp for the library	18	0	0			
Lighting charges	13	15	2			
Railway freight for books and other miscellaneous charges ...	12	12	9			
Postage	0	10	0			
Furniture	5	6	4	291	9	9
General						
Auditor's fees for the year 1917—18 ...	10	0	0			
For Victory cup to the Principal ...	65	8	0			
Social gathering	47	14	0	123	6	0
				1077	5	10
Closing balance ...				216	12	3
				1294	2	1
Total ...				1294	2	1

(Sd.) C. Tadulingam.

Departmental Notes.

Appointments etc :—

Mr. T. A. Rangaswami Ayyangar, Sub-Assistant, Government Sugarcane section is appointed as Assistant Farm Manager on probation on Rs. 35-2½-75 and posted to the Sugarcane Station.

Mr C Ramamurti, L. M. E. (Honors) Head Driver in charge of Water Works, Bezwada, to be sub-pro-tem Foreman of the Workshop attached to the Office of the Government Agricultural Engineer on Rs. 75, 75, 75-5-125, vice M. R. Ry. M. V. Jaganatha Ayyangar on other duty as temporary lecturer in Government Trades School, Madras.

The resignation of Mr. K. Mahabala Rao, late Assistant Farm Manager, is accepted.

Leave :—

Mr. C. S. Gopalaswami Rao, Sub-Assistant, Government Mycologist's Section, is granted privilege leave for 6 weeks from 21st July 1919.

Mr. A. Ramaswami Ayyar, Assistant Agricultural Demonstrator, is granted privilege leave for one month from or after 15th August 1919.

Mr. T. S. Ramasubramanya Ayyar, Assistant in Chemistry, is granted privilege leave for 30 days from 4th June 1919.

M. R. Ry. Rao Saheb A. Rama Rao, Farm Manager, Mangamallar is granted an extension of privilege leave for a fortnight in continuation of two months' leave already granted.

Mr. P. V. Issac, Assistant in Entomology is granted combined privilege leave for 3 months and 23 days and leave without allowances for 23 months and 7 days from the date of relief.

Mr. W. Raghavachariar, Agricultural Demonstrator, is granted extension of privilege leave for one month and twenty seven days combined with sick leave on medical certificate for 1 month and 3 days in continuation of 3 weeks' privilege leave already granted.

Mr. A. K. Subramanya Ayyar, Supervisor, Pumping and Boring section is granted privilege leave from 20th July 1919 to 31st August 1919 from four days after date of relief by Mr. Narayana Murthi Pantulu Lecturer in Engineering.

Mr. J. Lakshmayya, Assistant Farm Manager, is granted an extension of leave on medical certificate for 3 months.

Postings :—

Mr. V. G. Dhanakoti Raju, Farm Manager, Koilpatti Farm to District Work, Sattur.

Mr. K. S. Sankaran Pillai, Farm Manager to be in charge of Koilpatti Farm.

Mr. K. Sitharama Ayyar, Assistant Farm Manager to District work in the V circle.

Mr. K. E. Viswam Ayyar, Assistant Agricultural Demonstrator to Koilpatti Farm.

Mr. Ganesa Ayyar to VII circle, Coimbatore.

Mr. Viswanatha Rao, Assistant Farm Manager, to District work, Tanjore, for Training.

Mr. Ayyaswami Ayyar, Assistant Farm Manager, to District work, Tanjore for Training.

Mr. B. Mangesha Rao, Assistant Farm Manager, to District work, South Kanara.

K. Vasudeva Shenoi to report to the Deputy Director of Agriculture V and VII Circles to work on the west Coast on relief.

Mr. P. Ranganayakulu to relieve Mr. Vasudeva Shenoi at Bantanahal—to join without delay.

Mr. V. G. Dhanakoti Raju, Agricultural Demonstrator to the Central Farm to be Farm Manager.

Mr. L. S. Natesa Ayyar on relief to revert as Assistant Farm Manager Central Farm relieving Mr. C. S. Namasivayam Pillai.

Mr. C. S. Namasivayam Pillai on relief to place himself at the disposal of the Deputy Director of Agriculture, V and VII circles for District work Coimbatore.

Advertisement.

Applications are invited from ex-students of the Agricultural College, Coimbatore, who have obtained the proficiency certificate in Agriculture for vacancies in the lower subordinate grade on Rs. 35-2½-75 in this department.

R. Cecil Wood,
Ag. Director of Agriculture.

THE JOURNAL
OF
The Madras Agricultural Students' Union.

Vol. VII. September, 1919. No. 9.

Editorial Notes.

His Excellency's visit to the College.

His Excellency Lord Willingdon visited the College and estate on the 18th September between 10 A. M. and 1 P. M. His Excellency motored direct to Field. No. 37, the black soil field in front of the college where he was met by the Director and the Principal. He saw there the working of the "Fordson" Motor tractor both with the disc plough and the mould-board plough, Mr. Pickworth representative of the Russa Engineering Works, Madras, being in charge of the demonstration. We publish elsewhere an interesting extract on the working of these tractors.

Mr. R. C. Wood, the Director of Agriculture then took the party round the cattle sheds and the whole party felt much interested in the Breeding bulls which were tethered outside to facilitate inspection. His Excellency whose

interest in dairying is well known took special interest in the dairy stock. Readers will easily remember the interesting article which appeared in the Agricultural Journal of India, January 1918, on. "The Ganeshkhind Dairy Herd" from the pen of His Excellency.

He was then shown round the Dairy by Messrs. Wood and Broadfoot when the Principal, Mr. McRae took charge of the party. The party then proceeded along the Kees Road via the Co-operative Stores, past the Officers' Club and then to the Post Office, passing in front of the Hostels. Here the plan of the projected extensions of the new Teaching college was explained by the Principal and the party drove via the back entrance of the college and along the western road to the portico of the college.

Here His Excellency was again received by the Director and the various gazetted officers of the staff were introduced to His Excellency. He visited the various laboratories at the college spending about a quarter of an hour in each. He is said to have been well impressed with all he saw and it is our regret that His Excellency was not able to spend more time in this institution. We however learn that His Excellency has promised to take another opportunity to go to the college. At the time of the visit His Excellency was unwell and it speaks volumes for the great interest that our Governor takes in agriculture, that in spite of ill-health he found the inclination to visit it.

The Pest Act in the Coimbatore District.

We publish elsewhere a note from the Publicity Bureau on the operations of the Pest Act as enforced in the district of Coimbatore. The reports from all hands show, firstly, that the ryots took to it kindly when once the serious nature of the probable damages resulting from the pests against which this act was enforced, was brought home to them and, secondly, the creditable way in which the members of this department carried out the rather difficult task that was entrusted to them. Our department is one in which "Zulum" plays no part. It is a source of great pride to us that our brethren in the district did the work with such credit. We have seen a note in one of the prominent dailies that the ryots went beyond the Agricultural department in hitting upon the doubly useful plan of having the crop grazed by cattle. We realize the inherent intelligence of the local ryot but it is but, fair to state, that, we know it as a fact, that this method of getting the crop out of the ground was freely suggested by the members of the staff. A great deal of the smooth working of the Fact is attributable to the elasticity with which the measure was enforced, days of grace being allowed freely wherever and whenever it was thought reasonable.

We learn that definite orders have been received appointing three of our members to posts in Mesopotamia. Mr. B. Viswanath for Chemistry, Mr. Y. Ramachandra Rao for Entomology and Mr. S. R. Venkatakrishna Mudaliar for Mycology. All have left Coimbatore and are expected to

sail from Bombay on the 18th October Members of the Union will easily remember the prominent part taken by Mr. B. Viswanath in our College Day celebrations and Mr. Y. Ramachandra Rao helped this little journal on several occasions as a member of the Editorial Board. We wish all the three a *Bon Voyage* and a safe return. We are glad that out of the four science officers selected for appointments in Mesopotamia three are from Madras. The department ought to be congratulated on having scored so well.

Bon Voyage to Mesopotamia departures.

Birds.

In attempting to list the "Birds of the Central Farm and its vicinity with reference to their economic importance" for publication in the columns of this Journal, it was found highly desirable, as a prelude, to explain the general characteristics and the main natural divisions of the feathered tribe from the popular point of view.

The general characteristics of Birds:—

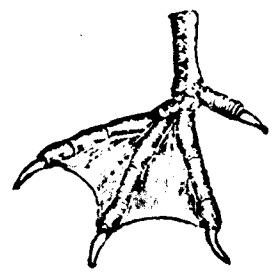
Birds produce their young from eggs, and do not suckle them. They are warm-blooded like the mammals and possess lungs for breathing. Birds have no teeth and in place of lips they have a strong beak which is a sort of horny sheath that encloses the tongue. Their fore-limbs are modified to form wings. Birds are very much lighter than any other animal of the same size, because they have thin hollow bones to give lightness to their bodies; besides, the bones instead of being packed with marrow, are provided with hollow spaces filled with air which is conducted into them from the respiratory organs by means of thin-walled canals. This condition is specially exhibited in the birds of most powerful flight. However, the bones are large and strong enough to support the muscles, especially those which move the wings. Birds have feet with claws; the beaks and claws have different shapes to suit the nature and habits of different birds. They are clothed with

feathers, which make the lightest and warmest of coverings. The feathers of the wings and tail are called *quill-feathers*; those which cover the body are *clothing-feathers*. Water-birds have an under-coat of *down*.

Natural Divisions of Birds:—

1. *Running birds* have long legs exceedingly strong and muscular and the broad thick toes are pointed forwards so as to form a solid support for running. These birds never fly; hence their wings are small-sized. They use their wings as balancers in running. The *Ostrich* (Tamil: Neruppukozhi; Malayalam: Ottagapatchi), is a native of Africa. It is extremely swift and can run at the rate of 26 miles per hour. It attains the height of more than seven feet. The *Rhea* or the *American Ostrich* is of smaller size and has three toes. The *Cassowary* of Australia and Borneo is larger but of a clumsy build. All these birds have rounded breast-bones and they possess functionless wings.

2. *Swimming birds or Palmipeds* (web-footed birds) have as their name indicates, palmated or webbed feet, that is to say, their toes are united to one another by a skin or web; this allows them to swim easily. *Ducks* (Tam. Vathu), *geese* (Tam. Bungalow-vathu), *swans* (Tam. Annapatchi; Tel. Hamsamu; Mal. Arayannam), *teals* (Tam. Kiluvai, siravi) and *grebes* (Tam. Mukulippan; Tel. Munugudi-kodi) are palmipeds that swim to perfection, fly very well, but walk awkwardly on the ground; they waddle rather than walk, their feet



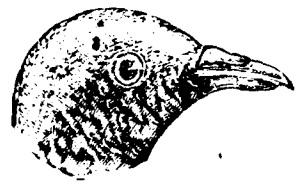
Webbed foot of *Swimming bird* or *Palmiped*. (Orginal)*

being made for swimming and not for walking. They have broad flat shovel-like bills with which they dabble in the mud. The upper mandible and sometimes the lower one or their large fleshy tongue are furnished with fringes at the edges. When dabbling, the mud and dirty water run out at the sides and the grain or insect that is in the mud is caught in the fringed mouth as in a trap. The enormous *Albatross* of the south seas, the largest sea-bird known, measuring 17½ feet from tip to tip of the wings, met with at immense distances from land has a pointed bill; it is also an excellent flier. The *Pelican* (Tam. Koozhykida) is even more completely web-footed than the foregoing for the web envelopes not only the three fore-toes, but even the first or great toe also. Upon the shores of the northern seas, the *Penguins* are to be seen in myriads. They cannot fly, as their wings have no real feathers on them. But the birds use them as fins to swim under water.

3. *Wading birds* are so called on account of their long naked legs, which enable them to walk in water. Most of them live in marshy places and wade through the mire. They are mostly provided with long necks and beaks, so formed as to enable them to catch, notwithstanding their long legs, the small animals on which they feed namely fishes, frogs and water-insects. Their long slender toes spread out as the bird walks or wades. The adaptability of such feet for walking on the soft mud or sand at the bottom of the water is evident; short feet would naturally sink in. Examples: *Snipe* (Tam. *Ullan*); *stork* (Tam. Natai; Tel. Konga), *crane*, and *heron* (Tam. Narayan; Tel. Narraina patchi).

4. *Scratching birds* are so called because they find their food by scratching or scraping in the earth. These birds too have three toes, two pointing forwards and one backwards, the hind toe being raised above the level of the three front toes. Their feet have strong stout claws provided with short and blunt nails. These birds always march about in search of food: grains, worms, grubs etc. which they scrape out of the ground. The *Pigeons* (Tam. Pura) have a weak membranous beak; they are characterised by having a scaly plate, covering the

base of the upper mandible. They are mostly birds of powerful flight. They can render great services especially in time of war by carrying messages to great distances at the rate of 50 miles an hour. They are strictly monogamous and are as a rule gregarious birds often living in large societies. The Indian rock pigeons (Tam. Kovilpura) sometimes migrate in thousands darkening the air by their flocks.

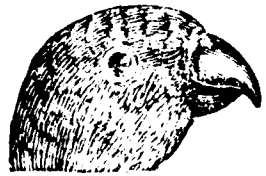


Head of *wood pigeon* to show the scaly covering at base of upper mandible. (Orginal)*

The name *Gallinacean* (Latin-gallina: hen) has been given to a subdivision of the birds of this group, on account of their greater or lesser resemblance to the hen which has been taken as the type of this group. Hens in Europe are supposed to have originally gone from India as well as peacocks and pheasants. They are heavy plump-bodied birds with comparatively small rounded wings, weak in flight. The domestic *fowl*, *peacocks* (Tam. Mayil; Tel. Nemili), *pheasants partridges* (Tam. Kaudari; Tel. Kawunzu), *turkeys* (Tam. Vankozhi), *guinea-fowl* (Tam. Kinnikozhi), and *quails* (Tam. Kadai) are typical of this division.

5. *Climbing birds* have strong muscular legs and each foot has two toes pointing forwards and two pointing backwards. Such a disposition of the toes enables the birds to climb and cling firmly and easily. They use the beak as well as the feet when climbing. Indeed, such birds must be good climbers, for they live usually on the trees in which they must seek for their food. They can only move about

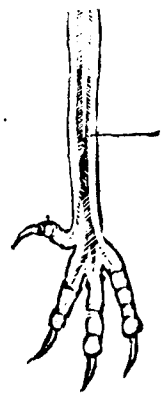
*All the blocks in this article have been executed under my direction by Mr. P. Jaganatha Mudaliar, Head Artits to the Govt. Mycologist.



Nut-cracking bill of *parrot*. (Orginal)*

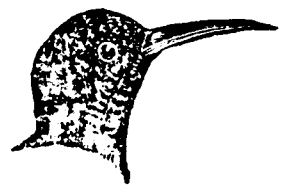
awkwardly on a flat surface. *Parrots* (Tam. Kili; Tel. Chiluka) are characterised by their fleshy tongue which allows them to articulate words. Their remarkable intelligence has justly entitled them to be called the 'feathered monkeys.' They have a short strong hooked bill the lower mandible of which is shorter than the upper. Beaks of this kind are nut-cracking bills. The sharp upper mandible which is hooked is very useful for that purpose. The *cuckoos* (Tam. Koel; Tel. Kokila), *woodpeckers* (Tam. Maranguthi), and *tree-pies* (Tam. Mankoel), are familiar examples of climbing birds.

6. The *Perching* or *Passerine birds*. They have three long-jointed slender toes pointing forwards and a short one pointing backwards. Such toes are made for grasping a branch or a twig and not for walking on a flat surface. These birds live almost entirely on the trees,



Foot of *Perching* or *Passerine bird* to show interior arrangement of tendons. (Orginal)*

hopping from twig to twig and when on the ground, they move about also, with a series of short hops. The peculiar arrangement of the leg and foot tendons enables the bird to hold firmly to the branch without any effort. Its own weight is sufficient to keep it secure; hence the bird rests safely when asleep. The *crows* (Tam. Kakka), *ravens* (Tam. Andankakka), and *sparrows*, (Tam. Adaikalanguruvi), have hard strong bills; most birds of this group feed on hard seeds, they use their bills for cracking the husks of seeds. *Nightingales*, *blackbirds*, *thrushes* and *robins* have slightly curved bills, with a notch or tooth on each side for the purpose of securing the prey. *Swallows*, *swifts*, *martins* and *goatsuckers* have wide gaping bills which act as fly-traps. *Humming birds* and *honey-birds* (Tam. Thanesittu; Mal. Suchimukhi), are provided with long slender bills. They frequent the

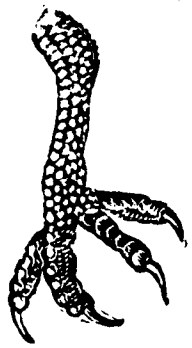


Honey-sucking beak of *humming-bird*. (Orginal)*

flowers either for the sweet nectar which they contain or for the insects which live in them. They are mostly of very minute size and include the smallest forms of the entire class of birds; thus the *Mellisuga minimus* from the island of San Domingo only weighs about nine grains and measures two inches in extreme length. Its nest is about the size of a small nut and it contains two eggs each nearly as large as a pea.

7. *Birds of Prey*. These are the fierce blood-thirsty hunters of the air. They live on the flesh of other animals. They have strong hooked beaks and long and piercing claws called *talons* to seize and tear their prey. Some hunt for their food in the day-time and therefore called *diurnal*; others hunt after nightfall and are called *nocturnal*.

The king of the diurnal birds of prey is the *Eagle* (Tam. Kazhugu), with its piercing powerful eyes which do not blink at the most brilliant midday sun and are able to see their victim from an enormous height. The eagle swoops down with unerring aim from its great height upon birds on the wing or lambs, hares and poultry feeding in the field. The *Condor* of South America is one of the largest of birds. It sometimes measures twelve feet from one tip of its outspread wings to the other. The *falcons* (Tam. Rajali), *hawks* (Tam. Laghudu),



Talons of a *Bird of prey*. (Original)*

vultures (Tam. Pinam-thinni-kazhugu), *harriers* and *kites* (Tam. Parundhu), are some more examples of diurnal birds of prey. Nocturnal birds of prey have a soft downy plumage which allows their flight to be quite noiseless; the openings of their ears are dilated and their big round eyes are directed towards the front.

These last come under the general name of *Owl* (Tam. Andhai; Tel. Gudlagubba).

P. Susainathan,
Assistant to the Govt Entomologist.

Notes on the cultivation of YAM as practised in the village of Kattampudi and other villages surrounding it, Ponnur Taluq, Guntur District.

There are three varieties of yam :—

i. Yam (creeper)—Teegapendalam (Telugu).
ii. Tree yam—Chettupendalam (do.)
iii. Elephant yam—Kanda (do).

The yam thrives well on loose and well drained soils. The soils may either be clay loam or red loam but it must be rich. It also does well on Pattimannu areas but it requires frequent waterings if grown on these soils.

The cultivation of yam is very profitable. Moreover it does not require frequent attention except at the time of planting and harvesting.

Preparatory cultivation. The land is ploughed at least thrice before the yam is planted, whenever the land is fit for cultivation.

Manure. As this is a root crop it is said to exhaust the soil very soon and therefore it requires heavy manuring. The field is dressed either with Pattimannu or cattle manure at the rate of 20 cart loads per acre. The manure is generally carted into the field before the last ploughing is done to it. The manure is spread evenly and ploughed to incorporate the same into the soil.

Seed. The seed rate is about 2500 lbs. per acre. The long tubers are cut to pieces weighing about 5 or 6 palams (2½ ozs. nearly). This operation is done about 12 hours before planting so that the cut surfaces of the pieces of yam may not dry up. If the cut surfaces of the tubers are allowed to dry up and to form a thin layer of dry surface, they are liable to rot if there be heavy rains soon after the seed is planted.

Planting. The cuttings are dibbled in every fourth furrow made by the country plough i.e. abont 1½ feet apart. The same distance of 1½ feet is observed when dibbling the cuttings along the furrows As the furrows are opened close to each other as in ordinary ploughing, the covering of the seed is also done at the same time. The planting is done early in the month of June just after the summer rains set in. If there is good moisture in the soil at the time of planting, the field is not irrigated for 5 or 6 days more.

Irrigation. The crop at times requires one or two irrigations before it reaches maturity. If there be rains once in one or two months during its growth, it does not require any watering. The ryot told me that his crop of 1916 had grown well with the help of the rains alone as they were timely and well distributed.

Weeding. The crop is weeded only once, two months after planting. No other operation is done to it till it is harvested.

Harvesting. The drying of the leaves of the creeper indicate that the crop has attained its maturity. The crop is generally harvested in the month of February. The vines are cut off at a height of 6 inches from the soil. The roots are dug with crow bars and picked up. The roots thus gathered are freed from soil adhering to them. The side roots are also cut off, when it is ready for marketting.

Yield. The yield is not a constant factor. It varies according to as the soil is rich or poor. The ryot says that he got from 30 to 60 putties (i.e. 15000 lbs. to 30,000 lbs.) per acre. On the average the crop may be expected to yield 45 putties or 22,500 lbs. per acre.

Reviews.

FISH GUANO AS MANURE.

To those interested in increasing the yield of crops we advise a perusal of the Departmental leaflet "The necessity for the local consumption of fish guano" by Mr. S. Subramanya Ayyar, Acting

Assistant Director of Agriculture, VII circle. He points out the need for manuring and how it could be best done by the application fish manure and the fish guano, the advantages of which have not been utilised locally and large quantities have been allowed to be exported. He gives some concrete examples where the use of this manure has improved the yield of various crops. At Coimbatore Central Farm, 5 cwts. of sundried fish when applied to paddy has yielded 19 to 26 salagais per acre; ragi with 300 lbs. of fish guano and the usual 20 cart loads of cattle manure has given 11 to 19 salagais grain per acre; combodia cotton, with 300 lbs. of fish guano and the usual 10 cart loads of cattle manure has given 7 pothies of kappas per acre. At Koilpatti Farm. fodder cholam has given 7900 lbs. dry fodder, i.e. twice the usual yield.

The advantage with this manure is that it can be used for all crops, viz., wet, garden and dry, with profit. Through the activities of this Department its merits are getting to be recognised in the Coimbatore District. There are already four depôts in Coimbatore, Erode, Gobichettipalayam and Dharapuram Taluks and its use has spread to 26 villages in these taluks. It is now applied to paddy, sugarcane, plantains, cholam, ragi, cotton, tobacco, chillies, vegatables and also fruit trees. Its price is said to be Rs. 84 per ton a Tellicherry.

U. V. R.

The Agricultural Journal of India July 1919 issue.

This issue like its predecessors is full of interesting matter. Besides the original articles the selected articles and notes are of great interest and we are of opinion that the inclusion of these in recent years has been one of the chief reasons for its present popularity.

The great importance of the size of the average holdings in India is well brought out by the fact that this subject finds mention in one article and forms the main theme in two other articles. The Hon'ble Mr. H. R. C. Hailey contributes an article based on a study of

some of the districts of the United Provinces. He finds difficulty in fixing any particular area, as the optimum for any tract as this is bound to vary widely even between adjoining districts. The desire, to posses fields for cultivation at both the harvests, he finds, to be a very potent cause for the extreme fragmentation that at present exists. In our own Presidency, we are familiar with the fact, that, whenever there is a division of property, an attempt is often made to give to each sharer a portion from each of the different grades available for distribution. If a landlord should leave behind, an amount of land partly dry, partly wet, partly double crop, partly single crop and partly garden land, it is natural, that each of the sons should try and obtain a portion from each. The uncertainty of the seasons and of the agricultural operations in general makes him feel secure, only when he has representative bits in each kind. It is difficult to see how this is ever going to be solved.

In a second article, Mr. B. C. Burt of the United Provinces, points out the analogy of an improved strain to a more efficient machine, and argues, that, to get the best results out of it the cultivation should be of as efficient a kind as possible. The present scattered nature of the holdings makes this very difficult, if not impossible. Japan is often pointed out as an example in such matters and it would be interesting to know exactly how they have solved the problem there.

Another important topic "Of the day" is the supply of milk of a good quality and in sufficient quantity, to the large Indian cities and the present issue contains two interesting articles on the subject.

Mr. Smith, Assistant Director, Bombay says that the development of the dairy industry and that of cattle breeding always go hand in hand, and, that to a country like India, both are of equal importance. The former because India is bound to be largely an agricultural country and the cattle is more than three fourths of agriculture. The latter is of importance, firstly, because India is largely a vegetarian country and supply of cheap and good milk is a great desideratum and, secondly because the development of this

industry would go a long way to secure to the land valuable manure in the form of cattle dung, urine etc. He points out, that, under present conditions, the average Indian cow is 100 per cent less efficient as a milk producer than its sister, in any of the other civilized countries of the world. In support of his contention that Cattle breeding and Dairying should go together he points out that the Ayreshires and the Holsteins, which are probably the finest milk producers in the world, are, at the same time, the best field bullocks as well.

An article, by Dr. Mann, gives the results of an experiment, now in progress, at supplying the city of Poona with milk brought from the surrounding villages far removed from the city. We learn with surprise that the price of milk in Poona is 50 per cent higher than that customary in cities in England during the pre-war days.

There are other articles of considerable interest which space forbids us from reviewing in the pages of this journal.

(Ed.)

Extracts.

"In the villages round about Suramangalam, Trichinopoly District, we were told that the ryots pick mature bolls off the Cambodia plants two or three days before bursting and heap them in a corner covering with an earthern pot. The heap lies like this for the night and then it is taken and spread out on the thrashing floor to dry. When the bolls burst the cotton is separrated and sold while still wet. This is said to be done for fear of theft".

This is a double dodge as besides cheating the thief it cheats the buyer of the kappas as well. (Ed).

"It is worthy of note", continues the report "that the ryots have reserved all the lands under wells for food grains and totally refuse to devote any portion to Cambodia."

A wholesome lesson from the high prices which the ryot has now to pay for food and fodder. (Ed).

"While mixing the Neem-cake with Fish guano, it was found that the strong smell of the Neem Poonac had almost made the offensive odour of the Fish-guano imperceptible. It also killed outright the innumerable insects found preying on the guano."

(Extracts from the June report of the Assistant Directot of Agriculture Vth Circle).

THE AGRICULTURAL PEST ACT.

PINK BOLL WORM AND COTTON STEM WEEVIL AND THEIR ATTACKS UPON CAMBODIA COTTON.

As there has been some misunderstanding as to the nature of the "Pest Act," its uses and purpose, some details about the two insects against which it has been directed may be of interest.

Taking first the pink-boll worm (*Pectinophora gossypiella*): this insect is one of the three or four major pests of the world and is engaging the attention of Entomologists from Hawaii to Coimbatore. In Egypt it has done so much damage to valuable cottons that a special act was introduced by which cotton had to be pulled up by certain time every year under pain of penalties, if left in the ground after that date. In the United States of America special legislation has been introduced to prevent its introduction. Were it to spread in that country it is terrible to contemplate the havoc it would create.

The rise in the price of cotton during the late war has induced growers of Cambodia cotton to leave their crop in the ground two or even three years instead of practising the usual rotation of more normal times. What has been the result? The boll-worm, provided all the year round with food and lodging, has increased

and multiplied to such an extent that in some fields over 80% of the cotton bolls are attacked, this would represent a loss in stained, damaged and undeveloped cotton of perhaps 50% of the total yield. How then is this loss to be mitigated?

First let us see how the boll-worm lives and has its being. When the cotton plant is just setting the first young bolls, a little obscure dusty coloured moth measuring some ½ inch across the out-stretched wings lays here and there about 200 small clear eggs. These eggs are usually laid on the bracts around the young bolls.

From each of these in time emerges a tiny caterpillar colourless but with a dark head. It immediately bores its way down into the boll usually at the top but sometimes at the bottom. Once inside it lives happily eating away one seed after another killing the seed and destroying the fibre. It grows larger eventually assuming the characteristic pick tinge. Sometimes three caterpillars will be in one boll.

Finally the boll-worm makes a little cocoon of silk either inside the boll, or very often outside on the bracts and at the base of the boll. In ten or eleven days time from this emerges the moth is ready after pairing to lay more eggs. Now see how soon damage can accumulate. One moth in December lays 200 eggs. Each of these produces a caterpillar and eventually a moth Suppose half of these are female moths each of which lays 200 eggs i. e., 100 multiplied by 200 which is equal to 20,000. In two generations 20,000 boll warms! What is the next generation going to be?

It was found in America that the percentage of infection rose during the season from 6% to 90%. A very slight amount of calculation will show how in three or four generations the multiplication would be so enormous that the wonder would be that the infection of the bolls was not 100%.

Now if an interval of two or three months can be put between the end of one crop and the flowering of another, moths emerging from the last generation will have nowhere to lay their eggs, nowhere for their descendents to live. At the most the longest life of a boll worm moth that has been reported is 34 days.

So instead of myriads of moths all ready to pounce on each new boll of a fresh crop there will only be a very few survivors. It is obvious then how great must be the benefit of having the land clear of cotton for two or three months so that the damage may be reduced to a minimum. Human nature being frail it is only by making such a remedy obligatory on all that the community at large can benefit, hence the Act.

The damage done to the cotton fibre by the boll worm either directly or indirectly is very great. The presence of dead and immature fibre caused by the grub eating out the immature seed and by the premature ripening of the boll means a very considerable wastage in the manufacture of yarn in the mills. Such fibre if made up into yarn will not take the dye and therefore is of little use for the manufacture of coloured piece goods for the local weaving of coloured cloths. The boll worm is responsible also for the red and yellow stains in the cotton. These greatly reduce the value of the fibre and render it unsuitable for the manufacture of white yarn. In the process of ginning the seeds which have been damaged by this grub frequently pass between the knife and the roller of the gin. This further stains the fibre and its presence in the ginned cotton greatly reduces its value. It means more waste in the process of manufacture and it means an inferior class of yarn or cloth, as it is not possible entirely to free the cotton from such impurities.

The attack of the boll worm on the seed means the premature death of the seed and fibre. This, in green boll, is quite wet and is very readily attacked by moulds which usually find their way

into the green boll through the borings of this grub. These moulds turn the cotton black and greatly reduce its value.

THE COTTON STEM WEEVIL (PEMPHERIS AFFINIS).

This insect is another which threatens the cotton industry of South India. When the Pest Act was first brought into force it was mainly meant to be directed against this weevil but the sudden alarming multiplication of the pick-boll worm in the last year has relegated it to a secondary place. Nevertheless it is potentially a dangerous pest.

Its life history is briefly as follows :—

The weevil which is a very small beetle bites a hole in the soft stem of a cotton plant, sometimes when that plant is only 3 weeks old and in this hold lays an egg.

From this emerges in about seven to eight days a tiny grub which bites its way into the cotton stem inside which it works in spirals. Finally when it is full-grown it cuts a little chamber in which lies in the pupal state. When the perfect beetle is formed it bites its way out to the open, mates and the whole process is repeated. The period from egg to adult is about two months.

As may be imagined the stem especially in the young stages is seriously weakened by this attack and often breaks off at the point where the grub has been working. Even well grown plants will do this when there is a high wind. Sometimes too the plant will be killed out-right.

This pest has spread enormously during the last few years and is especially fond of Cambodia cotton. But, for its well being, it must have soft and succulent stems to feed on. If then cotton is pulled up and left to dry in the sun the beetles will be unable to carry on their lives and will die for want of food, nor will there be any place for them to lay their eggs. Grubs still in stems pulled up in this way will in some cases struggle through and

complete their life histories but they are weak and very undersized and in any case would perish soon.

To show how seriously this pest damages cotton crops fields have been found infested to the extent of 70 per cent and even 100 per cent. It is an easy matter to detect any attacked cotton plant for the stems show a very characteristic swelling generally near the ground though sometimes even the lower branches are attacked.

The presence of these two dangers to cotton then show how very necessary it is, if Cambodia is to maintain its present position among Indian Cottons, that every effort should be made to lesson their numbers. This can only be done by leaving them no means of subsistence for a certain period of the year, and their pulling up and destruction of their food plant over wide areas.

THE EMPLOYMENT OF TRACTORS. There are indications that tractors will be increasingly employed in the West Indies for cultivation work on estates. The successful employment of Fordson Tractor at Four-square estate in Bardados is reported and information is at hand of a more detailed character concerning the work of the Titan Tractor in Antigua manufactured by the International Harvester Company, United States of America. Figures are not yet available regarding the amount and cost of the work done in Barbados, but in Antigua on average land the tractor ploughs 3 acres per day. The cost of ploughing one acre by the Titan Tractor in Antigue works out at 13s. 4d while the cost for cattle ploughing per acre is about 14s. 8d. In addition, it should be added that the tractor can pull 8 tons of canes uphill of normal gradient at a speed of 2½ miles per hour. As well as the machine referred to there was imported in Antigua during 1918 an Avery tractor. A report on the work of this tractor has not yet been received.

In connection with tractors an instructive FARMERS' BULLETIN (No. 1035) United States Department of Agriculture deals with the work of the farm tractors in the Dakotas. Several generalizations are put forward in the Bulletin. One is that the influence of the tractor in causing an increase in the size of the farms is much more marked than that of any machine since the introduction of the grain binder. It is fairly obvious that a small estate is no place for a tractor costing perhaps £ 400 to £ 500.

It might be noted however by the owners of small estates and holdings in the West Indies that an implement like the Beeman Garden Tractor might answer their purpose. We are in receipt of pamphlets illustrating the small tractor and it appears as far as one can judge from advertisments to be very well adopted for cotton and corn cultivation in the West Indies. Its cost is about 360. dollars Further information can be obtained from Mr. P. H. Gransaull, Sole Agent, Trinidad.

To continue the account of the statements made in the Bulletin referred to above, it should be remembered that one of the largest items which go to make up the total cost of performing work with the tractor is depreciation, yet this is one of the items which many people ignore entirely when figuring tractor cost. The advantages of a tractor, like that of most other improved farm machines, lies not so much in the reduction of the cost of performing a unit of work as in the fact that it permits one man to do considerably more work within a given period of time. Lastly before putting any one in charge of a tractor he should he given experience under a competent instructor. The mistake should not be made of assuming that any boy can operate a tractor in an efficient manner; only a proficient operator can handle a tractor properly. This has been discovered in Antigua. At present the lack of even one trained operator has been felt in Antigua and this trouble will be more pronounced as the numbers of tractors im-

ported increase. It is a difficulty however that should not be hard to get over.

(From the Agricultural News, West Indies, Vol. XVIII No. 451).

T. S. V.

THE DISADVANTAGES OF SCATTERED HOLDINGS.

The disadvantages of small and scattered holdings are many. The distances of the various fields from each other as well as from the village necessitates a waste of time, labour and cattle power. It has been calculated in Austria that the expenditure for cultivation of land increased for every 500 metres of distance by 5·3% for manual labour and ploughing, by 20 to 35% for transport of manure and by 15 to 32% for transport of crops. 500 metres = 546·8 yds.

(Extracts from the Agricultural and Co-operative Gazette of Central Provinces for July 1919).

K. G. K.

Notes and News.

Megass for paper. "Sugar" for March 1919 publishes a paper detailing the method by which a superior kind of white paper is manufactured with a combination of megass and plantain pulp. This pulp is obtained as a waste product after the extraction of fibre. The above is a case where two waste materials go together to produce of an article of every day use.

T. S. V.

Rats Rats Rats. All are agreed that rats should be exterminated and the number of devices for the purpose is very large

indeed. Some of these have appeared in the pages of this journal and here is another from Jamaica. A mixture of Epsom salts and grated coconuts is said to form an excellent bait. This is said to poison the mongoose as well.

T. S. V.

Government Controlling the crop to be grown by the ryots. The Government of Java intend to increase the production of rice by restricting the cultivation of sugarcane. The scheme naturally meets with strong opposition from the factories. It is believed that the Government will eventually carry out its measure as the Dutch are not easily deflected from any course, which they consider, is logically laid out. The Government is said to be keen to push this through as they feel that, money is of little account to the people, if they cannot get their food. In Egypt also, as in Java, it is said that Government has the power to restrict the areas under the different crops. It is hoped that the above will reconcile ryots to any losses that they may have incurred by the operation of the Pest Act. It is a case of the subordination of individual interests to those of the community.

(Ed.)

Students' Corner.

The following are the results of matches played by the College teams:—

Hockey.	vs. London Mission High School.	Won by 3 to nil.
	vs. Central Recruit School.	Lost by 2 to 1.
	vs. Reserve Police.	Won by 2 to 1.
	vs. Central Recruit School.	Lost by 4 to 3.
	vs. Government College.	Won by 6 to 1.
	vs. Central Recruit School.	Won by 6 to 1.

	vs. Young Men's United.	Lost by 1 to nil.
	vs. Forest College.	Lost by 4 to 1.
	vs. Forest College.	Won by 3 to 1.
	vs. Central Recruit School.	Won by 9 to 1.
	vs. Young Men's United.	Lost by 2 to 1.
	vs. Reserve Police	Lost by 2 to nil.
	vs. Young Men's United.	Won by 4 to 2.
Football.	vs. London Mission High School	Lost by 2 to nil.
	vs. London Mission High School.	Won by 2 to 1.
	vs. London Mission High School.	Lost by 3 to nil.
	vs. Young Men's United.	Lost by 1 to nil.
Cricket.	Staff vs. Students.	Won by students by 140 runs against 44.
Staff.	vs. Students.	Won by students by 154 runs against 114.
	vs. Forest College.	Our team won by 85 to 67 runs.
	vs. Coimbatore United XI.	Our team won by 263 runs for 6 wickets against 81.

"MATCH."

Crop Notes.

A few showers that were received in the latter part of the month were most welcome. Cholam sowings on light soils were completed, and black soil sowings were a good deal attempted. Cambodia cotton on garden land was sown to a large extent. Early ragi was maturing and was being harvested in parts. Transplanting of paddies including nurseries was very nearly finished. Late ragi was growing well; but the winds that blew up for four days at

the end of the month caused a partial withering up of the late ragi fields forcing ryots to resort to well irrigation which has not been found quite adequate.

V. M. Iyer.

Correspondence.

"May I request your readers to suggest any effective remedy for the ravages of wild pigs."

"Annapoorna."

Departmental Notes.

Appointments:—

Mr. L. Sankara Kumar L. Ag. to be lower subordinate on Rs. 50 in the scale of Rs. 35-2½-75. and posted to the VII circle.

Mr. T. V. Subramania Iyer B. A. acting Assistant in Entomology confirmed as such on Rs. 75-5-125 with effect from 17th May 1919.

Mr. P. Susainathan Sub-Assistant in Entomology to be Assistant in Entomology on Rs. 75-5-125 vice Mr. P. V. Isaac on leave.

Mr. D. Madurarajan Pillai B. A. to be Assistant in Mycology, Planting Section, in the fourth grade on probation.

Mr. G. V. James to be Sub-Assistant in the office of the Govt. Sugarcane Expert on Rs. 35-2½-75. on probation

Mr. C. Krishnan Nair Sub-Assistant in Mycology to be Assistant in Mycology in the fourth grade on probation.

Mr. D. S. Gopalaswamy Rao Sub-Assistant in Mycology to be Assistant in Mycology in the fourth grade on probation.

Promotions:—

Mr. T. Lakshmana Rao Assistant in Chemistry from the fourth grade to the third on Rs. 150.

Leave:—

Mr. K. S. Sankaram Pillai is granted leave on loss of pay for two years from from the 15th November 1919.

Advertisement.

Applications are invited from ex-students of the Agricultural College, Coimbatore, who have obtained the proficiency certificate in Agriculture for vacancies in the lower subordinate grade on Rs. 35-2½-75 in this department.

R. Cecil Wood,
Ag. Director of Agriculture.

Applications are invited from candidates who have undergone course of studies in the College of Agriculture, Coimbatore and obtained diploma, for the post of Agricultural Instructor on Rs. 50 per mensem in the District Jail, Tanjore.

Supdt.
Dist. Jail, Tanjore.

THE JOURNAL
OF
The Madras Agricultural Students' Union.

Vol. VII. **August 1919.** **No. 8.**

The visit of His Excellency Lord Willingdon.

We learn that His Excellency Lord Willingdon is to visit our college on the 18th September. We beg to offer him a very cordial welcome. His interest in agriculture and things agricultural is well known and we look to important developments in the near future.

The future of Agricultural Education in our Presidency.

Readers of this Journal were, in the issues of May and June treated to an elaborate discourse on the subject of Agricultural education delivered at the University of Adelaide by Professor Perkins. As Professor at the Roseworthy Agricultural College and as Director of Agriculture in South Australia, he has been in close touch with Australian farming for nearly quarter of a century. His theme is full of original and practical suggestions. The address is straight-forward, directed as it is to the Australian farmer who is just entering upon another phase of life which is one of transition from individual extensive to co-

operative intensive farming. His observations, however, have more than a local bearing and deserve more than a passing notice.

In the early years of the nineteenth century, the Court of Directors into whose hands the destinies of the then scattered provinces of India were entrusted, fully alive to their duties towards the toiling peasant, rightly directed their representatives in this country to try and increase his comforts and to lessen his burden. In so doing, there was free scope for the display of qualities which would make or mar the happiness of the people.

When the control of the Indian administration passed to the Crown of England in 1858, a more stable form of Government was established which regularised procedure. Sporadic efforts of the earlier regime were scrutinised by very able administrators who applied their knowledge to introduce changes suited to local conditions.

Taccavi advances, opening of railways and canals and other similar progressive schemes engaged the attention of the authorities as need arose. The great famine of 1877 which devastated large tracts of the country opened the eyes of Government. Sir James Caird, M. P. a practical British farmer came out as Famine Commissioner. His recommendations formed the basis of a detailed enquiry into the economic situation. The famine code was systematised, improvements were made in the act governing the distribution of loans to agriculturists, irrigation schemes were developed and the future agricultural policy chalked out. As a result of this, better attention was paid to the

reorganisation of Agricultural education in the few schools then in existence. Dr. J. A. Voelcker, Consulting Chemist to the Royal Agricultural Society of England, was deputed to investigate into the agricultural condition of India. His labours materialised into the publication of a monumental report on Improvement of Indian Agriculture. Government took some years to cogitate upon the various aspects of the recommendations made.

It was left to the brilliant Viceroy, Lord Curzon, and his able and intrepid Councillors Sir Denzil Ibbetson and Sir Bampfylde Fuller to take definite steps on the lines of Dr. Voelcker's suggestions. The Imperial and the Provincial departments of Agriculture came into existence. Pusa Research Institute was established and Agricultural Colleges in the Provinces were opened. Experimental and Demonstration farms followed in their wake. A stimulus was thus given to the filtering down of new ideas in agricultural methods.

The intellectual classes became more interested in cultivation. But the real cultivator though he responded to the new ideas, could not go beyond certain limits owing to lack of education. Thus the forecasts of those, who had proudly hoped that rapid changes would come about in the existing conditions, proved false. This has recently led to an introspection of the methods adopted hitherto. The system that was working for sixty years has been found unsuitable to the present-day conditions. The Government has risen equal to the occasion and have inaugurated a bold policy.

In the latter part of 1917, the Government of India convened at Simla, a conference of officials at which was discussed the question of bifurcation of agricultural studies and the creation of agricultural middle schools and high schools, distinct from the existing colleges. The Imperial Government and most Provincial Administrations were in favour of such bifurcation whilst the Government of Madras were more in favour of the dissemination of new ideas by means of demonstration. To this end they thought the present course of instruction at the Coimbatore Agricultural College should be sufficient.

From the above, one thing is however clear. And, that is, a real need is felt for the separation of the Agricultural course into a higher and a lower. Higher instruction should be imparted in the existing colleges which may be improved, if necessary, but the lower should certainly be restricted to the proposed schools of the lower grade. What results will be achieved by the latter, it is impossible to foresee at present. We feel sure, however, that the Agricultural Colleges will justify their existence and fulfill their purpose only when they remodel their courses to attract really capable men. The entrants should possess high general qualifications. The alumni of the College that go out into the outer world are expected to direct, guide and control the activities in farming.

It is therefore of prime importance that such men should possess the hallmark of the University and should be able to brush, shoulder to shoulder, with those engaged in similar walks of life. The Indians have a traditional

regard for intellectual superiority; nay even a "superstitious regard" for it, as Lord Carmichel recently put it in his evidence before the Joint Committee of Parliament on Indian Constitutional Reforms.

This aspect of the question receives strong support from the analogous position, that, University students of Agriculture in the United Kingdom, do occupy. It is a trite observation to make in the words of Professor Perkins that "all the acquired training that the hand can command is of little avail unless under the direction of the well trained mind, able effectively to register and analyse the daily happenings of life." Where can this well trained mind come from, except from the portals of a University?

The subject has not come up afresh now. It was mooted in the early eighties of the last century during the time of the late Mr. Robertson, Principal of the Saidapet Agricultural College; Sir Frederick Nicholson made a happy reference to it in his convocation address to the graduates of the Madras University in 1900.

Bombay took the lead in this matter and has been for the last twenty years conferring degrees in Agriculture apparently with success.

Latterly, in the year of grace 1919, the Calcutta University Commissioner's Report, has provoked the question of affiliation of agricultural and technological colleges to the University. We trust the Calcutta University senate will see its way to follow the lead given by Bombay. We are under very good auspices.

We have in Coimbatore an Agricultural College and Research Institute eminently fitted to University conditions. The College has well furnished research laboratories on the most up-to date lines and is manned by experts in the various branches of Science bearing on Agricultre. Further the College, as it is at present, is a residential one and is self contained in all the essentials of a University. It stands on an extensive ground of 400 acres which affords ample scope for experimentation and research and the climate is salubrious.

We would therefore point out the extreme desireability of affiliating the College at Coimbatore to the University and thus raise the status of this ancient profession, a profession the value of which is getting more and more to be realised after the war just ended.

Crop Notes.

We publish elsewhere the first series of crop notes which we hope to make a regular feature of our journal in future. We trust these will be found useful and we have no doubt they will be so, provided we have the co-operation of our readers. We welcome such notes every month from other districts so that our readers will be kept informed of the agricultural conditions of our Presidency.

Notes on Italian Country-life.

The following are a few random notes on the outstanding features of the country life of the Italians of the Veneto, as I had the opportunity to observe it during various billetings in farm houses and in the course of a march of some 200 miles.

The first and most important crop is the vine, for wine is the chief product of the Province and represents food, drink and raiment to the peasants. A bad grape year means hard times for every one from landlord to smallest tenant; for if the tenant gets no produce, the landlord gets no rent. One sees vineyards everywhere, on the plains, and on the hill sides; large and small, varying from several hundred acres to a few vines in a garden. The vines are supported on wires stretched between mulberry trees. The leaves of the mulberry are sold and used for rearing silk-worms, the country all round Verona and Vicenza being a very important silk producing centre. The grape harvest takes place about the end of September, and at that time the vineyards are very beautiful with their clusters of purple grapes hanging amid the red and gold leaves. When the harvest time draws on, an assessor—who is a Government Official —visits all the vineyards and estimates the amount of the crops. A fixed proportion on this valuation is paid to the landlord and the remainder goes to the tenant. As the value is always under-estimated, the tenant finds it worth while to raise a good crop, so that his margin of profit may be greater. This system is exactly the same as that used by the Jews in Palestine except that the assessors there were the stewards of the landlords and not Government officials.

The next most important crop is maize which is grown between the rows of vines. It is difficult to imagine any Italian family without their dish of "Polenta," which is made from the maize flour. Maize is sown broad-cast and after harvest is dried on large stone or brick drying floors before being stored. Usually it is stored in heaps in a loft; I never saw any bin used.

In addition to maize they grow a small amount of a millet, very like cholam, but with a less compact earhead. It grows very tall, but did not look to me like a profitable crop. In the gardens one sees all sorts of vegetables, especially gourds and pumpkins; also chillies of all kinds; and castor is grown in small plots. I also saw plantains but they appeared to be ornamental only, as they did not fruit. In some parts, more especially in the Euganean Hills near Padua, they grow olives, oranges and lemons; and in certain districts

a small amount of sugarcane and tobacco. The latter appeared to bear a good leaf, but was unpleasant to smoke: it is, as far as I know, sun cured, and not by artificial heat as is the American and African tobacco.

The ploughs used plough a very deep furrow and are drawn by three span of oxen. The Italians use oxen both for ordinary traction and for all agricultural work. Their carts are almost invariably four-wheeled with the pole rising in a curve and protruding well in front of, and rather above the bullocks' heads: the yoke is tied to the horns and no nose rope is used. The cattle are very fine animals tall and strong, rather reminiscent of Nellore cattle, but they have no hump. They appear to be as badly treated by their drivers as they are in India, except that I saw none with broken tails.

The farms are generally isolated holdings and on the whole the buildings are good. There always seemed to be ample provision of lofts, barns, and stabling for animals. Pigs, chicken, turkeys, geese and sometimes guinea fowl are kept; and surprising to anyone from England, almost every farm keeps rabbits. Our brigade possessed a very large rabbit: he was taken in the fighting at the crossing of the Livenza River and travelled many miles with us sitting in a basket slung on a mule. Italian villages although usually delightfully picturesque are in most cases excessively dirty, but the houses themselves are very well kept; even the poorest ones in the villages near the hills have electric light as the mountain streams are used to supply the power.

I did not notice any insect pests other than those which one cannot avoid collecting when living continuously in one's clothes without any chance of washing or changing. The other pests were flies, flies in countless myriads so that at times one almost had to fight them for ones food.

Though it is to wander from agriculture I should like to pay a tribute to the excellence of the Italian roads which are most carefully tended and kept. During the war the work on them appeared to be done entirely by women and small boys. Most of them are well

shaded chiefly by plane trees, and they run absolutely straight for miles and miles. The Italians have an extensive system of steam and electric trams on all the main roads between the big towns. Other places are linked by motor bus services. This makes it easy for even the smallest cultivator to get his produce into the local market and the larger markets in the neighbourhood. Trams lead one on to trains. The Italian trains, more than any I have have ever travelled in, have a wonderful power of being late; but the permanent way is very good and they run smoothly unlike the trains which shake one to bits.

Once started one could talk or write for hours on Italy in general for she has a fascination above all other countries I have seen, but though a lover's ravings on the subject of his love may be of great interest to himself it does not follow that anyone else will care to listen to them. So before I let my pen run away with me, I will bring these notes to a close with the words of one who also never expected to see her again.

"Italia addio! Benche' il destin severo
Mi tragga lungi dal tuo dolce aspetto
Tu vivrai nel mio core e nel pensiero
Fida memoria et immortale affetto."

E. Ballard.

The tragedy of milk production (a review).

The question of milk supply is a thorny problem in India. During the past few years this question has been prominently before the public but no intelligent and strenuous efforts have been made by the consumers towards its solution. The Government of Madras have, however, not forgotten this aspect of husbandry in its relation to the general advance of Agriculture in this country, and appointed an expert to study the subject of Live-Stock and Milk Supply. Readers of this Journal are aware of the contributions on milk supply and the dairy trade that have been appearing in the Agricultural Journal of India

and this Journal, from time to time. The milk supply of important towns has been taken up. "The Dairy Trade in Madras" by Mr. A. Carruth, Deputy Director of Agriculture, Live-Stock, published in 1918 is, we hope, an earnest of what is to follow in increasing numbers, by the Scientific Expert and by the layman. It is, therefore, of particular interest for us to know, how other countries face this matter.

Messrs. Oliver and Boyd, Tweeddale Court, Edinburgh, have just published a brochure by Professor Wallace entitled, "The tragedy of milk production." The author is the distinguished Professor of Agriculture and Rural Economy in the University of Edinburgh and has for well high forty years been connected in the British farming. He has kept himself in close touch, not only with milk supply dairies of all kinds but with condensed and dried milk supplies in Britain and Overseas. For years he owned a dairy of 100 cows and in his works dealing with live-stock, dairying has always found a pr eminent place. The knowledge thus gained, through his intimate acqua[illegible] with dairying all his life, has secured for him a claim to speak with confidence on this special matter.

In Great Britain the Dairy Industry is not confined to towns alone but is found all over the country. The town dairies and the town milk supply are strictly regulated by the municipal authorities and the town councils. Fewer animals are kept in towns, and the bulk of the milk comes from the rural parts. The number of city cows is generally steady throughout the year, but in summer when the grass is abundant, a larger number of cows comes into milk and there is an over-abundant supply of milk, while in winter, the grass being scarce, supply from the country goes down.

It has been the common practice for years for many of the large dairy farmers, whose main object is the production of milk with the least cost to themselves, and regardless of the effect upon the breeding of the stock of the nation, to buy all the cows they require for their trade. In so doing they are careful to buy the very best milkers. However young and good milker the cow might prove to be, she is dealt with the same as the others. In these herds none are bred from

the cows that are being fattened while continuing to give milk, and as soon as they cease giving a remunerative yield, they are finished off and sent to the butcher. In this way thousands of the best milch cows at their prime are annually being slaughtered. The pre-war policy of the Government in regard to the supply of the two necessaries of life—wheat and milk—demanded much rectification. The situation became worse during the war. There was a shrinkage of supply from all sources. The menace of the German submarine scared away supplies from foreign countries like Denmark. In August 1915, the number of cows and heifers slaughtered at the Birmingham abattoir was 890 and 830 respectively whereas in August 1917 it rose to 1319 and 1176.

The rate of depletion was accelerated by the high cost of feeding stuffs and steadily growing difficulty of securing labour. In Bristol, the number of cows decreased from 1014 to 807 in one year. In Leeds the city cows decreased from 2385 in 1914 to 1838 in 1916—a diminution of 547 cows in three years—and in Birmingham from 2244 to 2025 in one year. Twenty-five to thirty thousand cows at their prime disappear every year. Side by side there is a great and growing demand for milk, dried and otherwise preserved for the army in the field and for liquid and other forms of milk, apart from the needs for babies and adults in the United Kingdom.

It is to call attention to this serious state of affairs resulting in the present scarcity of milk supply, and the milk famine in the immediate future ending in increased infant mortality that Prof. Wallace has devoted his energies. And the present brochure is an attempt to rouse the British Nation to a sense of its duty and invites urgent attention of the members of the House of Commons and the general public, who are specially interested in child welfare, to the dangers that lie ahead. The Professor complains that the present situation would not have come to such an impasse, if the Committees appointed by the Food Controller were not composed of men hastily thrown together on the round man in a square hole system, and packed with highly distinguished scientists and experts in their own parcticular sphere of

activity, but usually with merely the remotest possible connection with the subject to be investigated although generally associated with a delusive camoufluge of a few excellent men, who were too busy to think or give any assistance worthy of the name. The Professor's cow-saving scheme which formed the basis of the correspondence between himself and the Government departments of Food Supply and Agriculture and Fisheries has not been included in the pamphlet. This is an unfortunate omission and detracts much from the value of the publication. The treatment of the subject is quite natural, but the author has left the present situation of the milk supply to be inferred from the letters published. His vigorous thinking has led the Professor to make some trite observations on the effects of the Education Acts, on the health and upbringing of children in the country side and on the ineptitude with which the situation is handled—the situation arising from the abolition of the office of the Pig-Controller and the restriction of the importation of American Pigs into country at a time when the heavy rains damaged the standing grain crop and the grains in the stack.

V. Muthusawmy Iyer.

Castors in the Presidency.

We are indebted for the following note to the Acting Director of Agriculture who kindly placed at our disposal for abstracting a file of correspondence on the Castors in this Presidency.

A crop which is content with the poorest soil, thriving with a very little amount of moisture, capable of being grown in a mixture as well as a pure crop, useful as an auxiliary crop to give shade, fuel, to serve as a wind break and a fence, is certainly castor, *Ricinus communis*. It is, as a pure crop, grown on light red soils as in Circars, on poor gravelly soils as in parts of Ceded Districts, and even on hills, and hill slopes as in Salem. But when used in mixtures, it has the opportunity of growing on

better soils. It is purely a rain fed crop, but occasionally as in Tanjore, being sown in conjunction with turmeric to give shade and fuel, it is also irrigated. Duration of the crop is eight to nine months.

There are several varieties of castor and these are all classified in numerous ways. The most commonly recognised classification is on their relative size, viz., big, medium and small. Other ways of classification are annual and perennial, popping and non-popping, long termed and short termed. The big sized castor belongs to the perennial class and the Arakkan Kottai of Salem to non-popping one. Popping is the scattering away of seeds by the capsule on bursting and in castor the distance is very great.

The big sized castor is grown only on edges of fields and irrigation channels as fences and wind breaks. It is specially used in Tanjore round turmeric fields, its fuel being used for curing turmeric. It is a perennial type and grows to a great height.

Medium and small sized castors are grown as dry field crops. These are grown pure or as mixtures chiefly with pulses in Circars, mixed or rotated in alternate years with cotton, pulses, korra etc., in Ceded Districts, or mixed with minor cereals in Salem. The season for sowing varies naturally and in Circars it lasts from October to December, beginning with light soils and proceeding to heavier ones in course of time. In Ceded Districts, it is sown after a heavy rain in June–July from the south-west monsoon. In the south there are two seasons early one in June—July for mixtures and the late one in September–October for a pure crop. Pods are gathered from January onwards. Yield varies and it is 500 to 600 lbs. when pure and 200-300 lbs. and even as little as 60 lbs. in Ceded Districts when it is grown mixed.

Big seeded varieties, for instance, Inji Kolai Kottai and irrigated crops are said to yield seeds of a poor oil content. Seeds rich in oil are those that are well filled as in dry crops and not

the hollow ones as found in irrigated crops. Storing seems to diminish the oil content. The two varieties, Manja Kolai Kottai of Tanjore and the medium sized variety grown round Salem, Karur, Kulittalai, Trichengode etc. are said to be very rich in oil content.

U. V. Rao.

More Trees for Farms.

(continued)

(4) Poinciana regia (Gold Mohur, Flame of the forest. Tam. *Panjalai*). The tree is said to be indigenous to Madagascar but is cultivated as a splendid ornamental plant in the Tropics and especially in Africa. The top of the tree is umbrella like and gives agreeable shade and is for this reason quite common in South India. The leaves are finely doubly pinnate and the flowers are large and yellow or red, grouped in clusters. The pods are flat, linear and compressed and the hard seeds contain endosperm which is unusual in the family (eguminosæ). The tree sheds its leaves in the hot season and the apparently dry branches by no means present a nice spectacle. It is also not a drought resistant and is therefore ill suited for dry regions with low rain-fall. The leaf-fall begins in the fifth year of its growth (H. Wright).

(5) Thespesia populnea (Indian Tulip, Portia, corrupt for Tamil Poovarasu). Common especially in coastal districts and mostly planted for its large beautiful flowers. The uniformly durable wood is said to be useful in carriage making and furniture and also for skilful carpentry. Winkler says (see Botanisches Hilfsbuch) that the natives of South Sea Islands manufacture a fibre from the bast which they make into coffee sacks. The seeds contain oil.

The propagation of the tree is by means of stumps though seeds capable of germination are also produced. The tree has a rugged

appearance about it and Butterworth rightly describes it "as an ugly tree on the whole." But it will always be a favourite in gardens, compounds and avenues in spite of the fact that it never allows other plants to thrive near it.

(6) Albizzia lebbek (Sirisha. Tam. *Kattuvagai*). A fine avenue tree often used as a shade tree for young coffee plants in the plantations. If this is the true 'sirisha,' as it appears most probable, it is certainly a native of India or at any rate of great antiquity on the Indian soil. For the plant often figures in descriptive Sanskrit poetry, the flowers being considered as the very emblem of softness. I have heard that the sudden blossoming of the plant indicates the approach of rain and believe this may be true as I have noticed the phenomenon in the case of the Rain tree.

(7) Pongamia glabra. (Tam. *Pungam*). When planted in short avenues this tree produces a very desirable effect. The dark green crown gives dense shade and the twigs entangle themselves and hang in long festoons. Branches begin 3 to 5 feet above ground. The tree sheds its leaves at the approach of the hot season in February and March and new leaves are put forth a month later. It also remains evergreen in some places and situations. In this connection three classes of trees may be recognised.

(i) those in which leaves and flowers appear simultaneously e. g. Nim.

(ii) those in which flowers appear first e. g. Erythrina indica.

(iii) those in which leaves precede the formation of flowers e. g. Pongamia glabra.

The leaves are eaten by cattle and are some times used for green manuring in paddy fields. Plant about 18 ft apart.

(8) Cassia Siamea (Tam. *Karunkonnai*). A favourite avenue tree in East Africa and also employed as a shade tree for coffee plants

in some other countries. Owing to its drought resistant character it deserves trial in places not suited to other trees. It is an evergreen and a remarkably quick growing plant. Two seedlings planted in a somewhat impoverished soil attained a height of nearly 15 ft in two years. The leaflets assume various positions during the day so as to avoid maximum illumination.

Two other Cassias that should be more widely grown for their beauty of foliage and flowers are C. fistula (Sarakonnai) and C. marginata (Senkonnai). The former is a deciduous tree with large pendulous racemes of golden yellow flowers and long cylindrical gummy fruits. C. marginata has handsome flowers and fine foliage. The medicinal use of some of the smaller Cassias is too well known to need any reference here.

(9) Tamarindus indica. (Tamarind. Tam. *Puliyamaram*). One of the commonest avenue trees in South India. Owing to its very slow growth it is advisable to plant this alternately with some such quick growing plant as the Rain tree in avenues. It is hardy and drought resistant and withstands neglect when once it is well established. The manifold uses of the hardwood in the making of implements, oil and sugarmills, hammers etc. are well known.

(10) Mangifera indica (Mango, Tam. *mamaram*). A typical evergreen quick-growing up to 30 or 40 ft with spherical, regular and exceptionally thick crown. When grown isolated on lawns it lends a most charming view to the landscape. The grafted varieties are specially to be preferred as they branch very low near the ground.

The mango requires a loamy soil rich in humus, a gravelly subsoil and a situation sheltered from wind.

(11) Cocos nucifera (Coconut. Tam. *Thennamaram*). The origin is traced to tropical South America and it is stated that it was introduced in India after it was extensively cultivated in Ceylon.

Whatever may be the fact, to the Malabar Indian the Coconut Palm is 'as dear as a son.'

When planted in avenues or in small groups the palms produce a most beautiful effect and they are of a fairly quick growth.

Owing to its very great importance as an industrial crop the following simple information may perhaps be interesting.

The age of the plant is limited to about 100 years and it attains a height of about 80 ft. It begins to bear after the seventh year and the average number of nuts yielded by a single tree per year is 75 or 80 up to 100 in the best trees though the commercial average is probably not above 50. According to a low estimate

100 plants 8 years old	may yield	$\frac{1}{10}$ to $\frac{1}{5}$	ton kopra.
,, 10 ,,	,,	$\frac{1}{2}$	ton ,,
,, 14 or 15 ,,	,,	$\frac{3}{4}$ to $\frac{4}{5}$	ton ,,
best plants ,,	,,	1	ton ,,

The seedlings must be planted about 20 ft apart for avenues.

(12) Casuarina equisetifolia. (Tam. *Savukku*). The importance of Casuarina for the afforestation of lands covered with drifting sand has been long known. As a wind resistant also it has proved to be efficient and is being grown widely near the sea coasts. The small seeds (really fruits) are sown in beds and the seedlings are transferred to small baskets where they are allowed to grow for some time before final planting in the desired places. The width of planting may be 6 or 8 ft.

The Casuarina is recommended for waysides, compounds, river banks, and sandy places in general.

(to be continued.)

P. S. Jivanna Rao.

Extracts.

The effect of weeds upon cereal crops.—

Pot culture tests were conducted with crops grown in association with weeds to determine whether vegetative competition is the sole factor suppressing the growth of crops or whether weeds excrete poisonous substances from them which actively inhibit growth. No evidence or indication was forthcoming to show that any toxic action was involved. It was obvious however, that the mere competition of plant with plant, irrespective of species, had much to do with plant development, and that the time and duration of such a competitive check were the chief factors involved.

(Extract from the Experiment Station Record, U. S. Dept. of Agri. June 1918).

S. S.

Notes and News.

A novel method of weed control.

The Modern Review for August 1919 abstracts an article from the "Literary Digest" indicating a new method of controlling weeds on the farms. Mr. F. C. Eckart belonging to one of the Hawaiian sugar companies has succeeded in keeping down weeds in sugarcane fields by covering the fields soon after planting the cane setts with yard rolls of a coarse kind of paper and keeping it in position by means of bamboo pegs, stones etc. The paper is impregnated with Asphalt to withstand weather and handling. The strong sugarcane shoots come out into the light and air by piercing through the paper while the growing tips of weeds which are generally softer are prevented by the paper covering from getting into the light and air, become unhealthy and ultimately die off. He further urges that the moisture is better conserved under the paper cover. The paper ultimately disintegrates and leaves the field open. It is claimed that this method effects a saving in labour of 50 to 70 per cent. and increases the tonnage yield in canes by about ten tons. The value of the work is further enhanced by the fact that they have perfected a method by which the paper could be made from the waste fibre materials of the crushed cane. At the Sugarcane Breeding Station, Coimbatore, a crop of Daincha is regularly grown in between the sugarcane rows and though this is done with a different purpose viz. to prevent undue evaporation from the deeper saline layers has the additional effect of keeping down the weeds In fact no weeding for the cane crop is needed for the first four months, that is, till the Daincha is cut down and buried in between the cane rows as manure.

T. S. V.

Sudan Dura (Cholam) as a brewing material.

In connection with the malting experiments with cholam conducted by this Department* with a view to test its suitability for brewing and for the preparation of malted foods, the following results of investigation by Briant, L. and Harman, H. published in the Journal of the Institute of Brewing, Vol. XXIV No. 5, June 1918 will be interesting. Fairly large quantities, 5 or 6 tons, appear to have been used in the experiments which were directed in testing the possibility of using the grain in the brewing industry as,

1. Malt.
2. Roasted grain,
3. Flaked grain, and
4. Glucose.

Malt. The grain is said to be not easy to handle during germination as the acrospire having no protective skin as in barley, is exposed

*Memoirs of the Department of Agriculture in India—Chemical Series. Vol. V, No. 4, January 1919.

and easily injured and detached during the frequent movements of the grain. The malt which gave results similar to barley malt was equal to it in diastatic power.

Roasted grain. Used as roasted grain, either malted or unmalted, it yielded products which were satisfactory in aroma and flavour and compared favourably with those obtained from barley. Porter brewed with the roasted grain was better in colour than and in no way inferior in flavour to that brewed with roasted barley although the proportion used was less in the former than in the latter case. It was found possible to substitute cholam for barley without changing the character of the beer.

The tests in the making of amber malt showed the flavour to be excellent. Owing to difficulty in malting, the extract yielded was low. Could this difficulty be overcome, it should prove to yield a satisfactory extract.

Flakes. The grain was easily flaked with an yield of 30% as against 68% for maize and 95% for rice and gelatinised readily. Used with half the usual proportion of flaked maize (15%) the results were satisfactory. Brewing Experts judged cholam flakes to be equal to maize flakes and the authors consider them suitable not only for brewing purposes but also as a food for human consumption.

Glucose. Cholam was also successfully used in preparing glucose for use in part in brewing. The sugar obtained was on the maltdextrine type. The experiments showed that in new bitter beers the cholam sugar yielded decidedly better results than invert sugar and that the beers when examined after 3 or 4 weeks were of better quality than those made with invert sugar. In new mild ales, however, cholam sugar gave rather less fulness than invert sugar.

T. L. Rao.

Agricultural Schools.

We are glad to note that most Provincial administrations are giving effect to some of the recommendations of the Government of India on the subject of Agricultural Education. In the Central Provinces an agricultural school for the sons of malguzars (Mirasdars) and well-to-do tenants was opened on the 1st of June last on the Powarkheda Farm near Hoshangabad. The course is one of two years and boys who have passed the Upper Primary class alone are admitted. Two teachers from the Education Department have been entertained after a training at the Agricultural College in Nagpur. The syllabus commences with the three R's but is in our opinion too ambitious for a boy of the type admitted. Studies of insect life relating to classification and methods of feeding, struggle for existence, fungus life, village, taluk and district administrations, constituents of soils and their properties, and crop cutting experiments are certainly a bewildering mass of information which an immature mind should go without. The course may, if necessary, be shortened if there is not enough for full two years. In our own Presidency, a similar school will be opened at Taliparamba in 1920. As a preliminary step two agricultural subordinates have been deputed to Saidapet for training in the Teachers' College. We are confident our Department will not fall into the same error as the Central Provinces administration in regard to the syllabus.

Crop Notes Coimbatore.

The summer monsoon has been less unfavourable this year. Wetland cultivation in Noyal valley is in full sowing and transplanting is progressing satisfactorily. Light soil sowings were partly finished in the beginning of August. Peria Manjal Cholam is fair, but needs rain. In garden land early Ragi is in ears and some fields have been harvested. Late Ragi is just planted, while in some places seed beds are still being raised. Cambodia cotton all over the district has been pulled out and ryots have on the whole very favourably received the departmental instructions issued under the Agricultural Pest Act for the removal of this crop. Sugarcane is good and has been manured and earthed up.

Students' Corner.

We have received from student M. Subbramanya Pillai of Class IV an article entitled "Education in relation to Agriculture." We abstract the following from the said article.

He begins the subject by tracing the development of English Education in India. That after the famous minute of 1835 of Lord Macaulay, the British Government definitely decided to give the people of India education on western lines. He says, the Government had to favour the giving of English education as they were then beginning to consolidate their possessions in India which required a number of Indian officers of English education to help them in carrying on the administration of the country. Consequently in 1857, the three Universities of Bombay, Madras and Calcutta were established and others followed later. He remarks that these Universities encourage more a literary education than technical. But fortunately, in 1901 the Educational Conference presided over by Lord Curzon took up the question of technical education for consideration and since then the Government is bestowing special attention to this branch of education.

He then deals with the primary importance of Agriculture to India and points out that over 240 millions of people are directly dependant on Agriculture as their sole occupation. He quotes from the convocation address of Mr. D. T. Chadwick, our former Director that Agriculture is the most ancient and most honourable of the World's callings. Lawyers, priests, school masters, traders, inventors, engineers only appear later on in a States' history. After a start has been made in Agriculture, it is above all things, honourable to apply trained common sense towards increasing the productivity of the earth on which ultimately all human activities depend. This shows how important is Agricultural education to any country and especially to India, a country largely agricultural.

He points out how the past and present systems of rural education are not at all beneficial to the masses but useful only to a very

minor section of the people, who take up secondary and university education.

The present day move is towards rural education of a practical kind and this is to be given in Agricultural middle schools to be newly started. He doubts the success of the middle schools without the hearty co-operation of the agricultural public He thinks their co-operation will come of its own accord if we educate the present day farmer and make him feel the necessity for a scientific training in agriculture—at least to the rising generation. The education of the present day farmer could be effected by judicious demonstration of improved agricultural methods. Lastly, he dwells upon the best methods of teaching in primary schools with a view to develop in the minds of young boys the power of observation and a spirit of inquisitiveness. He winds up with an extract from Mr. Wynne Sayer's writings, "Now is the time for India to make her effort. Her greatest asset is agriculture and the agriculture of the world was never so prosperous. Agricultural produce will rise in value after the war to the benefit of India. Let her, therefore, take steps to put her chief industry on a better footing; better cultivation, better marketting arrangements and better financing of the rural populations. All the world is moving on the line of advance and if India lags behind it will be a national calamity. Let her bestir herself and realise that the produce of the land is capable of a considerable amount of increase. This better state of things will be brought out by education of the adult farmer and the rising generation who will farm when he has gone—in short, by the Education of India in a direction, where the best talents of the nation may be fully and profitably employed to the benefit of all."

"Soodasan."

Departmental Notes.

Appointments :—

Mr. N. V. Viswanatha Ayyar, Agricultural Demonstrator to Palur Farm as Farm Manager in charge vice M. R. Ry. E. Unnikrishna Menon on deputation.

Mr. P. Janakirama Ayyar, Assistant Farm Manager, to District work Tirukoilur *vice* No. 1.

Mr. C. Rangaswami Ayyangar, to be Sub-Assistant on Rs. 35-2½-75 on probation, and posted to the Mycology section.

Mr. T. Seshachalam Naidu to be Assistant Farm Manager, Chintaldevi Cattle Farm on Rs. 35-2½-75 on probation.

Mr. Samuel Nallathambi to be Sub-Assistant in Economic Botany Section on Rs. 35-2½ 75 on probation.

Mr. John T. Devasaghayam to be Sub-Assistant in Entomology.

Mr. A. M. Nagalinga Mudaliar, is appointed as supervisor, 2nd grade on Rs. 75, 75-5-125 on probation for two years and posted to the Agricultural College under the Lecturer in Agricultural Engineering.

Mr. S. Jobitha Raj is appointed as Assistant in Economic Botany on Rs. 75, 75, 75-5-125 on probation for two years.

Leave :—

Mr. T. V. Ramakrishna Ayyar, Assistant in Entomology, who was recalled for duty on the 12th June 1919 is granted 2½ months privilege leave from or after 14th July 1919.

Extension of privilege leave for six days is granted to Agricultural Demonstrator V. S. Narayanaswami Ayyar.

Mr. Y. Ramachandra Rao, Assistant in Entomology, who was recalled for duty on the 13th June 1919 is again granted privilege leave for one month from or after 1st August 1919.

Mr. T. R. Ranganath, Assistant in Mycology, is granted privilege leave for 27 days from date of relief.

Mr. K. Ramanatha Ayyar, Assistant Farm Manager, is granted privilege leave for one month and three days and on medical certificate for 27 days in continuation from 13th July. This cancels 25 days privilege leave already granted.

Mr. C. R. Sreenivasa Ayyangar, Assistant in Economic Botany is granted privilege leave for 3 weeks on or after 25th July 1919.

Privilege leave for one month is granted to Mr. B. Viswanath, Assistant in Chemistry from date of relief.

Mr. K. Raghavachari, Teaching Assistant, is granted an extension of privilege leave for 3 weeks.

Mr. A. Venkobachar, Assistant Farm Manager, is granted privilege leave for 22 days from 22nd July 1919.

Mr. K. Raghavachari, Teaching Assistant, is again granted an extention of privilege leave for one week.

Mr. Lutchmiah Nayudu, Mechanic, second grade and sub-pro-tem mechanic first grade, has been granted privilege leave for one month from 8th September 1919 or from date of relief.

Advertisement.

Applications are invited from ex-students of the Agricultural College, Coimbatore, who have obtained the proficiency certificate in Agriculture for vacancies in the lower subordinate grade on Rs. 35-2½-75 in this department.

R. Cecil Wood,
Ag. Director of Agriculture.

Applications are invited from candidates who have undergone course of studies in the College of Agriculture, Coimbatore and obtained diploma for the post of Agricultural Instructor on Rs. 50 per mensem in the District Jail, Tanjore.

Supdt.
Dist. Jail, Tanjore.

Printed at the Literary Sun Press, Coimbatore.

THE JOURNAL
OF
The Madras Agricultural Students' Union.

Vol. VII. **October 1919.** **No. 10.**

Editorial Notes.

Apparently we are at the beginning of a new era in the matter of Agricultural Education in this Presidency. But Change is the very essence of life and it is not to be wondered at that in a rapidly growing department like ours changes should be so frequent. As early as 1812 the establishment of agricultural experimental farms was suggested by the East India Company as a means of Agricultural Education. In pursuance of this, spasmodic efforts were made in the later decades of the nineteenth century to start and run experimental farms in certain localities. These proved failures as they were placed in charge of unsuitable men, gardeners instead of farmers, as that eminent historian Sir W. W. Hunter put it.

Agricultural Education in this Presidency :-Early History.

The Universities Commission of 1902 expressed the view, that, in a country like India which is largely agricultural, "Agricultural Teaching," both ordinary and

higher, are essential. In 1904 the Government of Lord Curzon laid it down as a definite policy that each important province should be equipped with an agricultural college and research institute with suitable farms for carrying out experiments. This scheme was carried out only in part and it ended in something of a disappointment. Uniformity in the methods of instruction in the different provincial agricultural colleges was found unsuitable and it was thought best to allow each province to work out its own programme. In our own college the course of instruction was split into two (a) the "Diploma" course extending to 3½ years and (b) the "Certificate of Proficiency" course extending to two years, the former being a continuation of the latter. The candidates for the Diploma course were selected from the successful candidates of the Proficiency course. The hope was entertained that the college would attract the sons of Zamindars and landholders who would after the training be able to get back to the land, adopt the improved methods taught at the college and thus advance the agriculture of the country. The response from the landed aristocracy proved woefully inadequate and even the few entrants did not fullfil expectations but showed the usual desire to enter Government service.

Recent History.

It is now found that the quality of the material seeking admission into the college at Coimbatore is not of the class likely to yield recruits for the higher posts in this Department and the Government of Lord Willingdon

have appointed a Committee to report on the causes and suggest remedies. The Committee consists of Mr. R. Cecil Wood, President, the Hon'ble Messrs. Rao Bahadur V. K. Ramanujachari and Rao Bahadur T. Balaji Rao Naidu, Rev. S. D. Bowden of the Kavali Criminal Settlement and Mr. Champion, Deputy Director of Public Instruction. We regret to find that no Indian with wide teaching experience is included and that the Zamindars are not represented to give the Committee the benefit of their view point.

Appointment of Committee to investigate.

To our minds a good deal of the difficulties connected with Agricultural Education in this Presidency arises from making the one institution serve different needs. We are also of opinion that the main remedy lies in the direction of a complete differentiation of the material from the very start i. e., from their very entrance into the college in the course, qualifications and prospects according to the different requirements. Most of the other departments have done this —appprently— with a fair amount of success and there is no reason why we should not also follow suit.

Differentiation suggested as an important remedy.

For recruiting to the lower needs of the department such as assistant managers and assistent agricultural demonstrators the present two-year course appears to have proved its utility and the arrangement may be continued—i. e. the present Proficiency course. For this the present qualifications are adequate and preference should continue to be given to the agricultural classes. Nay, even special

The Lower Course.

inducements to the real agricultural classes of the country by way of special scholarships would appear to be indicated.

But for recruitment to the higher posts in the department we want men who will be able to guide and design experiments and for this the intermediate should be the minimum qualification. These need not necessarily come from the agricultural classes though an attempt may be made to secure a large proportion from this class by offering special scholarships for such men. But the class consideration should not allow any lowering of the minimum qualification required. We need only mention the names of Mr. Benson and Dr. C. A. Barber C. I. E., to show that a highly trained scientific mind can fill the highest posts of our department with credit without belonging to the agricultural class. Dr. Barber came out to India as a pure Scientist—a systematic Botanist—and let us remember that, he, not only started and was in charge of three of the most successful farms in this Presidency, but was an easy authority in all matters agricultural or otherwise. The fact seems to be, that, so long as a mind is properly trained, it can apply itself to any problem with success. Again we need only mention the names of Jathro Tull, the inventor of the seed-drill; Coke of Norfolk, the father of experimental farming; Sir John Sinclair, the founder of the Board of Agriculture in England; Mc' Cormick, the inventor of the reaping mechine and of Baron Leibeg and Professor Ville to show that in

High educational qualifications essential for candidates to the higher course.

the higher lines of research intellectual qualifications and a wide general education are great assets. Dr. Macdonald of the Union Department of Agriculture, South Africa observes that agriculture owes much to men who could scarcely be called practical farmers.

Another matter which is as important as the differentiation suggested above is the enhancement of the prospects in the Department. It is now fairly agreed on all hands, we take it, that (1) agriculture is a very complex science and (2) that it is the most important industry for our country. If so, it follows that we should be able to secure the best intellects of the land for this profession but what is the actual state of affairs? We are confronted with the fact that the best men are taken up by the other professions such as Law, Medicine and Engineering. In this connection the history of the Engineering College at Madras published elsewhere is of special interest. It is there seen that that college has succeeded in attracting the very best men by holding out guarranteed high salaried appointments to the first successful candidate. If our profession is as important to our country as Engineering—and who will dare say "No"—let us adopt the same policy and compete with all the other departments to secure the very best of the land.

Increased prospects.

We await with a beating heart the recomendations of the Committee and hope that the system of Agricultural Education in this Presidency would be on a sound basis as a result of its findings. The unsympathetic are apt to

think that we are changing our methods too often but, let us remember, that the other colleges have done the same and again the history of the Engineering College at Madras affords a parallel. Active change is the sign of life and represents a continuous adjustment to a rapidly changing environment.

We publish elsewhere an appeal from the General Secretary of our Union inviting funds for the D'Sylva Memorial. The appeal speaks for itself and we hope that old students and colleagues will freely respond to the appeal. The balance now available viz Rs. 277—8—3 is considered too inadequate for the institution of a prize and the Committee expects a sum of at least Rs. 500 for instituting a prize from the interests of the amount.

D'Sylva Memorial.

Agricultural Students and National Service, *

Let me assure you at the outset that I am not going to talk to you of politics this evening. For politics is still an art, not a science,—it is in the most advanced countries associated with much sentiment. It is best, therefore, to leave it alone, as far as possible, while you are still young and your character is being made. Get hold of facts, while you may, and later on in life you will be able to draw your own conclusions from them. National service is possible for you on a very large scale, without be-taking yourselves to political activities so early in life. In fact, some of the finest women and noblest men in the world have had little to do with politics.

This is the first time I have had the honour of addressing a body of agriculturists. As a layman, I dare not speak to you on any agricultural subject, in the presence of so many agricultural experts. You

* An address delivered before a meeting of the Students' Club.

are a body of scientific producers. I am a consumer—that is the link between us! I have come here not to complain, but to congratulate you and wish you God-speed.

You are producers of food and on your exertions depends the future of your country. Human life, as for that, all life, would become extinct without food. Amidst civilised communities the vast bulk of the food that man consumes is grown or produced by human labour. Hunting is rapidly being replaced by agriculture amongst the progressive peoples, and unless chemists come forward to manufacture food in the laboratories, we are left entirely to agricultural resources for our food supply. Even a great manufacturing country like England —a country in which the agricultural interests have been systematically sacrificed for manufactures and economic gain—at least realised during this world-war, that man lives not by manufactures, not by gold and silver, but by bread, butter and margarine. Since then efforts are being made on a formidable scale to stimulate the agricultural resources of the country. Let us take that lesson to our hearts. In the eagerness to make India industrial, let us not forget that the agricultural development of the country is far more important for the wellbeing of the people. Even for industries, we have got to grow our raw materials on a large scale than at present. No doubt, our natural resources are great, and it is a legitimate ambition to aspire to be self-sufficient industrially and economically at no distant future. But, we should remember that we have a population of over 300,000,000, the largest population in the world to deal with, next to that of China. We cannot expect other nations to grow food for us—even if they did, we might not be able to buy it with our low wages. We have to depend on our own exertions, we have to grow our own food.

The future of India, to a great extent depends on the developments in agriculture, i.e. the progressive adaptation of agricultural science to the production of large quantities and finer varieties of food which is demanded by the increasing population of the country.

Our country, even in twentieth century, is not exempt from the visitations of famines. We blame the failure of monsoon for the advent of the famine, and consider ourselves as having done a pious duty in making the heavens responsible for our misfortunes. But, before we can pacify our conscience in the matter, we have to ask ourselves whether everything has been done with the aid of our reason, forethought and the achievements of modern science, to mitigate, if not obviate, the harm done by the failure of rain.

(1) Has everything been done that ought to be done, to prevent the waste of water during the years of favourable rain?

(2) Do we store grain in the years of prosperity to tide over the years of adversity?

(3) Has the last words been said in the methods of boring wells, of obtaining cheap manure and of introducing co-operative help among the agricultural population?

Some years ago it used to be said that some places were not suitable for habitation. Vast wastes of land were condemned on the score of being malarial. But medical science kept on working at the problem till the cause of malaria had been discovered and its antidote, too, been found. Therefore, now it is only a matter of time, any malarial tract can be made quite habitable.

The impossibilities of today may be the possibilities of tomorrow. Instead of blaming nature's ordinances, if we blame ourselves and more unreservedly than before use the resources of our modern civilization to the solution of our food problem, we may be able to banish famine from the category of the inevitable with regard to India.

The lingering millions of India are waiting for your answer—can you produce more food or not? If you can, then for God's sake set about it at once. The work may indeed be hard, the conditions trying, and the result slow in arriving—but the end may compensate your sufficiency for all your toil and privation.

If you wish to further the agricultural production of your country let me impress upon you the need there is for doing research work in

any one subject that you love best. Have a scientific hobby and pursue it in season and out of season till you have accomplished something with it! But beware of expecting a return for your labours entirely in terms of gold and silver. Some of those who had been the greatest benefactors of humanity had been poor men. In the European countries, some gifted students, forsaking splendid prospects in life, give themselves to higher studies, and research and undergo privations even, in the pursuit of their investigations. We in this country are not ashamed to be poor. We have a popular saying to the effect that Lakshmi and Saraswathi do not live under the same roof any length of time. We may have to be poor ourselves, sometimes, to make others rich. I trust that some of you will discover something that would revolutionise agriculture of this country in the near future. You owe it to your *Alma-Mater*, to yourselves and to the inarticulate millions of India.

Now I speak to you as the future men and citizens of this great country. You are educated men and we are anxiously asking for mass education. Show the people among whom you live what education has done for you. Prove to them by your example as well as your precept that you are finer men, nobler men and more self-sacrificing men than they are—in fact, let them find in each one of you a gentleman. Be kind, considerate and thoughtful to all those you come in contact with. Do not be servile in your attitude towards your superiors, nor even bully your inferiors. Remember a bully is often the greatest coward on earth.

Again carry the scientific spirit of honest doubt which you have imbibed here in your after life, in all its many relations, social, moral, economic and religious. Do not accept anything for granted, on whatever authority be it given you, unless you have proved it to yourself.

Finally, some of you might aspire to be leaders of men in your time and generation. A worthy ambition indeed. We sadly lack leaders in this ancient country of ours. You cannot be leaders of

men, so long as you attempt to dominate and rule them. But remember that leadership comes through humility, self-sacrifice and service. You should learn to deny yourself and serve your country in any sphere open to one of your attainments, before you can aspire to become one of its leaders.

Trust yourself, trust your fellow creatures, trust God, and do the best of your ability whatever lies at your hand; do it earnestly, do it sincerely, do it with enthusiasm—and even if you had raised two blades of grass where hitherto only one had grown, be assured that you have done your bit of the national service, and that your life would be considered a great and unqualified success.

D. S. Ramachandra Rao, M. A., M. D.

Note on the cultivation of melons on the Hagari river-bed.

This river is formed by the junction of the two streams which rise and unite in Mysore. These are the Veda and Avati and in that State it goes by the alias of Vedavati, a word derived, like ThungaBhadara from the name of the rivers which give its birth. Within Bellary it flows nearly due north in a wide, shallow sandy bed which is dry for a greater part of the year but after heavy rains is filled with violent torrential floods which occasionally do much damage to the wet cultivation along the bank. The river is crossed by the Southern Maratta Railway near Paramaderanahalli and the railway station is called after the name of the river. It is here we should alight for the Hagari Agricultural Station. The name is said to be derived from *hagga-ari* i. e. freeing from the bonds of sin.

It will be very interesting for one to look at some spots in the Hagari river-bed covered with green foliage in the months of March and April. These spots are often enclosed within some thorny fencing, very often with babul. One will be tempted

to ask himself what they are and soon this doubt vanishes when he comes near and finds it to be a crop of melons.

This cultivation is effected when the river is dry and without a drop of water except in the spring channels of the river dug by the ryots of the villages lower down. It will be a puzzling problem for a cursory onlooker as to how such a luxuriant growth of this crop could be obtained in this dry patch of ground which abounds with nothing but bare sand supposed to be devoid of any plant food or any trace of moisture while no artificial irrigation is being resorted to. But at the same time one cannot find any difficulty in ascertaining that the required quantity of moisture for the plant growth is obtained from the underground layers of soil which are as a rule always in a sufficiently wet condition being the bed of a river of perennial underground current. This is taken advantage of by the ryots, who in their method of cultivation fail not to dig up trenches as will be explained below. The next item for the plant growth is the process of manuring and it is in this direction that the ryots of this place have to exert a good deal and it is also the limiting factor in growing this crop successfully. In short, they get melons in place of manure. This is an illustration of how even in desert tracts a prudent use of manure cannot go without its due reward and the fact that it is taken advantage of by these ryots is an evidence as to how much they appreciate the value of manures. When only this is likewise appreciated by the whole ryot population, one may say without contradiction that a real advance is made in the direction of agricultural industry.

Preparatory cultivation. During the months of December and January, i. e. as soon as the Hagari river gets dry trenches are dug. These are very often one foot deep, one and a half feet wide and fifty long. These trenches are left like this for about a week till the top layer of the sand gets dry in the trenches when the seeds are pressed in dry sand.

Manuring. When the plants are about 1½" in height, beautiful well rotton manure is applied round each plant at the rate of one basket about 20 lbs. for 8 plants and this is covered with dry sand. A fortnight after this a second manuring at the rate of one basket for every two plants will be resorted to. This is applied only on one side of the plant and third manuring after another fortnight will take place at the same rate and in the same way but application is made to the other side of the plant. This finishes the most important operation. Meanwhile, the trench will be gradually filled with sand and the very object with which the trench is dug is best served when the plants grow luxuriantly with an assured supply of manure and moisture.

Flowering commences at the age of 2 months and they bear fruits for 1½ months.

Marketting. These fruits are cut in the evening and in the morning they will be found in the markets of Bellary. Prices range from one anna to four annas. A plot—twentyfive cents—is reported to give daily on an average twenty fruits which in the long run would fetch 900 fruits or in money value Rs. 112—8—0 gross.

Expenses are as follows:—

Trenching 6 (six) men at as. 4	Rs.	1	8 0
Manure 15 cart loads at as. 8	Rs.	7	8 0
Carting at 3 loads per rupee	Rs.	5	0 0
Wages of watchmen for 3½ months at Rs. 7—8—0 per month. He will help himself for fencing and for his shelter.	Rs.	26	4 0
Wages for a woman to go to Bellary for disposal of the fruits at as. 3 for 45 days.	Rs.	8	7 0
Basket and other contingencies	Rs.	1	5 0
	Rs.	50	0 0

It is to be remembered that this is one of the most risky crops and on more than one occasion they were washed away by sudden floods. People who do not possess any holdings take up this work.

S. S. Patrudu.

Indian Chemical Industries.

Coal is available as a source of power for the manufacture of fundamental heavy chemicals in North, but not in South India. In the latter locality wood is cheap, and the production of charcoal as a fuel of high calorific power is under consideration in Mysore. Electric energy dependent on water power, is intermittent owing to climatic conditions. The manufacture of chemical plant and machinery, previously imported, has been undertaken during the war. The most promising line of development seems to be the cultivation of raw materials and the manufacture from them of finished products, as well as the working up of various ores and mineral substances. The question of tariffs, is, however, important.

Essential oils. The following oils are obtained from raw materials growing in India and Ceylon: anise, cardamom, cinnamon leaf, coriander, East Indian dill, ginger, sandalwood, thymol, vetivert, lemongrass, palmarosa, gingergrass, citronella. Cardamom, sandalwood, thymol and palmarosa oils are obtained from products grown only in India and Ceylon.

Since 1914 various developments have taken place in the distillation of essential oils. Sandalwood is now distilled instead of being sold by auction: thymol crystals are produced from ajwan seed; citronella oil is being distilled in Burma: palmarosa oil is steam-distilled. The refining of oils and perfumes calls for scientific treatment. The following accounts of raw materials for essentials oils were exported in 1917—18: ajwan seed, 3960 cwts., worth £ 2,735; aniseed, 1573 cwt., worth £ 1065; cardamoms, 716,358 lbs., worth £ 64,740; cinnamon, 55,554 lbs., worth £ 1064; coriander seed,

116,273 cwt., worth £ 80,154; cumin seed, 18,439 cwt., worth £ 54,778; cumin seed, black 3379 cwt., worth £ 5030; dill or savin seed, 33,813 cwt., worth £ 28,781; ginger, 5,841,374 lbs., worth £ 87,254; sandalwood, worth £ 56,644; lemongrass oil, 26,871 galls., worth £ 25,613.

Vegetable oils. The chief oil seeds produced in India are: linseed, cotton seed, coconut, rape, groundnut, castor, sesamum, and mahua.

Exports of the different products during 1917—18 were: linseed, 140,676 tons, worth £ 1,716,552; linseed oil, 557,663 gallons, worth £ 127,178; cottonseed, 1,627 tons, worth £ 9,056; cottonseed oil, 76,444 galls worth £ 9,621; cottonseed cake, 200 tons, worth £ 800; (quantities of cotton seed and cottonseed cake, exported during the year or two have much diminished, but quantities of the oil have increased); rape and mustard seed, 59,100 tons; rape and mustard oil, 488,771 gallons; sesamum seed, 16,000 tons, worth £ 225,000; groundnuts, 188,152 tons; groundnut cakes, 49,90 tons; castor seeds 86,101 tons, worth £ 1,017,373; castor oil, 2,086,038 gallons, worth £ 255,560.

Oil pressing is carried out in India by medieval methods; the problem of treating all seeds locally, instead of exporting them, is being attacked. The question of manufacturing pure vegetable margarines is also of importance.

Linseed is one of the most important crops grown in India; the cottonseed oil industry is still in its infancy, much of the seed being fed to cattle. The oil content of Indian cottonseed is 18 per cent; that of American seed 23 per cent. India is probably the largest centre of production of the rape (colza) oil; the seed contains 42-45 per cent. of oil. Sesamum is grown mainly in India, and the seeds contain about 44 per cent, of oil. Arachis (groundnut) for oil is grown chiefly in Madras, Bombay and Burma. India is the main source of the world's supply of castor oil; the oil is converted into Turkey red oil by means of sulphuric acid, an industry dependent on the price of the acid. Coconut oil is produced mainly on the

west coast; the export of mahua has latterly greatly diminished. There are numerous other oils, trade in which might be developed.

Exports during recent years have been :—

Year.	Oil seeds.		Oils.	Oil cakes.		
	Quantity tons.	Value £.	Quantity Galls.	Value £.	Quantity tons.	Value £.
1912—13	1,217,089	15,022,009	24,489,092	571,945	161,785	821,387
1913—14	1,572,792	17,000,385	25,991,315	657,085	175,313	920,249
1914—15	946,727	9.669,897	30,245,651	701,357	136,932	709,219
1915—16	641,983	6,582,617	33,081,357	812,571	150,286	757,501
1916—17	919,853	10,772,618	30,904,841	1,007,151	124,996	660,697
1917—18	431,737	5,052,062	26,755,953	1,326,441	86,159	471,665

Alkaloids. On account of its variety of climates, India is suittabe for the extended cultivation of alkaloidal plants. The production of cinchona and opium products has been undertaken by Government. Supply, however, is unequal to demand, and in 1917-1918, 29 tons of quinine and its salts, worth £ 105,660, was imported. Morphine is now being manufactured at the Opium Factory, Ghazipur. Hitherto seeds of STRICHNOS NUX VOMICA have been exported; now the extraction of strychnine and brucine is being attempted. The export of nux vomica in 1917—18 amounted to 1962 tons, worth £ 25,329. It is proposed to form a Drugs Manufacturing Committee to stimulate the cultivation of alkaloids in India.

Natural Dyes. India is very rich in natural dyes, of which the following are exported; Indigo, cutch, safflower, turmeric, annatto, red sandalwood. Heavier crops of Indigo are being obtained by the use of phosphatic manures; the following figures show that the cultivation of this dye has considerably increased during the war:—

Year.	Acreage.	Exports tons.	Value—£.
1912—13	227,045	593	146 755
1913—14	169,221	547	141,938
1914-15	145,792	857	599,691
1815—16	851,265	2096	1,385,795
1916—17	770,000	1677	1,382,931
1917—18	710,600	1456	957,985

Fertitizers. Although essensially an agricultural country, India uses few fertilizers. Bones are exported from India in steadily diminishing quantities. Thus in 1914—15 63,975 tons, worth £ 319,553, and in 1917—18, 26,679 tons worth £ 102,389, were exported.

Minor products. Considerable quantities of sodium sulphate are produced in India, and used in cotton mills, in the manufacture of glass, and for dehydrating oils; little is imported. Appreciable amounts of potassium nitrate are recovered from old village sites in Bihar and the Panjab. But Indian potash is unlikely to compete with that from other sources. The manufacture of zinc salts in India could be developed. The manufacture of aluminium sulphate and alums from pyritic shale has long been an Indian Industry. Alum cake is also made from bauxite. Considerable quantities of aluminium sulphate and alum are imported. Litharge and red lead are made on a considerable scale, and the manufacture of white lead is likely to be started. Deposits of chrome iron ore in Mysore Baluchistan and Singhbhum are being opened up, and attempts have been made on a small scale to manufacture chromium compounds. Ferrous sulphate has been made in India since the outbreak of war, as well as oxalic acid on a small scale. Citric acid could be made from limes, and tartaric acid from the pulp of tamarind fruit.

(From the Journal of the Society of Chemical Industry, Vol. 38—No. 16.)

Reviews.

The Madras Bulletin of Co-operation for july 1919 contains an interesting article on the working of Co-operative Egg Societies in Denmark:—

The Danish Farmers' Co-operative Egg-export Association has 550 societies with local centres affiliated to it, and possesses

45,000 members. The working of the association is as follows:—A small fee of six pence gets admission for one into a local union. The local unions collect eggs from their members who are to deliver only their own eggs and no chance-found eggs. Eggs older than seven days are not received. They are then packed in wooden boxes with card-board partitions forming small cells. Each cell is supplied with soft wool, and will receive one egg. A slayer of straw is put at the bottom and the top of the box, while a packing of wood wool is laid on each partition. The lids of boxes are firmly secured by means of iron loops and swivels, no lock being used. When the boxes are packed they are sent to the shipping stations where they are made to undergo a process of examination called "candling", which is as much interesting to the reader as it is merciless to the eggs. First, they are sorted and graded by skilled women according to their size and weight into five grades, 120 eggs of each grade weighing from 14 to 18 pounds respectively. When the trays are ready with the graded eggs they are carried to a dark room where the test takes place. The "candling" is as follows:—Eggs are exposed to powerful electric lights from below. Bad eggs betray themselves by their defective translucence, and they are immediately removed after sorting, grading, candling and branding they are re-packed and dispatched to their destinations.

In the case of breakage, if it does not exceed 2 per cent no debit is made against the member. Chipped eggs are sold locally, being used for cooking and omelettes. But how to effectively avoid a bad egg? It is said that the brand of the Danish Farmers' Co-operative Egg-export Association is a guarantee of good quality. How do they manage? It is here that their wonderful organisation and business instinct help them. They are very careful about their customers and supply them goods of good quality. Each egg is impressed with the number of the member who sent it, the number of the union to which the member belongs, and the brand of the Association.

Eggs that are in excess of demand and those that are more than seven days old are pickled in lime water. Large cement vats are filled with strong lime water aud eggs are thrown into them, each vat containg from 5,000 to 7,000 such preserved eggs. Some times they are kept there even for ten months, and then, 'candled' and sold. Prices are fixed by the weight of the eggs on every Thursday by the head office according to the state of the market. They are generally at a figure sufficient to clear a profit.

K. G. K.

Extracts.

Well debris for reclamation of saline lands. (At Rasipuram) A peculiar method of reclaiming saline lands was noticed. They use the decayed granite and other rock debris of wells as a corrective to "Usar" lands. In some places this is used as a substratum whilst in others they are simply spread and ploughed in order that both might get properly mixed. This is said to answer very well. Some of the lands on which very good crops were then seen standing were said to have been reclaimed in this manner. These decayed rock materials seem to improve the drainage and open up the soil.

(Extract from the August report of the Assistant Director of Agriculture, V circle, Trichinopoly).

Ed.

A New Method of Grafting. A new method of grafting is reported in the Experimental Station Record, Vol. 40, No. 5. The method was adopted to rejuvenate old grafted grape vines. Vigorous stocks from the old stock were shield-budded and then layered about 5 inches deep in mounds of mellow, fresh soil. Union is perfected in about three weeks time, after which the soil is removed and the shoot continues its normal growth. (Agricultural News, August, 9).

U. V. R.

How the Savarabreak their young animals to work. An ingenious device of the Savaras to break young animals to work deserves special mention. A central post is firmly fixed into the ground and a long shaft pole turns on it; to the loose end of this pole two wooden pins are fixed to receive the neck of the animal in between them and a rope is tied to both the pins below the neck. Then the animal is firmly secured and it is impossible for it to escape. The shaft pole always remains on the neck of the animal at all times and fodder is placed in front in that condition. Thus the animal, whenever it wants to run away, is made to go round and round the central post and is thus broken to work.

(Extract from the Monthly report for July 1919 of the Ag. Deputy Director of Agriculture, First Circle, Anakapalle).

Savaras are hill tribes belonging to the Ganjam Maliahs. (Ed).

An ingenious method for working a crop of Daincha into the soil. Mr. Sundaresaiyar has very ingeniously solved the problem of working the crop into the soil. Men are let into make pathways at intervals of 7 feet or 8 feet to admit the working of a levelling board. In order that the cattle may walk straight and steadily through the dense crop men walk through in the direction of the wind brushing the plants aside with both the hands as they go making a path. The field is now divided into several strips. Water is then let in. A heavy levelling board is worked in the direction of the high west wind which prevails at the time. By this means the plants are bent down and are all laid flat. After reaching the headland instead of taking a fresh piece the cattle and driver walk over the same strip carefully avoiding working the board lest this should lift up the bent plants. Successive strips are treated similarly. These plants remain in that posture in the water 4 or 5 days and rot quickly. Herds of buffaloes are turned into the field and made to tread the plants in

by moving round and round. The puddling is then done in the ordinary way. (Extract from the monthly report for July 1919 of the Assistant Director of Agriculture, Fifth circle Trichinopoly).

Ed.

History of the Engineering College, Madras.

The present College of Engineering, Madras, has grown from very small beginnings. It started as a Survey School in the year 1793 with twelve pupils who were subsisted and clothed by Government. In 1842 it was proposed to establish a college of Engineering in connection with the University. In 1856 the local Government appointed a Committee to go into the question of Engineering education in this Presidency and this Committee recommended the enlargement of the Survey school. In 1857 sanction was accorded for a scheme of tests for (1) Assistant Engineers (2) Assistant Overseers and (3) Sub-overseers. The instruction given and the examinations were the same for all the classes and each student was expected to find his own level in the class. Candidates for admission were required to be able to read and write, to possess a certain amount of facility in English and some knowledge of simple arithmetic. The tution was the same for the higher and lower officers of the Department from the Surveyer to the Master in Engineering

In 1858 the Government of India decided that the instruction given was on unsound lines and that the material for the different classes shoul be differentiated from one

another as regards qualifications and instruction. After various other changes the College in 1863 contained the following four classes:—

(1) A First Department for Assistant Engineers,

(2) A Second Department for Upper Subordiates,

(3) A Survey class, and

(4) A Surveying drawing and estimating class.

At first the number of students seeking admission into the College was low but, when in the year 1871, the Government announced appointments of Probationary Assistant Engineers to students who duly qualified themselves at the College and at the University there was a substantial increase in the number of applicants. But this guarrantee of employment was not continued in subsequent years with the result that the number seeking admission into the college appreciably fell down. In 1877 the College was affiliated to the University. By the year 1880 the strength was so low that it was thought necessary to appoint a Committee. This Committee amongst other things recommended the guarranteeing of two posts every year.

The subsequent history of the College shows that the number of pupils seeking entrance into the College varied strictly and proportionately with the prospects of employment in the Department or in other walks of life. The present rush into the Engineering College of suitable material is largely due, we believe, to the two guarranteed posts held out every year.

Notes and News.

We learn that a Sugar Committee has been formed by the Government of India to examine the present position of the Sugar Industry in this country and to report on the possibilities of its developement. The Committee has been formed under the Presidency of the Agricultural adviser to the Government of India and it is rumoured that they are expected in this Presidency in the latter half of February, 1920.

We learn that a temple of Agriculture is to be built at Washington. One of its first uses is said to be as a place in which to pray for rain. So India is not alone in its superstitions. The god of rain is so difficult to please apparently as much in the new continent as in the old.

T. S. V.

The Farm Manager, Government Agricultural Station, Hagari, Bellary District, announces that he has a stock of good Korukapalli seed available for sale at As. 2 per lb.

As we go to Press we learn that Mr. R. Cecil Wood has contributed a handsome donation of Rs. 100 towards the ensuing College Day celebrations.

Crop Notes.

The first fortnight during the month witnessed a bright sunshine. This enabled the gathering in of early Ragi and weeding of Cambodia cotton. During the second fortnight over nine inches of rain was received. This quantity was above the average for the period. Coming as it did at a time when the early sown cholam was maturing, some damage to the crop has ensued. Late ragi harvest has suffered from a similar inconvenience. Canes have shown a tendency of yellowing while the paddies have cheerfully enjoyed their overabundant supply. The prospects have been on the whole bright.

Students' Corner

Coimbatore Hockey Tournment.

The above tournament began on the 24th October and in the first round our College team had to meet the London Mission High School on the Recruits' ground. The game, though slack at first, became more interesting towards the end. However, it was an easy walk-over for our team which put in four goals while our opponents failed to score a single one.

In the second round, our team played the Central Recruits' school on the same ground. A better fight was witnessed but for a long time either party failed to put in a goal. However, a brilliant rush at the end by our college secured a useful goal which not being equalised by our opponents brought us to finals.

We met the Forest College at the finals on the Recruits' ground. Notwithstanding the absence of three of the usual match-players on account of absence from station or accidents and a few limping from injuries received in previous engagements our team struggled bravely during the first half. But during the second, the superiority of the opponents was evident and in the end we lost the match by three goals to nil.

Our team had however an excellent opportunity of securing the cup this year. But we need not be down-hearted for can it not be hoped that more students would take part in hockey so that substitution of the wounded or otherwise would not be so difficult as was felt this year ?

"Tournament."

D'Silva Memorial Fund.—(An appeal).

At a meeting of some of the old students of Mr. D'silva held at the Agricultural College, Coimbatore on 6th October 1916, it was resolved that the then Working Committee of the Madras Agriculture Students' Union in collaboration with Messrs. Nengail

K. Krishna Nayanar, T. N. Veerarayan Thirumulpad, P. Kochu Kunjunni Achan, Rai Sahib A. Sethurama Ayyar, G. Jogi Raju and Badami Siva Rao be requested to concert measures to perpetuate his memory by presenting a portrait (since unveiled) to be hung up in the College Hall and instituting an annual prize in Veterinary Science. Mr. Vengail Krishna Nayanar has been elected the President of the Committee and Messrs. T. N. Veerarayan Thirumulpad and K. Raghavachary, Joint Secretaries.

For this purpose a sum of Rs. 334 was collected as contribution from some of his old students and sympathisers and it yielded an interest amounting to Rs. 16-10-3 in the Urban Bank Current account upto 1st June 1919. After defraying the portrait and other charges Mr. K. Raghavachary on his transfer from the Agricultural College in the month of June passed the balance of Rs. 277-8-3 to the undersigned.

The Working Committee of the Union in consultation with the President of the Memorial Committee now proposes that a final appeal be made through the medium of the Union journal to the old students and sympathisers of late Mr. D'Silva inviting further subscriptions to supplement the balance fund and raise a sufficient and decent capital (Rs. 500) for founding the prize.

Any contributions will be thankfully received by the General Secretary.

C. Tadulingam,
General Secretary,
M. A. S. U. (Lawley Road, P. O).

Departmental Notes.

Appointments :—

1. Mr. M. P. Gourisankara Ayyar, Ag. Assistant in Botany, Govt. Sugarcane Expert's Section to be Assistant Farm Manager on probation on Rs. 40 in the grade of Rs. 35-2½-75 from the date of his entertainment in the Department.

2. Mr. T. V. Srinivasacharlu, Agricultural Instructor, District Jail, Tanjore, on Rs. 50 to be Assistant Farm Manager on the same pay in the grade of Rs. 35-2½-75 and posted to the Manganallur Agricultural Station.

3. Mr. C. K. Subbramania Ayyar, Ag. 2nd clerk to the Deputy Director of Agriculture, Fourth Circle, to be sub-protem Sub-Assistant in Entomology.

4. Mr. K. Govinda Nair, Clerk, Collector's office, Nilgris, to be sub-protem Assistant in Chemistry in Govt. Agricultural Chemist's section on Rs. 75, 75 75-5-125 vice M. R. Ry. B. Viswanath on other duty in Mesopotamia.

5. Mr. K. Krishnaswami Pillai, holder of proficiency certificate appointed on probation on Rs. 35-2½-75 in the Govt. Economic Botanist's section.

Promotions :—

1. Mr. S. Subbiah, Assistant Agricultural Demonstrator for the IV grade to the III grade.

2. Mr. V. S. Ramaswami Ayyar, Assistant Agricultural Demonstrator from the IV grade to the III grade.

3. Mr. M. Raman, Assistant Farm Manager from the IV grade to the III grade.

4. Mr. P. V. Raghavandra Rao, Assistant Farm Manager from the IV grade to the III grade.

5. Mr. K. Krishnamurthi Rao, Assistant in Chemistry from 3rd grade permanent to 2nd grade sub-protem vice M. R. Ry. B. Viswanath on other duty in Mesopotamia.

6. K. Cheriyan Jacob, Assistant in Botany from 4th grade permanent to 3rd grade sub-protem vice M. R. Ry. Y. Ramachandra Rao on other duty in Mesopotamia.

7. Mr. P. S. Jivanna Rao, Assistant in Botany from IV grade permanent to III grade sub-protem vice M. R. Ry. K. Krishnamurthi Rao.

8. Mr. W. Raghavachari. Agricultural Demonstrator, from IV grade to III grade vice M. R. Ry. K. Narayana Ayyangar, Farm Manager seconded.

9. Mr. K. M. Jacob, Assistant Farm Manager, IV grade, to Farm Manager V grade vice Mr. R. Ry. B. Siva Rao. Farm Manager seconded.

Leave :—

1. Mr. K. E Viswam Ayyar, Assistant Farm Manager, privilege leave for one month from 2nd October subject to eligibility.

2. Mr. C. S. Namasivayam Pillai, Assistant Agricultural Demonstrator, privilege leave for one month from or after 25th October 1919.

3. Mr. V. S. Ramaswami Ayyar, Assistant Agricultural Demonstrator, Nandyal, privilege leave for 3 weeks from or after 1st November 1919.

4. T. V. Subramaniam, Assistant in Entomology, privilege leave for one month from or after 24th November 1919 with permission to affix Xmas. holidays.

5. Mr. T. R. Ranganath, Assistant in Mycology, leave on medical certificate for three months from 22nd August 1919.

6. Mr. Ramachandra Naidu, Assistant Agricultural Demonstrator, Coimbatore privilege leave for one month from 1st January 1910.

An Announcement.

The Editorial Board has decided to give away two prizes of Rs. 25 and Rs. 20 respectively to Students M. P. Sankaran Nambiar and K. L. Ramakrishna Rao, for contributions to the Union Journal during the year 1918. The prizes will be in the form of books and given at the time of the coming College Day.

Advertisement.

Applications are invited from ex-students of the Agricultural College, Coimbatore, who have obtained the proficiency certificate in Agriculture for vacancies in the lower subordinate grade on Rs. 35-2½-75 in this department.

R. Cecil Wood,
Ag. Director of Agriculture.

THE JOURNAL
OF
The Madras Agricultural Students' Union.

Vol. VII. **November 1919.** **No. II.**

Editorial Notes.

Welcome to the President of the Conference.

We offer a very cordial welcome to Mr. M. E. Couchman I. C. S., the President-elect of this year's College Day and Conference. It was during his directorship that the Union came into existence and he was the President at our first Conference. We hope that during his stay with us he will be able to see enough to justify the hope he expressed as Chairman at the first conference that the Union had started on right lines.

The Board of Agriculture meeting 1919

We have perused with great interest the agenda for the next meeting of the Board of Agriculture in India which meets at Pusa December 1st to the 6th. We publish them elsewhere in this issue. The subjects are of great importance and we look eagerly forward to the publication of the resolutions. In our opinion agenda No. 4. "The preparation for famine conditions so far as the Agricultural Department is concerned" is of special interest in view of the acknow-

ledged unpreparedness of the average ryot to meet such conditions. We have heard it suggested that large Government granaries may be started in each town, nay, in each village to tide over years of dearth and scarcity. So long as Agriculture is dependent on the monsoons (and it will be long before it becomes independent) the recurrence of famines is a possibility seriously to be reckoned with and we open our columns for the discussion of the ways and means to minimize the hardships during such times.

The Conference Number.

We propose to publish the papers to be read at the coming Conference in the December issue as a Conference Number.

Power Drills.

Hand boring sets can normally drill up to a depth of 150' the utmost, in ordinary soils; beyond this depth or in rocky soils, a power drill should be used.

In power boring two types of drills may be employed, percussion or rotary, the particular method to be adopted depending upon the nature of the soil to be bored through. In the percussion drills, the tool works up and down with a very gentle screwing motion, breaking up the material into powder, which is scavenged out by cleaning tools. In the rotary drills the material is cut out with a rotary motion and taken out in cores and the cleaning tools are therefore unnecessary.

2. The department has 4 power drills, *2* of the percussion type and two of the rotary type. Of the two percussion drills one is driven by a steam engine of 10 N. H. P. and the other by kerosine oil engine of 12 B. H. P.

The percussion drills are of the keystone pattern and they consist of a carriage frame, power driven winding drums and reciprocating arms, the last two being briven by an engine attached to the carriage. To the winding drums one end of the rope is fixed and to the other end the percussion tool is attached and operated up and down by the reciprocating arms. The tools employed are similar to those of the hand boring sets but they are heavier. The carriage may be of the traction or non-traction type; but all the drills in the Department are provided with carriages of the non-traction type. The traction type is one in which the machine is run from place to place by its own engine power.

The cost of the steam power percussion drill is about Rs. 7500 and that of the oil engine percussion drill about Rs. 6500. These are pre-war prices. The first machine is capable of drilling up to 500 ft. depth and the other to 350 ft. depth. The maximum that has been actually reached by the steam engine drill was 332 ft., of which the bottom 178 ft. was in hard rock. Very lately the drill has been employed at Samalkota and other places and has tapped a number of artesian springs between 80 ft. to 130 ft. depth.

3. The rotary drills of this department, are of the Calyx pattern. These drills consist of a carriage with four sheer legs, a power pump and a rotating head, the latter two being driven by an oil engine of 10½ B. H. P. It is not possible to employ percussion tools in rotary drills. A hollow cutter is employed in this drill. The cutter is attached to a length of hollow rods and is made to rotate. Steel shot is required for drilling with this type of machine and the pump is required both for water circulation to the engine and to force the shot down, under hydraulic pressure. The shot, being forced to the bottom of the borehole, forms the cutting medium between the steel tool and the rock, so that a groove in the form of a ring, is cut out of the rock, leaving the

core to rise up into the centre of the core barrel. Cores of 5 ft. length have ben taken out with our rotary drills and those that were taken out of the boring at the Hosur Remount Depôt were exihibited in the Madras Exhibition of 1917.

4. These drills are capable of drilling up to 300 ft. but they have actually drilled to a maximum of 197 ft. in hard rock. The catalogue cost of a Calyx drill is Rs. 3,000. The two rotary drills worked by this department were practically made in our workshops and they cost about 12,368-0-0.

4. Percussion drills may be employed in alluvial and rocky soils alike, but the rotary drills can be employed only for boring in rock, the few feet of earth before striking rock in rocky places having to be bored by a hand drill and lined up to the rock preliminary to the employment of the rotary drills. There is also a limit to the depth to which the rotary drills can be employed. Beyond 500 ft. the ordinary rotary drills are not of advantage, as the length of rod to which the tool is attached is apt to bend and break, but the percussion type of drill may be employed for very deep borings and it is by far the cheapest to operate. But in the rotary drills, there is an advantage viz. the hole is perfectly circular and there is less risk of tools sticking up or being lost.

5. Cost of boring with power drills.

Cost of boring a six inches diameter borehole in alluvial soil by a percussion drill is as follows:—

Boring up to	100′	Rs.	1—0—0 per foot.
	100′ to 150′	,,	1—8—0
	150′ to 200′	,,	2—8—0
	200′ to 250′	,,	3—8—0
	250′ to 300′	,,	4—8—0

Cost of boring in rock with rotary drills is as follows:—

Boring up to	100′	Rs	3—0—0 per foot.
	100′ to 150′	,,	3—8—0
	150′ to 200′	,,	4—8—0

The average daily progress by the percussion drills in alluvial soil is 5′ to 15′ the rate decreasing as the depth increases. The progress of either drills in hard rock is, on an average 2 ft. per day.

These are the results of actual experience. The figures relating to costs are pre-war rates and the cost includes charges of labour, repairs, replacements and running. I consider that these drills are not economical and are cumbersome to move about and I cannot recommend these to ryots. A Musto's patent drill has been purchased in this Department and I am attempting to run it by power, attaching a small oil engine to it and the results of the experiments will be announced in due course.

6. As regards the staff to work the drills, the following are necessary:—

A mechanic on a pay of Rs. 35 to 50.
A driver on a pay of Rs. 30 to 35.
A Blacksmith on a pay of Rs. 20 to 30.
and two coolies.

The Keystone drills are available at Messrs. Key Stone Driller Co., Beaver Falls-Pa. U. S. A. and the Calyx drills, at Messrs. Ingersool-Rand Co, 11, Broadway, New York.

F. T. T. Newland,
Government Agricultural Engineer.

More Trees for Farms.

(Continued)

"but smiling there
The Acacia waves her yellow hair
Lonely and sweet, nor loved the less
For flowering in a wilderness."

—**Moore.**

(13) Acacia arabica (Babool, Tam. *Karuvelam.*) This tree is not resorted to because of the predominance of thorns in it. It is commonly seen on the borders of paddy lands and forms an important source of fuel at all times. The branches are made use of as dead fences to protect crops from cattle trespass. As an avenue tree it is not suitable but it is one of the most valuable plants where waste lands have to be brought under cultivation. The seeds are very hard and in order to hasten germination they may either be treated with acids or softened by keeping in water for a few days.

The Babool is well known for its gum but it is not the true gum arabic of commerce. That is derived from Acacia Senegal, a foreign plant. It may be pointed out here that gums are disintegrated products formed from grape sugars and exuded from stems or other parts of plants. They swell and dissolve in water but are insoluble in alcohol or ether. There are three classes of gums (1) arabin, fully soluble in water e. g. gum arabic, (2) bassorin, slightly soluble in water e. g. gum tragacanth and (3) cerasin, insoluble in water e. g. cherry gum. The soluble gums are generally known as gum arabic. The Babool gum is not so soluble but is neverthless called Indian gum arabic and is used as a substitute for the true gum arabic for different purposes viz., pastes, painting and printing works, medicine and calico printing etc.

With Babool may be compared Acacia leucophlœa (*Velvelan*), A. planifrons (*Udai*), and A. concinna (*Sikkai*) which are well known in S. India.

(14) Acacia auriculiformis. A promising tree of recent introduction, native of Australia and fit for growing as an ornamental plant everywhere because of its drought resistance and evergreen appearance. The most marked feature about the plant is the entire absence of leaves, what appear as leaf blades being merely the flattened leaf stalks (phyllodes) which serve the purpose of leaves and are by their profile position specially adapted to avoid the intensity of the midday sun.

(15) Ficus bengalensis (Tam. *Alamaram*). The ancient, majestic and time-honoured Banyan is very well known. It is easily the best avenue tree for large avenues and trunk roads because of the very extensive shade it provides but owing to its slow growth and the enormous space it will occupy in course of time its introduction in our farms need not perhaps be considered seriously though a few specimens should certainly be grown. The plant is raised from stumps and must be protected in the earlier stages by means of fences. Propagation also takes place by seeds. Young plants may often be noticed on old walls, temple towers, and also on Palmyra trees where the 'host' is nearly strangled to death and the aerial roots afterwards get into the soil and the plant becomes well established. The distribution of the seed in such cases takes place by means of birds, squirrels and other animals.

Cf Ficus religiosa (Peepul, *Arasamaram*), F. carica (Fig) F. elastica (India Rubber). F. glomerata (Country Fig).

(16) Millingtonia hortensis (Indian cork, *Maramalli*). A tall stately tree with divided leaves and long tubular white flowers which open at dusk giving out an agreeable smell. The plant requires plenty of moisture and a humid climate for its growth and is easily susceptible to drought. It is most suited to gardens and compounds and there is nothing to recommend it for avenues though it is sometimes used with success for beautifying streets in towns e. g., at Srivilliputtur (Ramnad Dt.)

(17) Melia azedarach (Persian Nim, Tam. *Malai vembu*). As an avenue tree, ornamental plant, shade tree, or as wind-break this is one of the most satisfactory of all plants. Its special virtue lies in its very rapid growth and it thrives on very poor soils. It is also as shortlived as it is quick-growing and grows tall and slender. The roots have a toxic effect on the soil so that other plants do not generally flourish well when planted close to this tree.

(18) Polyalthia longifolia (Tam. *Âsokam, Nettillingam*). For beauty of foliage and evergreen appearance this tree can rarely be surpassed. It grows straight and tall to a height varying according to the soil and water supply but it is of extremely slow growth. A humid climate, high rainfall and plentiful supply of water are needed and it is useless to attempt it in the absence of any of these factors.

The leaves possess a characteristically lanceolate shape and wavy margin. The flowers are green and inconspicuous and the fruits have the interesting peculiarity that each bunch of one seeded berries is derived from a single flower (aggregate fruit).

(19) Morinda tinctoria (Tam. *Nuna, Manjanatti*). An evergreen tree without any capacity for rapid growth, rarely planted, but thriving by itself in all situations even against continuous drought and possessing peculiar means of adaptation for self preservation which are not at first apparent. The plant is often noticed in very dry places where only such species like Tribulus, Calotropis and some xerophytic Indigoferas could manage to live and with its large and thin leaves it seems at first difficult to understand what adaptation exists therein which prevents an excessive loss of water. But an examination of the leaf by means of the hand lens will show innumerable small dots which are really oil drops inside the leaf and a section viewed under the microscope will reveal a layer of these drops beneath the epidermis.

According to recent researches the presence of such oil drops inside the leaves checks too much loss of water by transpiration and the excessive oxidation of the tissues is also prevented as the oxygen taken in for respiration is partly utilised for the conversion of the oil into soluble carbohydrates. As a result of this the leaves remain functional for a long time, growth is very slow and a mass of potential energy is thus summed up for the plant which is liberated to a great extent in the production of flowers.

The flowering commences about the middle of March and lasts till June. Flowers are white, sweet scented, open at night fall and drop in the mornings. The small potato—like 'fruits' are really masses of fruits coalesced together.

If it is not considered worthwhile to plant this tree for any purpose, it should undoubtedly be protected from destruction wherever it is self sown because of its effect on vegetation in general and for the sake of its valuable wood which is put to varied uses.

(20) Parkinsonia aculeata (Jerusalem or St. John's Thorn). A small leguminous foreign tree with stipular thorns and leaves doubly pinnate and the stalk also ending in a thorn. There are 2-4 very long pinnae with flattened ribs and numerous very small leaflets which close in the evenings. Flowers large, yellow, in axillary racemes. The plant is said to be medicinal and is a satisfactory hedge plant. It furnishes a white fibre which is not suited for spinning but good for paper manufacture (Winkler).

(21) Guazuma tomentosa (Bastard cedar, Tam. *Tenpoochi-maram*). A middle-sized tree of American origin widely planted in gardens and avenues. It is hardy and fairly quick growing and the noticeable features about the plant are the obliquely cordate leaves and the hard woody and sugary fruits which attract bees and other honey-sucking insects. Cooke says (Flora of Bombay) that the plant yields a fibre of good quality for paper making.

(22) Bambusa arundinacea (Bamboo, Tam. *Mungil*). Bamboos are not trees but they are so tree-like in habit that they cannot be excluded from any account regarding trees proper. Next to Palms they are the most picturesque ornaments of nature and lend quite a romantic aspect to the landscape. B. arundinacea is the most useful Bamboo of S. India but there are also others of which Dendrocalamus strictus is a giant form resembling the above species but differing from it in the absence of thorns. The smaller shrubby species belong to the genera Arundinaria (Pulneys, Anamalais, Nilgiris), Oxytenanthera (Western Ghats), Ochlandra (Hills of Tinnevelly, Travancore and Malabar). The ornamental kinds grown in gardens under the name of golden Bamboos are mostly introductions from China, Japan, Malay Peninsula etc., and belong to different genera.

The cultivation of this plant is easily effected by means of the seeds (grains), but as seeding is scarce, propagation by suckers may be generally adopted. The plant is well known for the extraordinary rapidity of growth, as much as 2 ft. in 24 hrs. having been recorded in some cases.

Whether for their economic value or for their beautiful effect Bamboos of some sort should be grown largely in Farms and Estates at least on lands which could not be better utilised though it must not be forgotten that by their rapid growth they exhaust the soil of its nourishment and deprive it of its moisture. Their admirable qualities of "strength, lightness, smoothness, straightness, roundness, and hollowness, the facility and regularity with which they can be split, their many different sizes, the varying length of their joints, the ease with which they can be cut and with which holes can be made through them, their hardness outside, their freedom from any pronounced taste or smell, their great abundance, and the rapidity of their growth and increase, are all qualities which render them useful for a hundred different purposes to serve which other materials would require much more labour and preparation" Posts and fences, scaffoldings and ladders, mats and thatties, instruments and furniture, pipes and flutes, mats and baskets, vessels and implements, are some of the more important articles made from the Bamboo to which may be added its use on occasions both of an auspicious and inauspicious nature. Well may one exclaim that the Bamboo "maintains order throughout the Empire!"

(to be concluded.)

P. S. Jivanna Rao.

Reviews.

Our Department in 1918—1919.

The Administration Report of our Department, with the Government review thereon, is before us. We consider it a sad mistake to have dropped the usual appendices which were the only records by which to know, in any detail, the efforts of the many experts with whom the department is manned.

The chief event of personal interest in the year is Dr. Barber's retirement from the scene of his labours. His name has an association far wider than the crop with which he has connected last i e., sugarcane, and we are not far wrong when we put it that he was the father of what we may call the New Era in our department.

Want of staff continued to be the limiting factor to the expansion of the department in this the final year of the War and now that normal conditions prevail it is hoped that an era of sound and rapid expansion lies ahead. The year saw three Indians enter the Indian Agricultural Service and a number of others officiate in other Imperial posts. The Director gracefully acknowledges the ability, both administrative and technical possessed by the Indian staff and the manner in which they have shown themselves capable of sharing larger responsibilities. This note of encouragement and hope is clouded by the reflection over the chronicling of the steady deterioration in the

quality of the recruits to the college—a decline leading us to face the forecast that none of them will ever be fit for the higher posts of the Department. It is our very earnest hope that the labours of the recently appointed committee will result in the adoption of such salutory measures as will brighten the present gloomy prospect

The Gudiyattam and Anamalai farms were opened during the year, as also four other farms for the study of Tea, Coffee, and Rubber. The soil survey of the Krishna Delta was completed and that on Godavari commenced. Phosphates and Malt continued to be the main lines of research in chemistry and the need of giving the chemical staff a freer hand at original work has been appreciated by Government. Improved strains of Paddy, and Ragi have been evolved and given out and the foundations of work on Cambodia cotton and Cocoanut have been well and truly laid. Great vigilance has been displayed, be it at spraying grapes against mildew or on control measures against the paddy hispa, the eradication of pulichi cotton or checking the spread of new entrants into the weed world.

It is a candid admission of the Director that ignorance is still very largely our position regarding Rural Life and Economics and the technique of Agriculture.

And with our coming wider educational responsibilities and the Department of Education concurrently looking to us more and more for light on these problems, it is upto us to take stock of our present position and chalk out a definite programme of research in Agricultural Economics.

X. Y. Z.

A contribution to our knowledge of South Indian Coccidae.*

BY

T. V. Ramakrishna Ayyar, B. A., F. E. S., F. Z. S.,

(A Review).

In this bulletin the author deals with a class of insects popularly known as "Scales and mealy bugs". This is a group that has

*Bulletin No. 87 published by the Pusa Institute.

received very little attention in South India except from people who are entomologically inclined and study them from a love of science. The author has been specialising in the study of coccidae and the publication is the result of his work in the family for the last few years. It shows a considerable amount of original investigation as will be evident from the large number of new species that are dealt with for the first time in South India.

To the ordinary man in the street these insects do not appear to be familiar as they are most of them small in size and fixed forms throughout the major portion of their life; to him they look like lifeless protuberances on the surface of the plant. This is one of the reasons why the family is much neglected. But to the Systematic Entomologist (to some extent to the Economic Entomologist also) it forms an important and interesting group for study, demanding great perseverance and keen eyesight for observation and collection.

The study of this great family of insects may not be of much economic value in South India just at present; they do not as a matter of fact appear to be serious pests of food crops like paddy or cholam, though they are not entirely free from the attacks of these creatures. These are mainly pests of fruit trees and are said to be doing so much harm in America and other places that a certain scientist in California is said to have remarked, "If we except the water problem, and possibly that of fertilisers and cultivation, no question concerns the growers of citrus fruits in California more than that of scale insects". The problem of dealing with these pests has engaged the attention of a number of Entomologists in America and big campaigns are arranged to fight the 'San Jose Scale', one member of this group. The Government also have passed a number of acts and regulations to prevent the spread of the pest; possibly our Government also may have to do the same thing in course of time to prevent the importation of scales from other countries along with fruit seedlings etc., when the fruit growing industry expands in South India. With the advent of fruit

culture, which has recently received a great impetus from the Government as well as the people here, the coccidae are sure to rise in economic importance.

The damage done by coccidae to the plants they attack is not a total destruction of the crop as in the case of other serious pests like the "paddy swarming caterpillar" or "rice hispa", except when the plant is very young; but a regular stunting of the growth amounting to a large reduction in the yield of the crop. The infestation of neem trees by the scale insect *(Pulvinaria maxima)* is a common sight to most of us in Coimbatore. The insect exudes a kind of juice from its body which drips down from the trees and makes the ground below wet. Coffee planters on the hills are familiar with the depredations of the green *(Lecanium viride)* and brown *(Lecanium hemisphaericum)* bugs in their gardens.

In most of these cases the pest can be controlled by spraying a contact poison like crude oil emulsion or fish oil soap on the crop affected. But there are some forms which are provided with a hand covering over the body which will not be wetted by these substances. These cases have to be dealt with by substances like Rosin-compound, which are capable of wetting them. But prevention is better than cure and the prevention of the damages by this kind of insect can best be effected by constant examination of the crop. The bulletin helps fruit-growers, planters and others in recognising these numerous and small enemies of their garden and taking timely measures to combat them. Delaying in this is dangerous, especially with the coccids which multiply very rapidly.

The Bulletin, I believe, is intended more as a systematic record of the members of the group in South India than as a hand-book for the farmers and that seems to be the reason why the control side of the question has been omitted by the author. The book would have been of wider use if that also had been included.

The publication is full of beautiful illustrations which add to the excellence of the matter inside. These have been drawn by the artists of the Entomological section and great credit is due to them for the accuracy with which they have done the work.

T. V. Subramanian,
Assistant to the Government Entomologist.

Extracts.

Fordson Tractor. The following extract from the Rhodesia Agricultural Journal for August 1919 about the working of the Fordson Tractor will be of interest to several of our readers. This was recently under trial in the Central Farm and exhibited before His Excellency when he visited the College in September.

Salisbury trials. Trial No. 1. The first trial was made on 6th June in a comparatively level stretch of diorite soil, which has been cropped under mealies in the previous season. The land had previously been fairly well cleared of stalks. Drawing an "Oliver" double furrow mould-board plough giving a cut of 24" and a depth of 10" the average speed was 2¾ miles per hour, or a ploughing rate of ¾ acre per hour. The next test, on the same date and under similar conditions, was a three furrow disc plough the cut in this case being 33" and the depth 8". The average speed was 1½ miles per hour, or a ploughing rate slightly exceeding ½ acre per hour.

Trial No. 2. This was carried out on 13th June in the same locality on fairly level diorite virgin soil. Using again an "Oliver" double furrow mould-board plough having a cut of 24" and a furrow depth of 5½" the average ploughing speed was 2 miles per hour, equal to the ploughing rate of ½ acre per hour. A further test made in land which had been previously cropped gave slightly better results, the depth of furrow being in this case 10".

The general impression from these trials was that, whether in new soil or previously ploughed lands, the tractor did its work

with a two furrow plough with ease. The ploughing was uniform and the furrows straight, while the slices were well turned and the depth of plough bottoms well maintained. The soil was well pulverised, and this was specially noticeable with the three furrow disc plough.

The running costs being the determining factor in the feasibility or otherwise of using this class of machinery there is given an extract from the report of the Principal, Elsenburgh College, Cape Town about a trial of this tractor.

Fuel consumption and ploughing rates of Fordson Tractor at Elsenburgh trial.

Class of soil.	Quantities per acre.			And ploughing rates.		
	Paraffin oil.	Petrol.	Lubricating oil.	Water.	Acres per hour.	Depth of ploughing.
Virgin land	gallons 3	pints 0·28	pints 2·48	gallons 4·71	0·70	8"
Hill side land of coarse sandy loam.	2·25	0·20	0·96	2·31	0·80	6"

On the basis of Cape Town prices, with paraffin oil at 2s. 1d. per gallon, petrol 3 s. 10 d. per gallon, lubricating oil 5 s 9 d. per gallon, and the wages of a white driver at 10 s. per day, the running costs in the above trials were as follows:—

Cost per acre.

Class of soil.	Fuel etc.	Labour.	Total.
	s. d.	s. d.	s. d.
Virgin land.	8 2	2 2	10 4
Hill side land.	5 6	1 8	7 2

K. R.

A Rat Exhibition.

In connection with the Rat Exhibition held a few months ago in the Gardens of the Zoological Society of London, special investigations were made into the various methods of rat destruction. Mr E. G. Boulenger was placed in charge of this research, and on September 26, in a lecture presided over by Mr. E. W. MacBride, and attended by a large gathering of medical officers of health, sanitary officers, and rat officers he gave an account of the results obtained. Of all the poisons experimented with, squil, the extract of the bulb of the Mediterranean, plant *Scilla Maritima*, gave the greatest satisfaction. Good results were also obtained with barium carbonate. Both these poisons, Mr. Boulenger said, were, in the small quantities required to kill rats and mice, more or less harmless to domestic animals. The destructive power of virus was found to be more untrustworthy than that of some poisons. The most successful form of trap consists of a funnel shaped cage with open doors at each end, which shut when the rats tread on a platform in the centre of the passage. The common steel gin-trap was specially successful when covered with wire funnels. A large number of experiments were conducted in order to ascertain whether there was any truth in the statements that rats are influenced by human odour. As a result of these experiments it was found that it was superfluous to avoid handling traps on the assumption that rats are detracted by the odour of man. Sulphur dioxide was found to be the most effective gas, and was recommended for killing rats on ships and in confined spaces. When driven off under pressure, the gas could be used with success in fumigating rat holes in the open. Details of the research will be found in a "Report on Methods of Rat Destruction," by Mr. E. G. Boulenger, shortly to be published by the Zoological Society, price 6d. (From "Nature" dated October 2, 1919, pages 97-98).

T. S. V.

Some parts as Urginea Scilla on African species. An allied plant known as Urginea, indica acd known as "Narivengayam" in Tamil is common on the Coromandal coast. C. T.

Destroying prickly pear.

The following are details of a preparation for destroying prickly pear, which has been used with much success in the Cape Province. (1) Boil thoroughly for thirty minutes ½ lb. of finely-powdered lime and ½ lb. sulphur in one gallon of water. An extra quart of water should be added to above to allow for evaporation whilst boiling. (2) Dissolve ½ lb. of salt and ½ lb. of arsenite of soda in one gallon boiling water. (3) Mix the above Nos. 1 and 2 together, which will then equal two gallons fluid stuff. (4) To be applied as the tree stands as follows:—Make an incision with a knife, with a sharp point, two or three inches deep into one or more leaves, according to size of tree, and inject the poison. (The South African Sugar Journal, Vol. III—No. 2, page 109.)

T. S. V.

Rice straw as manure

A note appears in the International Review of the Science and Practice of Agriculture for January 1919, on the utilization of rice straw in Italy. It is recommended that rice straw should be dried and then baled. In such a condition it can be used for various purposes. It will be remembered that in British Guiana rice straw in an undried state is being increasingly used as a manure. It is comparatively rich in the essential ingredients of plant food. (From the Agricultural News Vol. XVIII—No. 453, Sep. 6, 1919, p. 284.)

T. S. V.

N.B. In parts of the Kistna District paddy straw is occasionally applied to wet-lands and is believed to correct salinity.

T. V. R.

Nutritive value of coconuts.

Studies in Nutrition, reported in *Physiological Abstracts* for July 1919, show that the coconut possesses a really high nutritive value. The globulin of the coconut was sufficient to support the growth of rats without any other source of protein. It is stated that coconut press cake provides a source of protein of high nutritive value, and it also contains water-soluble and fat-soluble vitamines. (From the Agriculture News, Vol. XVIII-No. 453, September 6, 1919, p. 284.)

T. S. V.

Notes and News.

The benefits conferred on Indian agriculture by the Engineering section of the Agricultural department are not always well-known and so it is believed that the following extracts from the monthly report of the Agricultural Engineer for the month of September 1919 will be of interest to our readers. It is accepted on all hands that the increase of the water supply of the country for purposes of irrigation is one of our crying needs. Many an agricultural Demonstrator going out into the village for propoganda work has had the question directed to him "Yes but what about the water supply. If this is assured all the improvements you suggest will be possible and not otherwise. Sir, do give us plenty of water and leave the rest to us" The evidence before the Sugar Commission that is being reported in the papers just now shows, that, in parts of North India also, the increase in the supply of irrigation water is an equally important problem.

(1) A well in the village of Nallammapatti which previous to the boring was not able to support even a single inhote gave water for two kavalais after the boring.

(2) At Usalampatti a well which previous to the boring gave water only for one kavalai for 2 hrs. gave water for two kavalais for 4 hrs. after the operation.

(3) At Sundarasapuram a well which used to give water for one kavalai only for one hour was able to maintain the kavalai for four hours after the boring.

(4) At Atur a well after the boring overflowed the brink and enabled the irrigation of the lands by gravity.

These are only some of the instances mentioned.

Nidamangalam Manure Society.

It will interest our readers to note some of the salient features in the working of the Nidamangalam Manure Society whose energetic Secretary is M. R. Ry. Rai Sahib A. Sethurama Ayyar, Avl., a member of our Union and an old student of the Saidapet Agricultural College. This is the third year of the working of the Society and the number of members in 1918—19 increased from 68 to 84. The amount of paid up Share Capital increased from Rs. 600 to Rs. 800. The society produced 8½ tons of bonemeal and 1 cwt. of flour phosphate at a cost of Rs. 60 and Rs. 35 per ton respectively. These manures were sold to the members at Rs. 65 and Rs. 37½ per ton against the local market rate of Rs. 85 and Rs. 60 respectively. In addition to this production and sale business, the society secured and supplied to its members 15 tons of fish guano, 12 candies of castor cake, 5 candies of groundnut cake for manure, 1104 Madras measures of Kolingi, 50 Madras Measures of Indigo, 96 Madras measures of Ramagarudasanba paddy, for seeds, and five waggons of cambodia cotton seeds for cattle food. These were supplied to the members at nearly half the ruling market rates and the society made a profit of Rs. 320 in these transactions. Besides, the society helped its members by getting from the Government Entomologist fish oil soap as a remedy for the hopper pest on graft mango trees. The enthusiastic Secretary is to be congratulated on the striking progress made in the working of the Society.

K. G. K.

Crop Notes.

This month witnessed the completion of the sowings on the dry lands for the year. The weather was fairly dry. The failure of tobacco seed-beds owing to the excessive rains in the second half of October necessitated the planting of fields intended for tobacco with wheat, the area under which has increased in consequence this year. For dry lands selected Combodia and Karunganni seeds were in large demand in certain localities.

The main feature in the cultivation of crops during the month was the brisk intercultivation given to the cottons and this raised the wages of labour all round. The paddy crops started flowering as also the late sorghums in black soil areas.

Some of the farm Ragi crops were found affected with a new fungus disease similar to the Blast-fungus in paddy and is receiving the attention of the Govt. Mycologist.

T. V. R.

Departmental Notes.

Notifications :—

The Government approve the proposal of the Director of Agriculture to close the Sugarcane crushing plant at Chittavadigai in the Bellary District and to continue the plant at Pallapalayam, six miles from Coimbatore.

Appointments :—

Mr. M. Krishnaswami, a Proficiency Certificate holder, is to be Assistant Farm Manager on Rs. 35-2½-75 and posted to Hagari for training.

Promotions :—

Mr. P. Vishnusomayajalu, Sub-Assistant in Mycology, to be sub-protem Assistant, vice M. R. Ry. S. R. Venkatakrishna Mudaliar on other duty in Mesopotomia.

Mr. J. T Deivasakayam, Sub-Assistant in Entomology, to be sub protem Assistant, in the existing temporary vacancy.

Mr. A. G. Ramaswamiah, Setter in Entomological Section, to be sub protem Sub-Assistant, vice Mr. J. T. Deivasakayam.

Leave :—

Mr. P. V. Ragavendra Rao, Assistant Farm Manager, Central Farm, privilege leave for 22 days from 27th October 1919.

Mr. S. Sitharama Patrudu, Agricultural Demonstrator, Hospet privilege leave for 23 days from 13th October 1919.

Mr. A. K Subbrahmanya Ayyar, Supervisor, Pumping and Boaring Section, Coimbatore, extension of privilege leave for 6 days and leave on Medical certificate for one month and five days.

Mr. P. A. Ragunathasawmi Ayyangar, Assistant in Chemistry, privilege leave for 6 weeks from date of relief.

An Announcement.

The Editorial Board has decided to give away two prizes of Rs. 25 and Rs. 20 respectively to Students M. P. Sankaran Nambiar and K. L. Ramakrishna Rao, for contributions to the Union Journal during the year 1918. The prizes will be in the form of books and given at the time of the coming College Day.

Advertisement.

Applications are invited from ex-students of the Agricultural College, Coimbatore, who have obtained the proficiency certificate in Agriculture for vacancies in the lower subordinate grade on Rs. 35-2½-75 in this department.

R. Cecil Wood,
Ag. Director of Agriculture.

THE JOURNAL
OF

The Madras Agricultural Students' Union.

Vol. VII. December 1919. No. 12.

Editorial Notes.

The College Day celebrations and the conference which are the visible expressions of a year's activities of the Madras Agricultural Students' Union were shifted from July to December this year as the outcome of a desire on the part of the resident members to have something to show to the guests and give them an insight into their own work at headquarters. The Peace celebrations came off first. The 13th was devoted to sports preliminary heats and Intertutorial races, and the torch-light procession that night at 9-30 which terminated with the bonfire was excellent. The 14th was a thanks-giving day. The regular College Day celebrations commenced on Monday the 15th instant at 3 P. M. with sports. There were 22 items in the programme chief amongst which were the Hundred Yards Race, One Mile Race and Cross-country Race. The "Saidapet Boys," Mr. Anstead and Dr. Norris kindly offered cups for them and they were won by Dasappa Malli of class I, by Krishnamurthi of

class II and K. S. Bhandhari of class III respectively. Dasappa Malli was in addition the winner of the championship cup instituted by one of our Patrons, Mr. Vengail Krishna Nayanar. Our thanks are due to the gentlemen who instituted the cups and to the Judges, Time-keepers and Starters and last but not least to Mrs. Couchman who kindly gave away the prizes.

The First session of the conference opened at 8 A. M. on Tuesday the 16th instant in the College downstairs. The President of the Union, Mr. McRae, in a neat little speech extended a hearty welcome to the President of the Conference, Mr. M. E. Couchman, the guests and old students. The annual report of the Secretary was then read. It was a record of progress all round. The addition of 7 patrons and 108 members to the Union is encouraging and the Secretary, Mr. C. Tadulinga Mudaliar has our hearty congratulation. Mr. Couchman who was our first Director of Agriculture and has been evincing an unflagging interest in matters agricultural since he landed in India, then read his Presidential address. He truly observed that it had never been the fashion of the Madras Agricultural Department to advertise itself, that having been left to others and that the education given at the Agricultural College being a better education for men who have any bent for practical affairs. Agricultural students had a wider and a fresher outlook on life and greater interest in the world around them than the average University graduate. His advice to the members was that they should take more interest in the social and

economic aspects of their work and study all the aspects of the ryot's life, that is to say, regard him not merely as a cultivator but as a human being. He emphasised "in the near future we shall hear a lot about health and welfare and the general improvement of the conditions of village life. When ambitious schemes of this kind come to be taken up in Madras, I want the Agricultural Department to be looked upon as the best authority on village life. No other department has the same opportunities of getting to know the bedrock facts about village life. Living permanently in the village you can get much nearer to the people than any casual visitors." We commend his address published elsewhere to all well wishers of Indian agricultural progress.

The President then announced prizes. The "Ranga Raju Prize" on "Avasarasamba Paddy" was awarded to Mr. K. S. Sankaran Pillai, Godavari Prize on "History of Agriculture from Vedic Times" was given to Mr. G. Jogi Razu Pantulu, Farm Manager, Samalkota, Messrs. Sankara Nambiar and Ramakrishna Rao both students of the third year secured two prizes for their contributions to the Union Journal. Three papers were then read.

Mr. Sampson in his paper on "Evolution of Agriculture" dealt with the agriculture of the three separate tracts (a) the South Kanara Coastal or the Tulu country, (b) the Malabar coastal taluks and (c) the Central taluks of Coimbatore.

He observed "The first two are very similar in their general physical features, as well as soil and climate. In

both the valley bottoms have been converted into rice lands. The Tulu ryot concentrates his attention on the rice crop and the whole energy is directed towards maintaining the fertility of existing rice lands and the extention of its cultivation. He has a more advanced knowledge of manuring and one comes across the use of fish, shellfish, horn shavings being used as manures and the Tulu realises the use of pulse crop as a rotation crop. Even in his dry land cropping one sees the Tulu's hereditary instinct for intensive rice farming.

In Malabar the people dwell on the lower slopes of the valley, each house being in his own compound or paramba. The forest growth in the Tulu country is replaced here by fruit and other trees which are a source of manure. Ashes and other manures are only applied to them with the result that the paramba Cultivation has been extending. Wet land cultivation in Malabar is a more degrading occupation and the wet land labourer is a lower type of humanity and mental development."

Mr. Sampson thinks that the Goundan of Coimbatore has gradually developed from the pastural stage into the present day garden cultivator and his original instincts are still strong in his being a cattle breeder even today.

Dr. John Mathai in his paper on "Agriculture and Co-operation" gave an account of the steps taken to ameliorate the conditions of the population by popularising the ideas of Co-operation.

Mr. Whittle's paper on Citrus Industry was very interesting and and deserves careful study. The President

announced that Mr. J. Chelvaranga Raju would offer a prize of Rs. 100 on a subject to be notified later.

This over, the conference adjourned till 8 A. M. on the 17th. On the afternoon of the 16th at 2 P. M. members of the agricultural section assembled in a meeting presided over by M. R. Ry. D. Balakrishna Murthi Garu, Acting Dy. Director of Agriculture, First Circle and various subjects were discussed mostly relating to the management of farms and their working. At 9-30 P. M. an English drama "The Mock Doctor" was staged. This was followed by a Telugu drama, "Gayopakyanam" in both of which students acquitted themselves very well.

On the 17th the first item in the programme was the group photo of the members of the Union and guests. At 8-15 A. M. the conference reopened with the reading of papers on "Nature of leases and their effect on the improvement of Agriculture" by Mr. D. Balakrishna Murthi who gave a very clear account of the benefits that have accrued to the occupier since the estate land act was passed in July 1908 and the wholesome influence on the local agriculture and the appreciable improvement in the status of the tenant.

Mr. A. K. Menon, in the paper he next read on "The Oil Industry of the Madras Presidency" gave a very vivid account of the possibilities that exist for the development of this industry.

Dr. Norris concluded with his paper on "The Exhaustion of Indian soils and the method by which this may be remedied."

In the afternoon, the business meeting of the Union was held. The Secretary's report was read and office bearers for the coming year were elected.

The College Day functions came to a close with the enactment of the Tamil drama "Manoharan" on the 18th night. The grateful thanks of the Union are tendered to the guests and gentlemen who at very great personal sacrifice read the papers, Mr. and Mrs. Couchman, and to Mr. Wood, the Director of Agriculture.

Obituary.

We regret to record during the month, the deaths of two of our members Messrs. T. A. Krishna Aiyer and P. A. Subramania Aiyar. Mr. Krishna Aiyar was a student of this College and was agricultural Demonstrator, Madura. He was a sincere and unobtrusive worker. Mr. P. A. Subramania Aiyar graduated in 1903, in Physics in 1902 and in Chemistry and after two years' training at Pusa under Dr. J. Leather joined the staff of the agricultural chemist Madras and became Senior Research Assistant. He specialised in Bacteriology and gas analysis and was the the joint author with Dr. Harrison of a number of memoirs especially on the paddy soil gases. His thesis on Biochemical work brought him the coveted Curzon Prize of the local University. He was considered as one marked out for promotion to the imperial service. He was held in high esteem and was the heart and soul of the Officers' Club.

The President's welcome Address.

It is a pleasant duty that falls to my lot this year for the first time as President of the Madras Agricultural Students' Union to welcome the older members of the Association back to the dear old College where most of you have played in other years. Those of you who knew Saidapet have passed on a tradition which we are endeavouring to uphold in the newer College at Coimbatore. How we are succeeding you have had an opportunity of seeing on the playing field yesterday and I feel sure that you will agree that the present students are doing jolly well.

You miss from the platform today the jovial countenance of Mr. Wood, the President of the Union for 10 years. We congratulate him on his promotion to a higher sphere. Now he is one of our distinguished visitors who have honoured us by their presence today. To them I extend a hearty welcome. We are gratified to welcome back Mr. Couchman to preside over our meetings. He it was who presided over the first conference of the Madras Agricultural Students' Union in 1911 and we are proud of having him in the chair again.

We meet under more happy auspices than we have for the last four years. The great war has been brought to an end by the success of the allied arms and peace has been declared. A new era of activity has begun in which we as agricultural workers have to take a foremost place. It means strenuous endeavour and each one of us according to his talent is personally interested to do all there is in him

for the betterment of agriculture in this presidency. Our outlook goes even beyond these limits for at this moment we have four members of this Union at work in Mesopotamia, Messrs. R. Thomas, B. V. Nath, Y. Ramachandra Rao, and S. R. Venkatakrishna Mudaliar, from whom I have received this telegram of good wishes "Best wishes, success College Day."

I have the greatest pleasure in seeing the cheery faces of so many members of the Union. I give you welcome and wish success to the Conference.

Chairman's speech.

More than eight years have elapsed since I handed over charge of the office of the Director of Agriculture to Mr. Stuart, and thus brought to a close the most interesting period of my service in India. You will, therefore, understand that I feel rather at a loss in preparing my address. On the one hand you may be expecting from an ex-Director of the Department a closer acquaintance with the work of the Department than from one who had never been in that position; on the other, I feel myself that my knowledge is very out of date. The Department has developed so much that I feel in a different world. While I rejoice to see many of my old friends here, many of whom have risen by merit to high positions, on the other there are many here to whom I am a stranger.

First of all, I think that I may safely congratulate all the officers of the Department on the truly magnificent

progress made since I was Director. The faith that I had even in the earliest days in the great future that was in store for you has been more than justified by your accomplishments. It has never been the fashion of the Madras Department to advertise itself. We have always left that to others, and I have a firm conviction that the trumpet of praise sounds more convincing when blown by others. The tribute paid to the excellence of the work of the Department by the Cotton Commission—the well-measured praise of expert judges- is good enough for us, and I feel no doubt that if an equally expert authority were to examine any other portion of the work of the department the verdict would be the same, that nothing has been done for show, every part of the structure is sound honest work, the foundations for the future have been well and trully laid, great things have already been accomplished, and the same well-tried methods will produce still greater results in the future. The unfailing generosity with which the Government treats all the proposals for expansion shows that this is fully appreciated by the Madras Government.

I notice in the annual reports of the department complaints of the low standard of educational qualifications of the candidates for admission to the College. It may not be out of place to remind you that much of the good work alluded to above has been done by men whose educational qualifications when they entered the department were not of the highest. The stimulating effect of the College course, which introduces the students to new world and teaches them by new methods, makes new men of them. Here, for the first time, they find themselves dealing with

things instead of with words. Their knowledge is tested less by their power of memorising their text books than by tests which show how far they have assimilated the teaching. May it not be that the education they get here is a better education for men who have any bent for practical affairs, than the University courses? At all events, whenever I meet any of your past students in the districts, I cannot help being struck by their wider and fresher outlook on life, and their great interest in the world around them than I find in the average University Graduate.

For research, no doubt the keenest intelligences are indispensable, but the daily work of the department calls for practical intelligence. One sphere is as necessary and honourable as the other. If I were Director therefore I should not despair, if all the candidates for admission were not bright stars men when they entered the College.

The Department has now reached a stage when it may be profitable to look ahead and see what mainspring we can discover which will keep the machine going. You are no longer pioneers. The excitement of novelty has passed away. At first the discovery that real improvements could be effected in the immemorial agriculture of India and that the ryots' conservatism could be overcome, was a stimulating experience in itself. It is no doubt so still, but to a less extent. It requires to be supplemented by something more permanent. Men will begin to say, after all what good is our work? On account of the great rise in prices, even with poor cultivation and the un-scientific methods now in use, the ryots are becoming richer every day and do

not need our help, so there is no need for us to exert ourselves.

If such a feeling were to prevail, the result would be that men would pay more attention to showy work which would attract attention to them and perhaps gain them promotion and renown, to the neglect of the obscure drudgery of work in the villages and fields which will always remain the most important work of the department.

The suggestion that I have to make you today, both in your joint capacity as Members of the Students' Union and as individuals is that you should take more interest in the social and economic aspects of your work, and study all the aspects of ryot's life, that is to say, regard him not merely as a cultivator but as a human being. I can point out to you at once one way in which you can give practical effect to this suggestion. I do not know if any knowledge of Revenue Law and Procedure is taught here. If not I commend it to the Principal as a matter of first importance to all Agricultural workers. The point to which I specially wish to direct your attention is the changes in the Dharkast rules which have recently been sanctioned by Government, which are not yet as widely known as they should be, because the effect of these is to give the poor man the chance which he practically speaking never had before of getting land for himself and thus raising himself up to be a ryot.

Formerly under the rules of preference, the owner of the adjacent land had the first preferential claim to get any

assessed waste at the disposal of Government and next to him, any one who held a patta in the village.

I regret to say that in many parts of this Presidency, the landowners do not look with favour on any attempt on the part of the labourer to raise himself to the status of a ryot, by getting a piece of land for himself. When a poor man therefore who had no land, applied for a piece of Government waste, it was not possible for him to get it if any landowner in the village chose to apply for it, as they almost always did as soon as they came to know that another man was after it. How often have I seen a piece of waste land laboriously improved by some poor cooly in the hope of getting it assigned to him, but as soon as the cooly had put enough work into it to make it worth having the adjacent landowner or other pattadar of the village would apply for the land and obtain it and either turn out the cooly or allow him to remain as his tenant paying rent in fact for the improvements made by his own hard work.

This has now all been changed. Under the new rules, land is to be allotted on principles of equity.

"A preferential claim shall be recognised in the case of the person who has occupied the land under Shivai-jama and has expended a material amount of labour or money in clearing the land of weeds, scrub or prickly pear or otherwise fitting it for cultivation or improving it. All residents of the village whether landowners or houseowners or not are equally eligible to apply for land. Subject to these equitable considerations, preference is to be given to the first applicant."

Collectors have also been directed to set apart specific areas of land for assignment for cultivation to the depressed classes. To prevent such land when once assigned to a member of the depressed classes, from being alienated, there is a rule that the land cannot be alienated except to a member of the depressed classes.

These changes constitute a revolution in the methods of assigning lands, which may have a very beneficent effect on agriculture if they are made known to the poorer classes and availed of by them and administered by the Revenue Department in a liberal spirit. I want you to play an important part in popularising the new rules, by telling the ryots and especially the poorer classes about them, by helping them to apply for land under the new rules, by talking about them to the Revenue subordinates you meet, and by advising those who succeed in getting a bit of land how to make the best use of it. I need hardly say that by the best use, I mean how to make the best living of it. If a panchama has obtained an acre of poor land you would not advise him to adopt any crop or any method which would involve him in debt at the start. You could however tell him what crops the land is suited for, how and when to sow them and how to keep the land in the best condition at the lowest possible cost. I cannot promise that he will always follow your advice, but in some cases he will and the fact that you are taking an interest in him will be an encouragement to him to persevere. He will not be able to give you the same sumptuous entertainment which I understand is sometimes the good fortune of those who go

to the houses of rich ryots, but you will earn his gratitude and will have the satisfaction of seeing him gradually overcome his difficulties, and rise to the position of a ryot and thereafter send his sons to be students of this College

Even from the strictly departmental point of view your time will not be wasted. A poor man is more anxious to take advantage of any improvement you may have to tell him of. He will try new crops or new implements or new methods more readily than the rich man who has more money than he wants, and he will work harder. The man who is struggling in the water for life will exert himself more than a man who is sitting comfortably in a boat. I have recently had the great pleasure of seeing what wonders can be accomplished by the magic of property; what extraordinary efforts the poor man will make to develop and improve the most unpromising piece of land as soon as he gets it for his own. When I was Collector of a certain district, I induced the Government of the day to relax the rules so as to make it possible for one who had no house of his own to get a small piece, up to an acre, for making himself a house. Of course I was told that none would avail themselves of this concession. If they did, they would be unable to develop the land for want of capital. The other day I visited the district and inspected several localities where land had been given out to the houseless poor. The result surpassed my most optimistic hopes. A large number of small houses had been built, the ground had been planted up with cocoanut trees, jack trees, mango trees and plaintains and the balance cultivated with annual crops

including sugarcane. Many of them had ever dug their own wells. I spoke to a number of the occupants. All were full of the further developments which they were going to effect as time permitted. Many of the houses were tiled. I asked some of them how they earned their living. All were small village artizans or day labourers. I enquired how they had got the money to buy tiles and bamboos for roofing their houses. Some had borrowed money from Co-operative societies; some had borrowed from their friends or relations; some had sold some of their wives' ornaments; some had begged the tile manufacturers to give them inferior and damaged tiles either for nothing or for a nominal sum. All the earth-work, including the wells had been done by themselves in their spare moments. The wife and children watered the plants while the labourer himself was out at work. No doubt many hard earned rupees and much spare time which would have been spent in the arrack shop had been directed to a better purpose. As a result the most unpromising rocky sloping pieces of waste lands had been converted into excellent little homesteads, which provide a useful addition to the food supply of the family. I have no doubt that the possession of these little plots enabled the labourers to command a better wage than if they were living on land owned by some rich ryot who would be in a position to compel them to work for him on his own terms under pain of eviction, involving loss of their improvements, if they failed to comply with his requests.

The moral of this is that one should not be in too great a hurry to listen to the pessimists, who will tell you

that the labourers have no desire for improving their condition in life. Give them an opportunity and a fair percentage will always be found who are willing and capable of struggling hard to raise themselves from the slough of despond in which they live. Many of you can often give a helping hand to people of this kind. You can speak a word in their favour to the smaller officials or the village officers and get them a piece of land and you can encourage them to persevere with its improvement and this will give you a new interest in your surroundings, make yourselves faithful friends, who may one day do you a good turn in unexpected ways.

In the near future we shall hear a lot about health and welfare, and the general improvement of the conditions of village life. In some parts of India a lot has been done already, but I understand that most of it has been on paper. When ambitious schemes of this kind come to be taken up in Madras, I want the Agricultural Department to be looked upon as the best authority on village life. No other department has the same opportunities of getting to know the bed-rock facts about village life. How a small ryot actually lives; what is the margin that separates him from disaster; how much he can afford for clothes, for weddings and other ceremonies, how he borrows money, from whom and at what rate and how he repays it. How he gets the money to add to his holding or build a house. Those of you who live in the villages have greater opportunities of gaining the confidence of the ryot than members of any other department, because the ryots know that they have nothing

to fear from you and something to gain. Living permanently in the village, you can get much nearer to the people than any casual visitor. I suggest that the Students' Union should encourage its members to make a special study of the economic details of the ryot's life. One way of doing this would be to offer prizes for the best articles on this subject to be contributed to the journal. Most of those who have been engaged on work in the villages must know a lot of interesting things about minutiae of the ryot's life already, but probably they are not aware how intensely interesting such details are to those who have not had the same opportunities of studying village life. This knowledge should be elicited; your members should be encouraged to put their ideas on paper, possibly in the form of novels. The ignorance of rural conditions on the part of the town-dwellers is vast and there is a distinct risk of ill-advised legislation on the subject in the future. You can diffuse real knowledge about rural life and bring the village to the town.

I have now given you several reasons why you should pay more attention to the social and economic problems of the villagers. It will help you in your own work, it will help the ryot, and it will diffuse sound knowledge of rural conditions among classes who usually know very little about it. The chief reason, however, why you should take as much interest in the man as in the crops that he grows, is that you need to have a sympathy with and interest in the ryots if you are to retain the same enthusiasm for the work of the Department as you have had hitherto. If you are to influence the ryots, you must have a fire in your own

hearts, a burning desire to help them in their struggles because it is not knowledge but feeling which is the spring of action. Enthusiasm is infectious. Fire can only be kindled by fire. I know well that much of the good work of the Department in the past is due to the enthusiasm of the expert communicating itself to the ryot. This fire can only be kindled and kept alive by a practical living interest in the welfare of the ryots who live on and cultivate the land near the district farms where you are living and whom you frequently visit in the course of your work. Make friends of them and do what you can to help them on in life and you will reap a rich reward.

*Evolution of Agriculture.

I am going to try and outline the evolution of the Agriculture of three separate tracts and to show how far the habits and customs of the people are responsible for the local agriculture as it exists today.

How far my views are correct, I do not know. I am merely an outside observer and those who are more closely acquainted with the habits and customs often, of their own caste and people, may be inclined to make adverse criticism The why and wherefore ofdifferent agricultural practices has always been to me a most fascinating subject, and it is a subject which every officer of this department ought to study, if he is to effect improvement in the local agriculture. It makes all the difference between success and failure whether you can lead the farmer on to improve his practice following the natural lines of evolution, or whether you attempt to lead him in an opposite direction and against all his inclinations.

*Paper read at the Conference by H. C. Sampson, Esq., B. Sc., Deputy Director of Agriculture.

The three tracts which I am taking are the South Kanara Coast or the Tulu country, the Malabar Coastal taluks and the Central taluks of Coimbatore.

The first two are of particular interest, because the general physical features, as well as the soil and climate are very similar, but the aspect of the two countries at the present time is quite different. A bird's eye view of the West Coast presents a level plain, broken here and there by isolated hills, which stretches from the low foot hills of the Western Ghauts to the sea. A closer view however, especially if you have to study it on a bicycle, shows that this is by no means a level plain at the present day. The surface of the plain is deeply cut by rivers and streams and the level plains are now plateaus overlooking the river valleys. In both tracts the valley bottoms have been converted into rice lands, but here the resemblance between the two countries ends.

The Tulu country has concentrated its attention on the rice crop and the whole energy and outlook of the farmer has been directed towards maintaining the fertility of existing rice lands and the extension of the cultivation of rice, either by growing two more crops in the year on the same area or by extending the width of the valley by bringing the more gentle lower slopes under rice cultivation by levelling and terracing. I suppose in early times it was foreseen that the prosperity of the country was dependent on the rice crops, but for whatever the reason the owners of rice land were given not only water-right up to the water shed, but also a right over the jungle and forest growth on the lower slope of the valley from which the owner of the adjacent rice lands had the exclusive right to cut leaves for manure. These are known as kumiki lands. It is interesting to note even today how such kumiki lands have been treated by their owners. Some have recklessly cut leaves from the jungle growth without considering the fate of the trees and such lands are now merely grass covered slopes, sometimes where the slope is steep and erosion great, there is not even grass. Others again have reserved their kumiki lands as rigidly as any reserved forest is protected. The result has been the same however, in that

the women, who collect leaves, had to go further afield. Others again, have maintained their kumiki lands for the purpose for which they were given. The general result has been that the reckless extravagance or canny caution of the first two have resulted in clearing very large areas of waste lands of all jungle growth. This is specially the case near the coasts. Here the valleys are wider and the rice lands much more extensive, so that the demand for leaves has been much greater than the supply. Yet the idea of intensive cultivation of rice lands still persists. Every care is taken to collect leaves, even the leaves which fall from trees, and these are taken to the cattle-sheds and used as bedding for the cattle and thus become thoroughly incorporated with the cattle manure, all of which is used as manure. This is not all. The people have a much more advanced knowledge of manuring than is found in many parts of the country, and one comes across the use of fish, shell-fish, horn-shavings, etc., being used as manure, and they realise the value of pulse crops as a rotation crop. The essentials of the agriculture are intensive cultivation and real arable farming. Now after a long period of peaceful government, a time is bound to come in all agricultural countries where the extension of the area under the recognised agricultural practice of the tract can no longer keep pace with the increase in population. Either agriculture has to become still more intensive or it has to seek new fields. Both means have been adopted in the Tulu country, and one sees how any new development in agriculture here is carried on by the agricuitural labouring classes who in Kanara are largely the Sudra-Christian population. One sees the more intensive cultivation of wet lands in the shape of the sugarcane crop which is entirely carried out by the Christian population. One sees also the inception of dry cultivation and even garden cultivation under wells which again is mainly in the hands of the Christian population. Such dry land cultivation is real arable farming and as intensive as the resources of the people permit. One even sees the rudiments of that intensive system of farming described by Sir F. Nicholson in his "Agriculture in Japan." A typical small dry holding will consits

of a small field of pasture if the owner can afford to keep cattle, an area of dry paddy and possibly an area of ragg mixed with gingelly, which will usually be followed after the monsoon with a crop of horse-gram. Such raggi crops are very intensively manured not only at the time of planting, but later in their growth as a top-dressing. Then there is an area of money crops very intensively farmed consisting of such crops as sweet potatoes, chillies, ginger and various fresh vegetable crops. The house in usually in the holding itself and there may be a few trees immediately around it, such as cashew nuts, coconuts, jack or mango. Live-stock other than cattle consist often of pigs and poultry. Here then one sees the hereditary instinct of intensive rice farming, finding its way to the intensive cultivation of dry land crops.

Though the Malabar Coast immediately adjoins the Tulu Country, one sees that the evolution of agriculture here is on entirely different lines. The commencent appears to have been the same, viz., rice cultivation in the valley bottoms; but here all similarity ends. There are no kumiki lands. Instead of these the people themselves dwell on the lower slopes of the valley, each house being in its own compound or paramba. The forest growth of the kumiki land is replaced by the fruit and other trees planted by the occupier of the paramba. The trees which are grown in the paramba are looked upon as a source of income and vary in different parts of the coast. The jack and mango are always there for the sake of their shade and fruit, but besides this, the paramba may contain pepper and the trees on which the pepper vines are trained. In the north this crop predominates except right on the coast. In other parts the coconut palm is the main tree, while near the South Malabar Coast this is to some extent replaced by areca-nut. Now all these trees yield valuable produce and without a great deal of attention and trouble. With the house in the compound the easiest way of disposing of ashes and other manures is to apply them to the trees growing around. The result has been an extension of what is known as paramba cultivation. These have receded from the valley bottom up the hill slopes and with the increase in the value

of the perennial crops produced from the trees planted, these have even encroached on to the rice lands of the valleys themselves. Such land is actually built up and the level raised to add to the paramba. The result has been that rice cultivation is much neglected and the art of arable farming if ever known, has very largely been forgotten, and as for intensive farming of arable land this is practically unknown. One has only to see the waste of cattle manure all down the coast to realise this. It may be heaped outside the cattle shed but only because this is the easiest way of disposing of it. The monsoon is largely utilised to spread it and I will admit that a certain amourt does reach the wet lands along the channels of rain water draining off the paramba.

Now what has been the result of this development on the pressure of population. The only agriculture known, is the paramba cultivation, or paramba residence rather, and the extension of parambas has its economic limits. One cannot make profitable parambas out of rocky hill sides. The only out-let which appears to have been discovered, is the fugitive cultivation of jungle land. This apparently appears to have been practised for a much longer period in South Malabar than in north; as here one sees that jungle growth has practically disappeared and in order to prevent the too rapid denudation of the soil when these lands are left uncultivated, they are usually roughly terraced. In North Malabar the practice still exists of clearing jungle for temporary cultivation and it is about the most primitive farming which exists anywhere in the country. The land is cleared and burnt and the crop after sowing is allowed to grow till it ripens grain without any attempt at weeding or inter-cultivation. No doubt one would say that the intensive farming practice of the Tulu country should be introduced here, but how can you graft it on to an agriculture which hardly exists.

I have not as yet attempted to explain the social reasons of these different evolutions and no doubt they largely are responsible. I imagine that wet land cultivation in Malabar is on so much lower

a plane because the wet land labourer, i. e., the Cheruma is of a much lower type of humanity and mental development and being so the actual cultivation of wet lands is regarded as a much more degrading occupation than in the Tulu country and the same amount of brain power has not been brought to bear on its development.

To turn now to another entirely different tract, viz., the centre of Coimbatore. Formerly, I imagine, this was a pastoral country where the people were largely dependent on their herds of cattle much in the same way as exists at the present time on the Kollegal plateau. The name Goundan which is the common caste of the farmer in this tract bears out this supposition as to the pastoral leanings of the people. I imagine the country was developed in much the same way as the Transvaal was first settled by the Dutch except that probably the people were more under feudal rule. The Dutch settler when he first came to the Transvaal with his flocks and herds, sought out a likely piece of land for his house and in selecting this his main consideration was watering for his cattle. I suppose 95% of the original farms in the Transvaal ended in "fontein" or spring and about 50% of them were called Reitfontein, i. e., the spring where reeds grow in other words a surface spring. Around the house would be grown fruit trees and a certain area brought under the plough. This land would be selected below the spring so that it could be irrigated and a certain crop ensured, here also would be applied the manure collected from the cattle kraals or pens. In this way one sees the birth of garden cultivation and this it seems to me, is how garden cultivation may probably have developed in this tract and why it is that the Goundan is the best garden cultivator. One can see the spring develop into a 4-6 mhote well as the area under it increased and you can see other members of the family searching around for other springs in the locality, often digging into the ground to find springs. One can see how his cattle herds or chucklers became his farm servants and one can understand how the more certain profits from his cultivation gradually replaced the much less certain profits of cattle rearing. The process was probably considerably hastened by the curtailment

of grazing arqas which followed the Telugu invasion of the black cotton soil. Yet the instinct for the cattle rearing remained, as evidenced by the hedges put up to enclose fields for pasturage which probably under stress of population had ultimately to come under the plough. Even to the present day the Goundan, whose whole existence is wrapped around his garden land, still remains a cattle breeder.

I am afraid I have taken up much of your time, but if I have succeeded in showing the necessity of getting at what one might call the instinctive trend of agriculture in a tract, how much easier it is to suggest and effect improvement in the Agricultural practice.

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*Agriculture and Co-operation.

The task of rural development in this Presidency is entrusted by Government to the Departments of Agriculture and Co-operation jointly. The Department of Agriculture is in charge of the supremely important duty of investigating scientifically the possibility of improving the methods, processes, instruments and raw materials of agriculture, of demonstrating the results of its investigation to agriculturists and of imparting instruction in agriculture. The Department of Co-operation is entrusted with the duty of combining agriculturists into organised societies for the purpose of improving their economic condition by the joint supply of capital, raw materials and implements, by the joint preparation of their produce for the market and by the joint marketing of the produce. The two departments are obviously complementary to each other. One is concerned mainly with investigation and technical instruction and the other with organisation.

*Paper read at the Conference by Dr. John Matthai, Personal Assistant to the Registrar of Co-operative Societies.

The term 'Co-operation' is apt to convey a rather narrow view of the possible scope of the co-operative department. It would be better expressed probably by the title which is in use in the United Kingdom, namely, Agricultural Organisation. The word 'Co-operation' as used in the manufacturing industry denotes a method of organisation, distinct from the competitive, mechanical large scale system which is the prevailing, or to use a rather misleading word, the natural system in that industry. The co-operative movement arose as a protest against that system. But in agriculture co-operation was introduced not as an alternative to a prevailing method of organisation but as an alternative to no organisation at all. The statement is probably not absolutely accurate but to a large extent it represents the truth.

The point of the distinction may be restated thus: In the manufacturing industry co-operation stands for a different ideal of social progress from ordinary joint stock enterprise. In co-operation the test of progress is primarily the welfare of the human factors engaged in production. In ordinary commercial enterprise the test is rather the output, or the aggregate amount of finished produce. This however does not mean that in every joint stock enterprise the welfare of the worker is neglected or that in every co-operative undertaking the output is necessarily smaller. But it is true in the main that if your chief aim is not to increase the output but rather to increase the happiness of the community, then you try to distribute capital and management on as wide a basis as possible.

On the other hand, if you take agriculture, whether you judge progress by the test of welfare or by the test of output, in many countries co-operation is the only practicable method of organisation. Of course farming on a large scale as a joint stock business has in suitable cases great advantages from the point of view of output. But except in new countries or in countries

where feudalism has survived in some form or other, the possibility of organising large farms is very little

The difficulty is that, unlike other forms of wealth land is strictly limited in quantity. If you take any given area which is already under cultivation, you cannot easily persuade the people who own the land to throw it into a common stock. This is especially true of a country which is occupied predominantly by small agricultural holders, among whom land is the most cherished form of possession and the sense of property is most keen in regard to land. You cannot as a rule organise large joint stock farms on the basis of single estates in a country of peasant proprietors. If people will not part with the ownership and possession of land, then you cannot get them to combine to the extent of owning and cultivating the land in common but only to the extent of co-operation in regard to certain aspects of agriculture. This obviously sets a limit to the development of agricultural organisation—a limit which is imposed by certain factors in human nature and history which it is useless at this time of day to argue away. But within this limit there is an immense possibility of development by combination which even in the most advanced co-operative countries has not been explored to the fullest extent.

The necessity of co-ordinating the functions of the agricultural and co-operative departments in India is now accepted as a truism. The committee on co-operation, over which Sir Edward Maclagan presided, made a strong point of the need for co-ordination. Their proposal was that what are called the Development Departments of Government should be placed under a single official head in order that they might function in response to a common will and policy. Whether this is a sound proposal or not, there is no doubt that the necessity of co-ordination between the various Development departments to which they called attention is now generally recognised in every province. Such co-

ordination has always existed informally. But in Madras the first formal step in this direction was taken in July 1917 by the holding of a joint conference between the senior officers of the two departments—a conference which if it had not led to any substantial results, capable of being measured and tabulated, has at any rate resulted in a perceptible awakening, on the part of the agricultural co-operators of the desire to understand and utilise the valuable discoveries of the Agricultural Department especially in the matter of improved seed, manure and implements.

The work of the interdepartmental conference fell under two heads (a) general lines of work and (b) suggestions for particular areas. Under the first head, it was resolved, for example, that Deputy Directors, Assistant Directors and Assistant Registrars should endeavour to meet once in every three months at least, in order to discuss matters of mutual interest. Certain lines of activity capable of general application were recommended such as joint rotation of crop, joint storing of seed and manure and irrigation; and certain manures and foodstuffs for cattle were mentioned as being fairly safe to recommend anywhere.

The really important work of the Conference, however, was the detailed survey which it made of the directions in which co-operative societies might assist in the improvement of agriculture in definite localities in the Presidency. The suggestions necessarily covered a very wide range but they may be briefly summarised as follows: (1) Joint purchase of seed for green manure such as dancha, sun hemp and kolinji. (2) joint purchase of artificial manure such as bone—meal, oil cake and fish guano (3) joint purchase of improved seed for crops like paddy and cotton (4) joint production in respect of sugarcane crushing, cotton ginning and groundnut decortication and (5) joint sale of agricultural produce, especially garden produce such as arecanut, coconut and pepper on the West Coast.

The actuals method by which it was sought to secure coordination during the year for these various objects were mainly meetings between agricultural and co-operative officers and joint tours by them, constant correspondence on points requiring expert assistance not merely between the heads of the two departments but between the officers in charge of local areas, and the presence of agricultural officers at co-operative conferences.

It may be admittted at once that the success achieved by co-operative societies in carrying out the suggestions, and utilising the assistance of the agricultural department has not been as considerable as we might wish. Those of us who have examined the quarterly reviews issued by the Registrar of Co-operative Societies during the year on the progress of agricultural co-operation will have noticed how slow on the whole the progress has been. But it is encouraging that in the quarter ending June last a perceptible improvement was noticed over the two previous quarters especially in respect of the joint purchase of seeds and manures in certain areas. The movement for co-operative purchase which has set in may "lead us on to fortune" in the supply of agricultural requisites as well as of ordinary domestic articles.

The chief difficulties which beset co-operative societies in this matter were set out by Mr. Hemingway in a paper he read before this conference last year. Briefly the difficulties have been of three kinds. (1) Co-operative trade in agricultural requisites which naturally bulks largest among the suggestions of the inter-departmental conference, is inherently a more difficult form of co-operation than credit. It requires a knowledge of the market, it requires more discipline and business habits and last but not least it is often attended by serious risks such as fluctuations in price and deterioration of quality. (2) Both the agricultural and co-operative departments have been admittedly shorthanded in view of the immense possibilities which lie before them. The whole field of non-credit co-operation lies practically unexplored in

the country. The experiments in this direction which have been made in recent years have been a severe strain on the existing staff who have led to undertake them in addition to the fairly exacting work of looking after nearly 4000 societies in the Presidency. (3) Besides these, the special difficulties of last year transport, supply and the season—must be remembered.

Looking towards the future, one feels there are four circumstances at least on which co-operators may base their hopes of a better day. First, the definite acceptance by Goverment of the necessity for expanding very considerably the staff of the co-operative department; secondly, the recognition of the valuable services of official co-operators by the appointment of Honorary Assistant Registrars; thirdly, the rather striking application which has been given to the principle of "trade in indent" and fourthly, the establishment of the local co-operative union as a natural self-governing unit in the co-operative system.

All these are circumstances which will obviously help co-operators in the efforts they are making to strike out new lines of work especially in the direction of agricultural improvement. The increase of staff proposed will mitigate a long standing and acknowledged difficulty. And the habit which co-operative societies are beginning to develop of buying and occasionally selling as agents of their members affords a safe basis on which trade in agricultural requisites may be developed. It is however on the second and fourth points that one would lay the greatest stress, namely, the definite recognition of non-official workers and the constitution of local unions.

In any movement which depends for success on the education of public opinion, the discovery of a local unit which could form the nucleus for a spontaneous grouping of people is a step of great consequence. The co-operative local union is still decidedly on its trial, but there is reason to believe that a group of societies

situated in a small area, not bigger than a taluk and [illegible] much smaller would such people have easy access [illegible] and a fairly [illegible] of common interests, [illegible] making of a good village unit. It is through co-operative organisations based on such units that we must hope for a real permeation of co-operative activities with the idea of rural improvement both on the economic and on the social side. That is the importance of the local union and it is primarily a great point in its favour.

It is not necessary to [illegible] on the importance of accepting the willing services of [illegible] who are not like co-operation and [illegible] by giving them definite responsibilities and duties in the movement. If a sufficient [illegible] of workers with local experience in [illegible] co-operation [illegible] ant Registrars, the result will be that [illegible] t "Union" centres in the Presidency you would [illegible] the co-operative organisation capable of being used [illegible] but an individual on whom you could count placing the organisation to proper use.

Can anything be done to still further co-ordinate the work of the agricultural and co-operative Departments? We have made a good beginning towards co-ordination by holding a joint conference between the officers of the two departments a practice which we hope will be continued hereafter.

With regard to further steps, two questions may be realised for the consideration of the conference:

1. Is it practicable and desirable to give short courses of instruction in improved methods of agriculture to Honorary co-operative workers at one or more centres in the Presidency?

2. Will it help agricultural propaganda if, in posting agricultural demonstrators, preference is given to places where co-operative unions have been formed?

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*The possibilities of Citrus culture in India

Much interest has been awakened in recent years in the cultivation of fruit, and the production of articles of consumption previously imported. There is no doubt that, if the subject was better understood and the knowledge properly applied, the greater proportion of the money paid to outside producers might be kept in the country, not only to the material economic advantage of India, but also from a health point of view.

India—and I may even confine my statement to apply to the Madras Presidency—with its varying altitudes and climate is, in my opinion, as near as possible, ideal for the cultivation of almost every known variety of fruit, and, what with the ever improving economic position of the majority of Indians, combined with Government assistance in opening up an Experimental Jam and preserve factory on the Nilgiris, there [illegible]nd always will be, a growing demand for really well grown fr[illegible]

At the present time, demand is [illegible]oubtedly outpacing the Supply.

Apart from the urgent need [illegible] fruit, there is also a growing demand for pre[illegible]s, [illegible]ks, etc., such as marmalade, candied-citrus p[illegible] [illegible]et [illegible]uice, citric acid crystals for mineral wa[illegible]ate o[illegible] which is used in its crude form for bleachi[illegible]. Also other bye-products, which owing to [illegible]mple [illegible]nufacture, could

*Paper read at the conference by A. R[illegible], Orchard [illegible], Yercaud.

easily be made in this country by any intelligent ryot, after receiving a few lessons from an expert of the Agricultural Department and it is my good fortune to know how keen the officials of the Agricultural Department are, in every branch, to help one and to give valuable advice merely for the asking.

What with cheap labour, combined with a few simple and effective appliances for cultivation, and given facilities for irrigation where necessary, and average good land—such as is met with more or less all over the country—with an addition of fertilizers intelligently applied, we should not only be capable of producing enough first class fruit for our own requirements, but could compete most favourably with other exporting countries on the European markets.

The most suitable places in South India for citrus culture would be parts of the Nilgris, Shervaroys, Kunnamalais and many other hills, the Malabar Coast, Wynad and in fact, almost any where, where there is good soil and ample rainfall, say, from 60 to 120 inches average, or where irrigation is available.

Citrus fruits do best in a deep loamy soil rich in humus and the essential plant foods, but it had been my experience that almost any soil can be made to grow good healthy fruit trees; with proper preparation of the soil before planting, and what with cheap labour, and suitable implements, which are available in the country at present, it is not a very difficult or expensive matter to bring some of the most intractable and apparently indifferent looking soil into a fit state to grow excellent fruit trees. It is merely a matter of thoroughly working, and in some cases, sub-soiling, draining, and ploughing in one or two green manure crops and adding suitable fertilizers, and the trees,—other things being equal—will not only grow well, but, very soon, bear paying crops.

Now to the question of the right kind of plants to propagate or purchase:—Cheap trees, merely because they are cheap, usually

prove to be the most expensive in the long run, therefore, purchase your trees from a reliable nurseryman and pay him a fair price for the very best trees he can produce. You may be told that a two or three year old plants, such as one sees in nurserymens' show gardens and which are usually covered more or less with fungi of sorts, trying to grow in a 6 inch flower-pot, will make excellent growth when planted out, and will bear fruit in one or two years. These plants are sold at a low price and are usually not worth paying freight on. It is more economical to pay a good price for really well-grown healthy plants free from leaf and other diseases and also guaranteed true to name and thus avoid the possible dissemination of virrulent plant diseases. It is to be hoped, now that the Pest Act is in force, Government will consider the necessity of inspecting plants offered for sale in every Nursery in the country, and no one should be allowed to sell plants to the public without first obtaining an annual certificate of cleanliness from an authorised Government expert. I know a case where a man spent a considerable amount of money on citrus plants which were covered with a most destructive fungus disease and, had it not been that he procured advice, and, had not the plants been properly treated in time, he would have lost the whole of them and worse still, would have given up in despair, an enterprise which has since proved a most remunerative undertaking, thinking that either the climate, or soil was unsuitable.

As regards suitable varieties, there are many, and, on looking through a catalogue one is often bewildered by the host of varieties named, all—or nearly all of which appear to have special merits. As India is the home of citrus tribe, it would be as well to consider the best of those usually grown in the locality, such as the Nagpur Sunthura Orange, the Sylhet, and in South India expecially in Coorg, and which has come to be known locally as the Coorg orange, are perhaps three of the best. Of imported varieties, there are Washington Navel, Navelensia, Mediterranean Sweet, Paper

ripe. St. Michael Joppa, and Valencia late—to mention only a few of the best, there is Sevill Orange (C. Vulgeris and sometimes called C. Bigardia or bitter orange, which is used extensively in the manufacture of marmalade and also for the extraction of essential oil from the rind, leaves and flowers which is used as a base, in the manufacture of some of the most expensive perfumes, and also for the manufacture of citrate of lime from the juice. A sample taken from this variety growing [illegible] was found to contain 9oz: of citric Acid crystals per gallon.

The citron (C Medica, Var.), the rind of which is used in the manufacture of the candied peel of commerce, and for which there is a large demand. Juice of this fruit also has been tested and found to contain over 7½ oz. of citric Acid per gallon of juice.

The Pomelo (C. decumana) which is some-times called the Shaddock, grape fruit, etc. Apparently there are three varieties of this fruit grown in South India, although none of them could by any stretch of imagination be considered to resemble a grape in taste. There is no doubt, however, that there is more than one variety of this fruit which is really delicious when prepared by extracting the bitter membrane and sprinkling the pulp with sugar. I have it on the authority of an expert in such matters that it is a delicious and refreshing fruit to eat early in the morning (after the night before). There is no doubt that if this fruit with its vigorous deep-rooting system, and enormous bearing qualities, was extensively grown, and the taste for it acquired, there would be an enormous demand at remunerative prices, and it probably will become as well known and appreciated in India as it is in Europe and America at the present time.

The lime (C. Medicia Var acida) of which there are at least three distinct kinds, viz., thorny, thornless and seedless.

possible the thornless variety should be chosen for general cultivation owing to the convenient way in which pruning, gathering the fruit, and general cultivation can be carried out and this applies especially in India, where the labourers generally work barefooted. If, however, a thorny variety be planted the inconvenience of the thorns can, to a great extent be overcome by careful handling at pruning time, by having some kind of cart, hauled between the lines in which all prunings are thrown and this will probably pay for doing, in view of the fact that, so far as is known at present, the thorny gives the highest percentage of critic acid. There does not appear to be any appreciable difference between the thorny and seedless varieties in this respect.

It is found, where limes are grown on a large scale, that the critic acid content of the juice varies considerably with the rainfall, that is, in a wet climate or season, the acid content is low, whereas during dry weather, or, where the average rainfall is small, the acid content is high, the variation being from 10 oz. per gallon in the wet weather to 14 oz in dry weather - tests in the West Indies. In June of this year, after trees growing in Yercaud had passed through a very severe dry weather, the juice tested as high as 21½ oz. per gallon, whereas in December, after a long spell of wet weather, the test gave only 10 oz. to the gallon. At the same time, the variation in such figures may be more apparent than real, as fruit may contain more juice in a wet season than in a dry one, and it is quite possible that, although the percentage of critic acid per gallon may be lower in wet weather, the probable extra amount of juice will compensate, or perhaps more than compensate for the higher percentage in dry weather fruit. Although the different kinds of lime in general cultivation do not appear to vary greatly either in acid content or the amount of juice per given weight of fruit, this is a point which appears to lend itself to very useful research work, both on the line of natural selection, and possibly through budding selected plants on to vigorous stocks, with a view

to improve not only the yield of acid content, but also the improvement in quality and quantity of the essential oil in the rind, and this is a point well worth considering before planting out on a large scale, the main issues being the citric acid percentage, quantity of juice and essential oil obtainable per acre. And I cannot find that, up to the present, this subject has seriously been studied in a scientific manner. It is obvious that one acre of limes giving an average of, say, 2000 fruits per tree of 10 oz acid content, is more profitable than one giving 200 per tree of the same sized fruit giving 10 oz. acid per gallon.

You will now naturally want to know the possible returns from citrus fruit growing, and this is a point on which I fear much controversy will arise, and, to avoid the possibility of misunderstanding which may lead a prospective planter astray and cause him to invest his capital without a full knowledge of the subject, I will say at once that—other things being equal—much, in fact everything depends on the individual. At the same time, there is no reason why any one interested in fruit culture should go astray when really sound advice can be easily obtained from the Agricultural Department and—strange as it may—seem I have much more faith in the eagle eye of an Entomologist or Mycologist, than in a painted chatti which one sometimes sees erected on a pole to ward off the evil eye. As there is now no excuse for any one going astray on this point, I will give you some figures which may encourage some one to have a flutter at what I consider to be a paying proposition. To begin on the safe, side I cannot—I think—do better than qnote figures which I gave to a fruit-planter who obtained my advice sometime ago in connection with his orange trees, which consisted chiefly of Mandarines, Washington Navel, Navelia, St. Michael, Mediterranean Sweet, and Lemons; and as these figures (rise) to 9 year old trees which were allowed to over bear in the fourth year and suffered, not only in consequence of this, but also from neglect of the ordinary practices of cultivation

for the remaining five years, they were in anything but good condition. I estimated that given proper cultivation and pruning., each tree should give an average of 5 dozen perfect fruit the same season, considering the excellent varieties and the advantageous market conditions prevailing, would have sold at 8 annas per dozen or Rs. 2-8-0 per tree, and this on over 700 trees, or roughly 7 acres, or say, Rs. 250 an acre. Allowing Rs. 100 an acre for cultivation, manure, etc. aud cost of marketing the crop, it would have left Rs. 150 an acre clear. Had those trees been properly cared for and Rs. 100 an acre spent annually on cultivation, pruning and manure, they would have, at 9 years old, given considerably over 500 fruits per tree, and this is what I consider to be a fair average crop on well-cared for trees under general Indian conditions for oranges, lemons, citrons &c. Limes of course bear much heavier crops, and, owing to their being planted 15′ × 15′ apart which would allow them ample room even on the best of soils and gives 193 trees per acre, I have seen trees which gave an annual crop of between three and five thousand limes of good size. As to the prices obtainable for fruit in different districts, much depends on the market facilities on each plantation; it is impossible to give anything like an accurate statement as to possible profits in each district. But the figures I have given will, I think, enable any one interested in the subject to form a fair idea on this point. Unfortunately I am unable to go into details of the manufacture and sale prices, etc., of citric acid in such a short paper as this must be. There are other aspects of citrus culture, such as the preservation of fruit by the sweating process and allied subjects, which, I fear must be left out of this paper, also through lack of time. As it is, I am afaid I have overstepped the time limit and trust you will excuse the prolonged babbling of an enthusiast.

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*Effect of Tenure and Lease on the Improvement of Agriculture.

The cultivated land in India is held under three systems of Land Tenure :—

1. Ryotwari tenure.
2. Zamindari tenure and
3. Inam tenure.

In the Madras Presidency the bulk of the land is held under the ryotwari tenure; where each tenant pays his assessment in money direct to Government officials and holds his land in full and absolute ownership so long as he pays his dues punctually. There is difference of opinion regarding the assessment paid to Government whether it is a rent or a tax. It partakes of the nature of both [illegible] as it is fixed on the productive capacity of the land [illegible] inasmuch as it is a fixed sum taken as the first charge [illegible] Although there is no permanent settlement in this Presidency [illegible] settlements are done once in 30 years. The period is long enough to enable tenants to make permanent improvements such as sinking wells etc., to protect their lands, and the Government have promised that the rental would not be enhanced by such improvements at the time of re-settlement. At all events, if an ordinary land is converted into a tope the ryot would necessarily be getting much more income from it than when it is to be merely an ordinary land and he would not grudge to pay a little more if the assessment is enhanced suitably.

Zamindari Land :—Prior to the Madras Estate's Land Act the land used to be let out to the tenants on annual leases year after year No ryot was confident that he would remain in possession of the same land next year. He had no inducement to make any improvement. If he happened to improve the land another poor ryot began to compete with him for exchange. When a ryot cultivating a particular land on an annual rental of Rs. 50 wanted to get another holding on the same rental what he did

*Paper read at the conference by Mr. D. Balakrishnamurthi, Ag. Deputy Director of Agriculture 1st Circle.

was to reduce the rent on his holding to Rs. 40 and offer Rs. 60 for the other, and the amount due to the Zamindar remained practically the same. This system was a great hindrance to the improvement of lands. The Zamindar finding that a particular village was very prosperous, enhanced the assessment of that village by, say Rs. 10. This could be done voluntarily or by receiving a corresponding amount from another poorer village. When owing to adverse seasons the crops in a particular village failed, the Zamindar would remit a particular sum from the assessment of that village in part or in whole and raise the amount on another village where good crops were harvested. This might appear reasonable to some extent as the Zamindar got no increase in his revenue. Another case is the Zamindar, finding that the ryots of a particular village by dint of their industry cultivated valuable garden crops such as sugarcane, tobacco, chillies etc., sunk wells in their dry lands whereby they were able to get better income from the more paying crops, his rapacity enhanced the rental very heavily with the result that other villagers who could effect similar improvements were dissuaded from doing so by fear their rental would be similarly enhanced for the increased yield rendered possible mainly by their own exertions and the expenditure of their money in sinking wells and converting their dry lands into garden lands. Thus ryots having very good lands and very good facilities for irrigation were deterred from growing more paying crops for fear the rental would most certainly be enhanced. Thus the two obstacles the ryots were labouring under were very considerably competition amongst themselves and the enhancement of assessment at the will and pleasure of the Zamindar.

Since the Madras Estates Land Act came into operation ryots have been assured permanent occupancy rights in the lands. They have begun to effect permanent improvements by laying out into regular fields, by levelling, sinking wells and converting dry land into garden land. They are now growing crops in place of poor rainfed crops. Several [illegible] have been springing up on Estate lands. Lands which were [illegible] years, lying waste or were valueless have mostly become gardens where graft

mangoes, coconuts and other valuable crops are raised. The phenominal change within the last decade is astonishing as several instances can be cited of ryots who have put up permanent structures for themselves and their cattle.

The long term lease and the permanent right of occupancy induce the ryot now to effect permanent improvements such as sinking wells planting topes, constructing cattle-sheds and granaries.

Thus the tenure in the Zamindari villages enables ryots as much as in Government villages to undertake permanent improvement of the land to get more income out of it. The case is quite different with regard to the third class.

Inam land:—An Inam land is land granted by Government to an individual or group of individuals either free of assessment or on reduced assessment. Often the right of the Inamdar extends merely of the collection of assessment from cultivators. In other cases, the Inamdar has got both the occupancy right as well as that collecting the assessment. This class suffers the greatest loss on account of the short term leases the landlords resort to. The relationship between the landlord and the tenant is very peculiar, far from satisfactory and should be much improved to induce the tenant to effect any improvement in the way of levelling and manuring. The land is mostly owned by an absentee landlord who generally seeks towns for a profession or goes there for the education of his children He visits the village once or twice a year to collect his annual rental. He has no further interest and does not trouble himself whether his tenant is impoverishing his lands or improving them. The landlord is anxious to get as much as possible for his land by creating competition amongst ryots unmindful of the results, whether the ryot,—the new tenant—is going to improve or spoil his land, or is capable of paying his rent regularly. On the other hand the tenant is anxious to get out of the land large profits with the least expenditure possible and even were it by robbing the soil of its fertility and thus impoverishing it to such an extent that another could not compete with him for an enhanced rental. Unless the relationship between the landlord

and the tenant is improved for the better, the lands cannot continue in a state of sustained fertility for the landlord to get his annual rental without much difficulty.

Generally the leases are short-termed. Several landlords insist upon giving only annual leases. In the Circars with which I am now concerned some give for three years while others for 5 years and no more. These short-termed leases do not sufficiently induce the cultivating tenant to improve the land without fear of eviction. If a ryot takes pains to manure the land in any year he unconsciously courts competition whereby another tenant is enabled by seeing better crops that year to offer more rental thus tempting the landlord to eject the tenant who took all the trouble to manure his fields. The landlord does not care to consider whether the new comer would continue to effect improvements or pay the increased rental regularly. The temptation mostly vanishes with a single year or at the most in two years as the new comer would not be in a position to manure the land and thereby get a better crop. The landlord should see that his lands are properly cultivated and the state of fertility of his lands is maintained by the tenant. Sufficient inducement is given to the tenant by giving a long term lease, by offering advice to grow better crops, by improving his lands by manuring and if necessary by giving advances on reasonable interest for effecting desirable improvements. Instances are not wanting where intelligent landlords stipulate conditions in the leases by which their lands are not spoiled by the time the lease expires.

In the Godavari district, stipulations are made in the leases regarding growing second crops in the last year of the lease and cultivating canes in the last but one year.

While in the Vizagapatam district the ryot insists on cultivating the land, for a year or more after the canes are cut. These differences are entirely due to the difference in the method of manuring. In the Godavari the canes are manured with a forcing manure castor oil cake —and the paddy crop immediately after is very poor. Therefore the landlord insists that the land should be cultivated by the same tenant

with at least one paddy crop after cane so that [illegible] effects [illegible] cane cultivation are borne by him as he gets more [illegible]
In Vizagapatam fields are heavily manured before canes are planted by such bulky manures as cattle dung or by folding sheep. While canes are growing heavy dressings of wild indigo are given and cane crop does not exhaust the whole benefit of the initial manure and the subsequent leaf manure. Thus a good deal of residual effect is possible for the succeeding crop in the soil and the ryot therefore insists on cultiv[illegible] the lands [illegible] st for a year after the harvest of canes so that he [illegible] fruit of the manure applied for canes. It is usual to get a heavy ragi crop immediately after the canes.

In the Amalapuram Taluq where coconut gardens are leased stipulations are made regarding root [illegible] growing green manure [illegible] tenant is [illegible] made regarding the kind of rent to be paid.

Many instances can be quoted where the leases provide for the fertility of the soil being maintained; but as the landlord does not trouble himself to see if the conditions are properly fulfilled, the tenants constantly violate the terms [illegible] their own advantage.

In western districts short term leases are doing much harm. In [illegible] there is the Kanam system of a 12 years' lease, which in [illegible] respect is more a mortgage than a l[illegible]. The [illegible] [illegible] sum [illegible] and a yearly fee to his je[illegible] [illegible] pays. Coconut gardens are [illegible]lly leased for a period of [illegible] [illegible] land improvement [illegible] enables the tenant to get a [illegible] years [illegible] trees planted by him [illegible] the period of his lease and [illegible] cannot eject him unless he pays suitable compensation for the t[illegible] grown by the tenant. To guard himself from eviction the ten[illegible] overcrowds the land by planting more trees than could be profitable in

a [illegible] garden [illegible] 60 [illegible] distance of [illegible] 18 ft. [illegible] maximum [illegible] of compensation in case of [illegible] the landlord wants to eject him after paying full compensation [illegible] not keep all the trees if he wants to get a proper yield from his [illegible]. Except the trees on the margins and near dwellings [illegible] coconut worth the name. Nor can he remove the trees [illegible] proper distances as they were planted at wrong distances. Even when he takes the trouble to cut the whole garden the new tenant who [illegible] a similar lease repeats the old story. The landlord must therefore see that the tenant plants the right number of trees only, by giving him proper inducement, lengthening the period of the lease if necessary. Theoretically the Kanamdar can be evicted at the end of the 12 years but in practice the [illegible] of the Kanamdar is almost permanent.

Large areas of waste lands covered with scrub jungle are leased for a very short period. The tenants take no pains to clear the lands properly and only cultivate poor crops. Unless a very long term lease is given the tenants will not be tempted to clear the land and fence it so as to [illegible] it [illegible] cultivating valuable crops as tobacco, chillies, [illegible]. The [illegible] may be encouraged by giving advances for clearing [illegible] jungle [illegible] fencing the land properly, and for sinking wells to [illegible] garden crops. The advance could be recovered with reasonable interest in easy instalments. Then the tenants would be willing to pay more rents than when they get the land on short term lease for growing poor rain-fed crops by shabby cultivation. When the landlord encourages the tenant to cultivate the land properly both are benefitted.

Messrs. Parry & Co's cane cultivation near Anakapalle is a single instance in illustration of the evil effects of short term leases. Two years back Messrs. Parry & Co., offered tempting rents to landlords, in order to get as much land as possible for cultivating cane themselves. The landlord ejected the long standing tenants by paying heavy compensation, to deliver the land during the unexpired portion

of their leases. After a year's cultivation the Company gave up the idea of growing cane themselves and wanted to deliver the lands to the landlords. Now the old tenants offer very low amounts teaching the landlord a sound lesson in injudiciously ejecting them for the sake of a temporary tempting increase in the rental.

The present situation calls for wholesome changes in the relationship of the landlord and his tenant. The tenant has to be assured of the full benefit of his labour and expenditure of money, while the landlord gets as much as a man in his position in allied trades would get and no less. This is a delicate problem and would tax the brains of well intentioned administrators. We have, in this country, a nucleus in the budding village panchayets on whom can devolve the responsibility of settling differences arising between landlords and tenants. A beginning can surely be made by utilising these Panchayets and training them up for wider spheres of usefulness in the future. Experience alone can tell what is suitable to Madras and what other changes will be needed.

*A Survey of the oil Industry of the Madras Presidency.

No other industry in this Presidency offers such a large and entransing field for investigation and research as the Oil Industry: its potentialities have long since been recognised by the commercial world; but efforts for developing same locally were sadly lacking. The European interests were mainly directed towards the export of oil seeds for conversion into manufactured products outside India. I need not emphasise the great economic sin that is being committed by the people in this country in allowing such a state of affairs to exist. The profit derivable from the sale of manufactured goods is several times larger than that on the sale of the raw products, the finished and bye-products of the oil seeds being represented by edible oils (margarine), soap, candle, glycerine, varnish, paint, lubricants, feeding cakes, manure, etc.

*Paper read at the Conference by A. K. Menon Esq., Oil Expert.

Several causes contributed towards the perpetuation of a purely export business in seeds with the consequent crippling of the industries directly dependent on their treatment and utilisation. Before the war, Germany, France, Belgium, Austria, and the United States were the chief markets for the oil seeds produced in this Presidency. The heavy duty levied by these countries on the import of oils and manufactured goods spelt the death blow to the oil seed crushing and subsidiary industries in this Presidency; while the paucity of demand for oils for manufacturing purposes made the people entirely dependent on the export business, for getting rid of their annual crops of seeds. It must also be said that most of the oils produced in this country, except perhaps coconut oil of the West Coast, are usually of not the best quality fit for the European market. The oils are charged with a great deal of impurities such as water, mucilage, albuminous particles of the seeds, earthy matter, and such like, which set up decomposition of the oils tending them towards getting rancid during the voyage.

Another reason why oil exporting was not much in favour with the manufacturers and exporters was the difficulty and expense of obtaining suitable containers, while the seeds could generally be packed in cheap and ordinary bags; large tank steamers are entirely out of the question unless a steady supply of large quantities of good oil could be guaranteed. Messrs. Tata & Sons who are putting up large oil mills for the crushing of seeds and the manufacture of edible oils etc. are reported to have completed arrangements for running tank steamers for the transport of oil in bulk to Europe and America.

The chief reason, however, why the seed is preferred to the oil is the desire of the importing countries to obtain and retain the cake and meal: cake or poonac as we all know is used largely as food for cattle either *per se* or in admixture with other ingredients as in the manufacture of compound cake. Further, oil cake and meal are converted into edible and wholesome food for human consumption in the form of flour, biscuits, sweet cakes, etc. It is really

unfortunate that the use of oil cake as cattle food has not become so general and important in India as in European countries, although it is available at very much cheaper rates out here. The conservatism, superstitious ideas, and idyosyncracies of the farmers, coupled with the general neglect and ignorance of the scientific and proper rearing of cattle, are chiefly responsible for such a sad state of affairs. The Agricultural Departments throughout India are impressing upon the ryots the importance and necessity of having good cattle for effecting agricultural improvements; for this purpose, cattle shows and exhibitions are chiefly organised. It is satisfactory to note that there is an awakening amongst the ryots and that modern methods of cattle rearing are becoming popular and more extended. The lack of demand, for oil cakes in this country, is also another reason why oil pressing industry has not been looked upon as a sound commercial proposi ion, as the oil millers could ill-afford to lose the value of this important byeproduct, for want of suitable local markets.

The great war has shown in a remarkable manner how abjectly dependent India is on other countries for even the very necessaries of her life. As a direct result of the lack of facilities for the export of oil seeds owing to the absence of tonnage, a large quantity of seeds was thrown on the Indian markets without any big demand, Ofcourse, the war gave a great impetus to the extended cultivation of some oil seeds such as castor, as castor oil was greatly in demand as a lubricant for aeroplane machinery. But in the case of other seeds and oils, the supply was more than the demand as most of the markets abroad were entirely closed for business. Whereever and whenever possible, the ryots gave up the cultivation of oil seeds or at least reduced their acreage in proportion to the demand, and directed their attention towards the raising of other crops of greater local demand and value. The prices of some of the oil seeds and oils dropped to less than half their normal figures; e. g. coconut oil, which in prewar times fetched about Rs. 500 to 600 per ton was going abegging at the

absurdly low figure of Rs. 285 or thereabout per ton. The same applied to different other oils. Towards the middle of the war, the prices recovered somewhat owing to the sudden dislocation of trade in kerosine oil, imports of which were spasmodic and irregular which had the undesirable effect of forcing up its price by leaps and bounds and made it beyond the reach of any one except the most favoured by profiteers in the trade. Resumption of the ancient practice of using vegetable oil for lighting purposes with the aid of lamps specially designed for the purpose was the only refuge of many people living in the villages and towns which were not fortunate enough to be provided with luxuries such as gas or electricity. This had the wholesome effect of helping the prices of vegetable oils to recover somewhat their lost ground. And as prices of all commodities showed an upward tendency owing to the prevailing abnormal conditions, the prices of oil seeds and oils were also automatically forced up There is still no tendency for prices to descend, as the demand for oil seeds and oils from erstwhile starved markets of Europe and America is frantic Moreover, production is by no means on the same gigantic scale as before the war, as only since the declaration of the armistice that the cultivators have taken to intensive cultivation of the seed crops temporarily neglected and partly suspended during the early parts of the war.

Even the most obscure oils—I mean oils of comparative minor importance and value in the local markets in prewar times—such as Elupa or mowrah (Bassia longifolia), Hoongay (pongamia glabra), Punna (calophyllum inophyllum), etc, attained unprecedented recognition and value during the temporary kerosine oil famine. The prices of these lesser known oils are still abnormal and are likely to remain so, until there is a plethora of output of the ordinary oil seeds which could satiate overseas demands

Having said so far about the position of the seed markets during the war, let me go on to enumerate some of the ordinary oil seeds that are met with in this Presidency. I do not wish to indulge in a description of the common seeds, such as groundnut,

castor, coconut (copra), sesamum, as these are well known. The tables appended will give an idea of the acreage and other statistics regarding the same. What I wish to emphasise is the comparative neglect of the lesser known oil seeds and oil bearing materials of vegetable and animal orgin of great potential value, and the imperative need for the scientific and industrial exploitation of the same in this Presidency. Some of these are no doubt recognised in the European markets, through the investigations of the Imperial Institute, London, as affording splendid raw materials for the edible oil, soap, candle, paint, varnish and allied industries. But it is a matter to be regretted that no systematic effort has been made either in the matter of the regular cultivation of these crops or in the collection and proper disposal of the same.

I give below some of the lesser known oil yielding materials a study of the properties and uses of which by the industrious agriculturist, planter or commercial agent will considerably repay the trouble.

(A). Materials of vegetable origin.

1. Cotton seed (Gossypium).
2. Mowrah, Elupa (Bassia longifolia).
3. Hoongay (Pongamia glabra).
4. Maroti (Hydnocarpus wightiana).
5. Punna (Calophyllum inophyllum).
6. Poovam (Schleichera trijuga).
7. Vappam (Melia azadirachta).
8. Dupa (Vateria indica).
9. Soapnut (Sapindus trifoliatus).
10. Physicnut (Jatropha curcas and glandulifera).
11. Rubber seed.
12. Tea seed (Camellia theifera).
13. Rosin (Colophony).
14. Sugar cane wax.

(B). Materials of animal origin.

1. Tallow.
2. Bone fat.
3. Wool grease.
4. Fish oil.
5. Chrysalis oils.
6. Bees wax.

Cotton seed has been brought under the category of the lesser known seeds for the reason that although it is largely used for feeding cattle, its properties as a high class oil yielding material are scarcely recognised in this Presidency. In Northern India, especially in the Bombay Presidency, cotton oil is a common article of food and holds the same position as coconut oil or groundnut oil in this Presidency. The annual production of cotton seed in this Presidency is estimated at about 2,50,000 to 3,50,000 tons of which only about half is exported. It seems a great economic waste that the oil contained in the seed should not be extracted and utilised for different purposes. The main use to which the seed is put in this Presidency is for feeding cattle. This habit of giving the whole seed with its fatty contents of about 18% and also part of the lint and fibres is undesirable as the cattle scarcely require such a high percentage of oil which acts deleteriously on their digestive system. By recovering most of the oil from the seed, the resulting cake or meal is rendered more nutritious, wholesome and easily assimilable by cattle.

The uses to which cotton seed oil can be put are various; it could be used *per-se* for soft soaps and with the addition of other oils and fats for all grades of washing and toilet soaps and soap powders. The refined oil can be used as edible or salad oil and in the manufacture of margarine and artificial butters. In the Bombay Presidency there are several cotton seed oil mills established on modern lines with up-to-date plant, which turn out all

grades of oil, the double refined quality being eminently suitable as a high class edible oil and largely used as such. Refined cotton oil is always in demand for canning fish etc, and large quantities are annually used for this purpose in the canneries of America and Europe. In pharmacy, cotton oil finds application in the preparation of liniment, ointments, etc. For tempering steel, and for the use in varnishes, paints and manufacture of artificial rubber, the oil is somewhat used.

Cotton seed oil manufacture is eminently suited for this Presidency. It is advisable to instal the mills near the ginning factories as in the off season, the seed could be worked up for oil. Moreover, as the cake forms the bulk of the product and as freight is excessive, it will be paying to locate the mills in the centre of the cotton growing areas The oil bears transport as it fetches considerably more than the cake. The cake could be sold to the neighbouring farms for feeding cattle and eventually goes back to the land as manure.

The oils obtained from the fatty seeds, Bassia longifolia, Pongamia glabra, Calophyllum inophyllum, Hydnocarpus wightiana, Schleichera trijuga, Melia azadirachta, and Vateria indica, have been successfully used in the Government Soap Works, Calicut, in the manufacture of household and toilet soaps for which many of these are admirably suited. Except Mowrah and latterly Dupa, none of the other seeds or oils therefrom have been exported to Europe. Figures for Mowrah are shown in the statistics. There is practically very little information regarding the acreage and the annual production of these seeds. The forests of Malabar, Cochin, and Travancore, South Canara, and other parts of the Presidency are rich in the possession of these oil seed bearing trees, while the avenues throughout the Presidency are lined more or less with these useful trees.

Several syndicates have of late been formed to exploit the oil seed resources in this Presidency, and some of these, I understand, have already started operation. One of these development corporations started before the war the extraction of the dupa fat by the solvent process. The factory wich is located at Kaliyanpur in South Kanara turned out and exported a few hundred tons of fat, but had to close down during the war partly owing to the alien expert but chiefly due to the difficulty of getting the neccessary chemicals which were originally imported from Germany. I understand the factory has not resumed operations.

Dupa fat is a very valuable product as it is suitable for the manufacture of high grade margarine for which purpose it was exported largely to Europe before the war It could be used for making candles, possessing as it does a high melting point, and for soap making it forms an excellent substitute for tallow. In South Kanara, some people make small quantities of fat by boiling the seeds; but this is a very wasteful process and unless firewood can be smuggled from the reserved forests, the cost of fuel would be considerable.

Rubber seed. The area under rubber in South India extends over 50,000 acres and taking on an average about 300 lbs. per acre, the quantity of seeds available would be about 7,000 tons. Kernels form 50% of the seeds; the percentage of oil obtainable from the kernels being 30, the quantity of available oil from this source is about 1,900 tons. It has been found by analysis that rubber seed oil is fairly good drying oil and can be used as a substitute for linseed oil for some porposes. As a medicinal oil for cutaneous affections, it is highly recommended. The difficulty is in the matter of getting sufficient quantity of seeds for extraction purposes. It is likely, however, that with increased production, it may be possible to obtain large quantities of seeds. The cost of collection of seed is the only item for consideration: Rs. 20 or Rs. 30 per ton of seeds would be a fair estimate.

Tea seed. The area under tea in South India is estimated at about 75,000 acres, but this is rapidly being exceeded. There are no figures relating to the quantity of seeds available per acre, and no systematic efforts have been made in collecting such data. About 15% of oil is obtained from the seeds which could be used for edible purposes, inferior grades for soap making etc.

Curcas seeds. The plants bearing the above seeds are met with growing profusely in several parts of the Presidency. The seeds are not made use of to any extent. About 30% of oils is obtained which could be used for soap making and as an inferior drying oil.

Rosin This is the product left after the turpentine is distilled off from the sap of the pine trees. Large quantities of rosin are made now in Northen India in the Government Turpentine Distilleries at Bhowali and Jallo, and I understand a large factory is under construction with up-to-date plant at Barielly. The tree from which this particular rosin is obtained is the *Chir pine.* It is quite likely that in the forests of Southern India there are tre s like Hardwickia pinnata, Vateria indica, Canarium strictum and others which yield saps from which rosin could be obtained. Experiments should be made in this direction. I have seen rosin obtained from the Wynaad forests on sale at Calicut; the rosin is full of dirt and impurities although sometimes of good colour. Rosin is largely used in the soap, varnish, paint and other industries, and is a well known article of commerce in America and Europe.

Sugar cane wax. The acreage under sugar cane in this Presidency is about 2,00,000 tons, calculated at 20 tons per acre. From the filter press residues obtained in the purification of the sugar juice with lime, some wax like sustance is recovered. It can be used in the manufacture of oil cloths, boot polishes, etc A large quantity of this wax should be available from this source.

There are several other oil yielding materials of vegetable origin, which have not been described in this paper. The Forest Department may be in a position to supply full details regarding these. For a description and analysis of many of these lesser known oils, reference may be made to the bulletin No. 5. 1911–12 of the Agricultural Ledger by David Hooper, and also to the article entitled "Some Indian Oils and Fats" by the present writer published in the journal of the Society of Chemical Industry No. 24. Vol. XXIX of December 31st 1910.

Coming to the oils and fats of animal origin, the chief source is represented by cows, buffaloes, sheep, goats, etc. According to the census return of 1914, the number of these amounted to forty million head in the Presidency. If we take the average annual mortality among these animals from all causes to be about 20%, the number of animals available for fat extraction is about 8 millions. The quantity of fat available from adults, calves, sheep and goats may be taken on an average about 1 lb. per head, and the total quantity derivable from this source is about 3,500 tons. Of course this is only a rough estimate, but it will sufficiently indicate what an enormous source of fat lies latent in this direction. No doubt most of the fat obtained from animals killed for food is utilised in the household economy, but there is still ample source from the carcasses of deceased animals. In several places, especially in large centres of mixed population, tallow of one kind or another is procurable in fairly large quantities. On the Madras West Coast, about 25 to 30 tons is a fair estimate. No statistics are, however, available. The West Coast product is of fair quality although the methods adopted for preparing the fat are of the crudest description. The tallow merchants collect the fat mixed with fleshy matter and other substances from the several slaughter houses, melt the stuff and strain it from impurities. Tallow rendering as practised in

Europe is entirely unknown here. The stuff is not infrequently adulterated with starchy and other substances which could easily be revealed by analysis.

Bone Fat is the fat obtained from the bones of animals. The quantity of bones available in this Presidency calculated from the statistics of cattle is about 1,00,000 tons per annum. Fresh bones yield from 15 to 18% of fat, but considering the leanness of the majority of Indian cattle etc, 10% will be a fair estimate. The total yield of fat from this source is therefore about *10,000* tons. So far, no attempts have been made to recover this product in the steaming out of bones during the preparation of bone meal, the foul smelling liquor containing the fat and also glue together worth several thousands of rupees being run into the drains in the manure works. It will pay the works to recover these products. Decayed and dried bones yield less fat and of a poorer quality. Bone fat is used largely in Europe for the manufacture of cheap soaps.

Wool grease is the natural grease contained in sheep's wool. In preparing the raw wool for spinning, the grease is removed by means of dilute soap solution; the soap suds are collected and chemically treated for the recovery of wool grease. The most valuable products obtained from this, being lanolin and adeps lanae, which find useful application for ointment, salves, etc. and are also employed for superfatting toilet soaps. Recovered fats from suds are also converted into cheap material for soap making. It has been found by experiment that the New Zeland wool yields 16·6% of fat, Australian 16·0, South American 13·2, and Russian 6·6. The Indian wool may yield anything up to 5% or more, but experiments are to be made in this direction to confirm this view.

Bees wax. A large quantity of this material is collected in the forests, but the methods of preparation and purification of the wax are capable of great improvement. The Indian Bees wax of

commerce is often adulterated with all sorts of inferior substances viz, paraffin wax, insect wax, water, minerals such as ochres, rosin, tallow, starchy matter etc. Bees wax is used largely for making candles (especially in Russia) and also finds application in the manufacture of polishes, ointments, paints etc.

Chrysalis oil. This oil is now being largely extracted in Italy and Japan from the chrysalids of silk worms by means of solvents. The oil is of a dark colour and the smell recalls that of fish oils. It is chiefly used in its place of production for the manufacture of soaps. In Southern India where silk worm is now being reared in large quantities, the manufacture of oil for commercial purposes is worth consideration.

Fish oils. The chief source of oil is the sardine (clupea longiceps) the annual catch of which on the West Coast is estimated at 1,00,000 tons. On the West Coast, there are 250 private factories, started through the aid of the Fisheries Department, which are engaged in the manufacture of oil. The Fisheries Department factory produces superior qualities of oil by the steaming process, which are used for edible purposes. A firm in Mangalore has put on the market a medicinal oil prepared from sardine and claims it to possess properties similar to Cod Liver Oil. The country oil prepared by the putrifactive method was a discoloured, foulsmelling product of no great commercial value, being used only by fishermen for caulking boats and lighting purposes. The products of the modern factories are in great demand for steel tempering, jute batching, leather working, soap making etc. During the war the Munitions Board bought large quantities of West Coast Oil. Large prospects are open for this industry, thanks to the efforts of Sir Frederick Nicholson. Shark, skate and other aquatic vertebrates also yield oil, but no data as to the quantity of production are available. Guano, which is the product left after the oil is removed, is a good

manure largely used by planters; the quality of this has considerably improved since the introduction of modern methods, the guano now obtainable being free from sand, oil, excess of moisture and other impurities which were a common feature of the beach dried product of the whole tish.

Essential oil. There is considerable scope in this Presidency for the establishment of factories for the extraction of essential oils as the raw materials required for same are abundant. Practically very little is being done at present in this direction. The plants used and the methods adopted are of crudest description; and the quality of the products could be considerably improved. *Lemon grass oil* is one of the chief essential oils that is now manufactured on a large scale on the West Coast; but owing to the defective methods employed, the product is of a dark colour and fetches only a nominal value in the European markets. *Eucalyptus oil* which is distilled on the Nilgiris is more scientifically prepared. But better yield and purer products could be obtained if proper selection of plant is made. *Sandalwood oil* made at the factories of the Mysore Government is of chemically pure quality and commands a high value. There are materials in this Presidency for the extraction of the following essential oils.

Thymol, Wintergreen oil, Vetivert oil, Cardamom oil, Linaloe oil, Ginger grass oil, Palmarosa oil, Cinnamon oil, etc.

Besides there are several odoriferous gums and resins, civets and such animal secretions which yield excellent materials for perfumes. The cultivation of essential oil plants and roots afford, great possibilities in this Presidency especially on the hills. It is gratifying to note that Sir Frederick Nicholson is engaged in making investigations in this direction at Coonoor. Manufacture of artificial perfumes is also capable of great development in this Presidency, as the demand for such products from soap factories is on the increase year by year.

Hydrogenation. All the oils of the vegetable and animal kingdom lend themselves easily for conversion into solid or semi-oil fats by the Hydrogenation or hardening process which is more or less an electro chemical processs. This process is particularly suited for converting cheap oils such as fish oils into solid fats, the hardened products being entirely inodorous and quite unlike the original products in appearance or consistence. Owing to the introduction of this process a large quantity of cheap solid fats fit for making soap, candles etc., are available; prices of the ordinery fats of both animal and vegetable origin being very high are likely to remain so owing to the large demand for making margarine etc. A great future is open to this process on the West Coast as cheap raw materials are in abundance and electricity will be easily available, when the new schemes are fully developed. If we take the cost of fish oil at Rs. 150 per ton and cost of hardening same at Rs. 100, a ton of fish oil will cost only Rs. 250, which is much cheaper than any vegetable oil or fat. Another advantage is that the cheap vegetable oils could be treated on the spot in as fresh a state and as free from acidity as possible. The hardened products could be sent to the European markets at a very cheap rate as the difficulty of containers which is a serious handicap for transporting oil to Europe entirely disappears as the hardened products could be shipped in quantity with little or no packing. It is likely that Messrs. Tata & Sons might introduce this process in their mills at Ernakulam.

Adulteration. The objectionable practice of adulterating genuine articles by mixing inferior or deleterious qualities of lower or no value is not uncommon even in European countries amongst certain classes of tradesmen and in certain commodities. The advance of science has, however, revealed methods of discovering such fraud by chemical analysis. Scientific knowledge is

however, abused by unscrupulous persons in Europe by employing it for purposes of adulteration.

It is a matter for consolation that in India, art of adulteration has not assumed scientific importance, but neverthless it is practised to such an extent, that many of the Indian products are looked upon with suspicion in the European markets as being ungenuine and unreliable. Oil seeds and fatty materials do not escape such stigma. Ground nut is often wetted to increase its weight and mixed with inferior seeds, shells, fibres, etc., this practice extends to several other kinds of seeds for export. Wetting the seeds is very objectionable as it tends to promote decomposition of the seeds with evolution of a considerable amount of heat which is fraught with dangerous consequences. Bees wax is often mixed with inferior grades of wax such as paraffin wax, insect wax, rosin, etc., instances have been reported where only a fraction of the consignment represented the genuine stuff, the rest being pebbles, stones, etc. added to make weight. Oils are adulterated with water, meal or powdered cake, earthy and sometimes starchy matters The oils that escape adulteration are indeed few; Coconut oil has seldom been employed for adulterating other oils except ghee and sesamum oil but during the war when prices of cocoanut oil touched absurdly low levels it was not infrequently used to adulterate even groundnut oil which fetched better prices, although in normal times groundnut oil forms the chief basis for adulterating other oils.

Unadulterated sesamum oil is almost impossible to get except in small quantities prepared at the village chekkus under one's own personal supervision. Cator oil is more or less adulterated with Pongam, Mowrah and Poovam and other cheap oils. When only vegetable oils are used as adulterants, the consequences are not very serious; but examination has shown that edible oils, chiefly ghee are sophisticated by the addition of mineral oils such as the bloomless white oils which were before the war imported from Germany

in Belgium. Analysis has revealed the presence of about 30% and more of these deleterious ingredients in ghee. In the interests of public health, it is highly necessary to introduce legislative measures to prevent such base and injurious practices: it is reported that Northern India is likely to take the lead in the introduction of such measures. Pure ghee, for which anything will be paid, is now obtainable except perhaps in small villages.

Adulteration also extends to manufactured products such as soaps, edible butters, candles, etc. Several specimens of soaps imported from Japan, Germany and Austria have been found to be full of chalk, poonac, carbonate and other useless & harmful matters. Many soaps put on the local markets by uninstructed persons are very defective and injurious in-as-much-as they contain excess of caustic lime, carbonate and other undesirable fillings. Only punitive measures can effectually stop the appearance of such spurious products and the sooner they are set on foot, the better.

In conclusion, it cannot be denied that the future outlook of the Oil Industry in this Presidency is very promising. There is not the slightest reason why, with the healthy co-operation of the Agricultural, Forest, and Fisheries Departments, all the available sources of oil yielding materials should not be systematically tapped by a well organised private company or corporation and factories established for the conversion and utilisation of such materials in the various arts and industries enumerated above which would then enable this Presidency to hold a premier position as manufacturer and exporter of oil products, instead of at present a mere supplier of oil seeds.

*Note on the exhaustion of Indian soils and the methods by which this may be remedied.

As a result partly of war conditions and of the shortage of grain stuffs resulting from the failure of the monsoon a year ago a good deal of attention hae recently been paid to the present condition of Indian soils and the crop-yields obtained from these. The results of such investigations have tended on all sides to demonstrate that a very serious impoverishment of these soils is taking place and that egergetic steps are necessary to remedy this state of affairs.

Let us consider for a moment the changes taking place in the soils. We know that the various plant foods, nitrogen, phosphates, potash etc may exist in the soil in a number of different forms. Some of these will be present as compounds which are of immediate use to the crop, others require to undergo various transformations before they can be taken up by the plant. The former class we describe as the "*Available*" plant food, the latter as the "*Unavailable.*" The second term is of course a relative one, because, as I have explained a certain proportion of the unavailable material slowly undergoes change and becomes available. Now how does this influence the crop? It is obvious of course that while there is a plentiful supply of available plant food the soil will be fertile and other conditions being favourable good crop-yields will be obtained. If this food supply however is not maintained by the addition of appropriate manures there will be a regular falling off in yield until eventually a state of balance is reached when the plant food removed in any given crop is equal to the amount of unavailable food rendered available during the time of growth. The yield obtained under such circumstances is of course very low and we refer to it as the "minimum cropping value of the soil." Owing to the relatively large reserves of plant food present in practically all

*Paper read at the Conference by Dr. R. V. Norris, Government agricultural Chemist.

soils. this low figure will remain practically unchanged for very prolonged periods. I have gone into these very elementary details of soil chemistry with which most of you are entirely familiar because it is sometimes argued that since many Indian soils go on producing year after year a fairly constant yield there is really little cause for anxiety. You will readily see that such an argument is fallacious. It simply means a very large proportion of these soils have already reached this *minimum* cropping value which I have just described, that is to say they are producing year after year crops far below those which could be raised after reasonable manurial treatment.

Now to meet the shortage of food stuffs to which I have already referred there has been a vigorous demand in many quarters for the adoption of more intensive methods of cultivation and for the introduction of heavier yielding strains. Now both of these are eminently desirable things but it is necessary we should realise one result of their adoption. It is perfectly obvious of course that the introduction of more prolific strains means we shall remove plant food from the soil at an increased rate. Similarly by more intensive measures of cultivation we shall increase the rate at which our reserve plant foods are brought into use and lead in this way to a more rapid depletion of our stocks. In other words both these methods alone while giving us a momentary greater return will, unless accompanied by proper manurial treatment, eventually lead only to a still greater exhaustion of the soil and the final yield will again fall to the minimum value. The more intensive our methods therefore and the more prolific the strains we employ the more imperative is the necessity for an extended and judicious use of fertilisers. It is obvious that these fertilisers must be used in a systematic and rational method. If a soil is deficient in both nitrogen and phosphate such a soil will derive but little benefit from the application of nitrogen alone as the crop would still be limited by the phosphate deficiency. We may say then that usually general manures will be required, prolonged treatment with a manure containing one particular type of plant food only leading to a more rapid exhaustion of the other forms of plant food and hence ultimately to a reduction of fertility.

It is probably not generally realised to what extent soil exhaustion in India has already proceeded so I may give one or two figures to illustrate the point.

In Madras we have during the last few years been engaged in a soil survey of the paddy lands of the Presidency and up to the present time have completed such a survey in four of the chief deltas namely Guntur, Tanjore, Kistna and Godaveri. This survey has had as one of its principal objects merely to ascertain how far these soils are in need of immediate manurial treatment. The results are certainly instructive. Considering first the Godaveri Delta which is generally considered to contain some of the most fertile land in the Presidency we find nevertheless that 23% of the samples analysed show a deficiency in available phosphate and 40% or nearly half the Delta a deficiency in nitrogen content.

The Kistna Delta gives slightly worse figures. 33% of the samples exhibiting phosphate starvation and 55% lack of nitrogen.

In the remaining two Deltas the situation is even more serious, the figures being as follows:—

	Deficient in Nitrogen.	Deficient in Phosphate.
Guntur.	81%	33%
Tanjore.	87%	80%

Comment on such figures is hardly necessary and there is no reason to believe that many of the other paddy lands of the Presidency are in any better condition. If we remember that an increase of 5% only in the average yield would provide an extra 1,000,000 tons of rice a year in Madras alone we can realise to some extent what the annual loss is in the whole country in this and other crops.

Examples such as the above could be brought forward in numbers. Clouston in a paper read at the Indian Science Congress in 1918 stated that the four chief soils of the Central Provinces had in most districts reached a state of maximum impoverishment. In one of his experiments by an outlay of Rs. 33 per acre on manures in cane the net profit per acre was increased by no less than Rs. 146, i.e. over 400% the cost of the manure applied. In a

similar way Davis has emphasized the critical condition of many of the Bihar soils as regards Phosphoric acid content.

We may then I think take it as a fact that a very large number of Indian soils are already exhausted or approaching that state. We must pass on to consider what are the chief requirements of such soils and the reasons why under present condition these requirements, urgent as they are, are being met to such a small extent.

In the examples I have quoted we have seen the deficiency chiefly consists of nitrogen and phosphates and this may on the whole be considered as applicable to the whole of India though certain districts of which the Nilgiris and Malabar are examples are also extremely deficient in lime. Let us consider first of all the nitrogen question. Now nitrogen like other plant foods exists in the soil in available and nonavailable forms the most available form, nitrates, being produced from complex nitrogenous compounds in the soil by a series of changes terminating in nitrification. Sometimes however these changes take another course and in this way an accumulation of relatively unavailable nitrogenous material may take place of which a familiar example is the production of peat. By cultivation we produce conditions however which are favourable to nitrification. One result therefore of the intensive cultivation to which I have already referred will be to accelerate this conversion of unavailable nitrogenous material into nitrates and unless appropriate measures are taken the reserves, being used up at a rapid rate, exhaustion will occur. Such cultivation moreover has another disadvantage. It is well known that under suitable conditions very large quantities of nitrogen can be added to the soil from the atmosphere by the agency of nitrogen—assimilating bacteria. But these bacteria require the presence in the soil of considerable amounts of carbonaceous organic matter. Hence if by our intense cultivation we use up at a rapid pace this organic matter in the soil we shall thereby at the same time diminish this valuable fixation of nitrogen.

It is obvious therefore that we must combine such methods of cultivation with liberal supply of manure and for the reasons I have

stated bulky organic manures such as farmyard manure, poonacs and fish manure are peculiarly suitable to the conditions prevailing in this country. Such manures moreover have a further advantage as compared with more concentrated manures in that they improve to a marked degree the mechanical condition of the soil whereas the concentrated chemical manures have a tendency in the opposite directions.

It is particularly unfortunate therefore that the manures to which I have referred are precisely those which for various reasons are either being sent out of the country or else used in a wasteful manner. In the first place the best use is not made of the manure most generally available viz. farmyard manure. In many districts this is used mainly as fuel resulting in a total loss of nitrogen. Even if this be not done the manure is almost invariably stored in such a way that at least 60% of the nitrogen is not utilised. Little effort is made to collect the liquid and more valuable portion of the manure or to protect the manure pit in any way with the result that the aggregate loss in manurial value is enormous.

There is no doubt that many ryots at present do not realise the value of manures. This is a factor which time alone can remove but the ryot is a shrewd judge in many ways and when once convinced by demonstration of the benefits to be derived he will not be slow to take up the use of manures. This has been shown in a striking way by the largely increased demand for fish guano even in districts remote from the source of supply. But assuming that the ryot is fully convinced of the value of manure and anxious to obtain these, the price of most fertilisers has reached a figure which puts them quite out of reach of the small cultivator except in the case of the most profitable crops. The reason for this is the high price which manures such as oil cakes and fish command in the foreign market resulting in a large export trade and a rise of price in this country.

Fish manure containing as it does a good percentage of both nitrogen and phosphate is particularly suitable to our soils and yet the export is increasing rapidly. In February of this year Colombo was paying Rs. 160 per ton for fish guano and consequently was attracting the bulk of this commodity which a

year or so before was obtainable at Rs. 45 a ton ex-factory. This export is likely to continue therefore, with a consequent increase in price in spite of the fact that the production of fish manure is necessarily limited and quite insufficient to meet the manurial requirements of the country.

When we come to consider the case of oil cakes we find again exactly the same conditions prevailing. These cakes though they contain sometimes a fair amount of phosphate must be regarded chiefly as nitrogenous manure. Now the oil seeds crops are notoriously exhausting to the soil But if the seeds were crushed and the resulting cake either applied to the land directly or in the form of cattle manure after feeding, there would at least be some return of plant food to the soil. But the tendency is all the other way. Not only has the export of oil seeds steadily increased but even in those cases where the seeds have been crushed in this country a large amount of cake is exported. The figures are instructive. Taking the normal years immediately preceding the war the export figures for the whole of India were approximately as follows:—

1913-14	*All India*	Tons,	Value
	Whole oil seeds	1,572,792	£ 17,000,000
	Oil cakes	175,000	1,000,006.
From Madras alone.			
	Oil seeds		£ 3,500,000
	Oil cakes		£ 400,000 (approximately)

This has naturally led to a great increase in cost and the state of affairs is likely to become worse owing to the intense demand for such products at the present time in European countries. Hence it is not surprising to find that the present price of groundnut cake is about Rs. 140 per ton or three times the price for which it could be obtained a few years ago, It is impossible for the average ryot to pay such prices and it is in my opinion essential that steps should be taken to remedy this state of affairs. It would therefore appear necessary to prohibit entirely the ex-

port of fish manure of which the supply is so limited and to impose an export tax on oil cakes in order to retain a large quantity of these in the country. With regard to whole oil seeds also a heavy export tax should be imposed. In this way the oil crushing industry could be developed in India, the oil being freely exported but the residual cake being consumed as far as required in this country. Two causes have hitherto tended to retard the development of oil crushing in this country. The fact was that when oil crushing was introduced, owing to the wholesale adulteration which took place Indian oils obtained a thoroughly bad reputation. Secondly European countries have imposed an import duty on oil while allowing free entry to whole seeds and cake. The remedy for the first is obvious; in regard to the second the conditions in Europe are such that it is doubtful whether these duties would be maintained if the supply of whole seed were restricted. Hence the times are now particularly favourable for such a change.

So far we have been considering nitrogenous manures In the case of phosphates the situation is much the same. The chief phosphatic manures available in this country are bones, fish manure, and deposits of mineral phosphate. With fish we have already dealt. In the case of bones we again find a large export taking place. Owing to the war the figures for the last few years have been erratic but in normal times bones to the value of over 4 lakhs of rupees were annually exported from this Presidency alone chiefly to Ceylon. As a result of this external demand the price has steadily risen and early this year the excessively high figure of Rs. 130 per ton was being quoted in Ceylon for bone meal. This is therefore another case where export should be totally prohibited. The bones retained in this way could readily be crushed at a large number of centres because many land owners are already in possession of oil engines which are not fully employed and which could therefore be used with advantage to drive small disintegrators. In this way bone meal which has given good results in this country would be available at a greatly reduced cost.

In the case of mineral phosphate deposits in this country we are at present in some doubt as to the best method of utilisation. They are not suitable for the preparation of superphosphate and when used alone the availability is of a very low order. A considerable number of experiments have been carried out here to increase their availability by using the crushed mineral phosphates in combination with organic matter. The experiments have been sufficiently successful to indicate that a satisfactory method of utilising these deposits will probably be found but it cannot be said that the correct conditions have yet been realised.

Quite recently claims have been put forward regarding a phosphatic manure termed "tetra phosphate" which is prepared in a very simple way from rock phosphate. These experiments have been carried out chiefly in Italy and in my opinion the evidence is not particularly convincing. In view of the importance of utilising our supply of phosphate we are, however, at present carrying out trials to test this new method on the Trichinopoly deposits but the experiments are not yet sufficiently advanced to indicate the probable result.

One other possibility has lately arisen in connection with such deposits. Very favourable results have been obtained in America by the use of ammonium phosphate. Such a fertiliser containing as it does about 13 per cent. of ammonia and 40 per cent. of soluble phosphate would probably be particularly suitable for the conditions prevailing in South Indian soils. The possibility of utilising the Trichinopoly deposits in such a way depend entirely on the cost of production and this will again depend largely on the production of cheap ammonia which is quite a feasible proposal in this country. At any rate the prospect opens out a promising field of enquiry.

While dealing with future possibilities I may also refer to the use of what is known as "activated sludge" which is the final deposit obtained in the most recent method of sewage disposal. This substance when dry contains about 6—7% of nitrogen instead

may obtain but little benefit and for which, if evicted, he can claim no compensation.

The whole question therefore is by no means a simple one but the time is quickly approaching when it will have to be faced in a resolute manner. The population is increasing rapidly and I believe that the enhanced production required can only be brought about by a determained effort to increase the *permanent* fertility of the soil by reasonable manurial treatment At present there is a tendency to face it in another way by the attempt to bring into cultivation large areas of more or less unprofitable land but judged only from the point of view of production this can have but little permanent value and cannot be regarded as anything but a palliative of a temporary nature.

Summary.

The situation may then be summed up briefly as follows :—

1. A large proportion of the soils of the country are already suffering from starvation or are approaching that state.

2. The supply of indigenous manurial products is being sent out of the country at an increasing rate with the result that the price is now prohibitive to the small cultivator.

3. Such a deficiency must be met by (a) limitation of export of such materials; (b) increased productions of synthetic nitrogenous manures, in which, methods based on the cyanamide process would appear to be most likely of success in this country; (c) development of processes for the utilisation of the phosphatic deposits of the country.

4. In order to utilise the increased supply of manurial substances attention must be directed to (a) education of the ryot to realise their value (b) development of co-operative buying and transport (c) revision of land tenures when these do not give the tenant a sufficient margin of protection.

REPORT

OF THE

Working Committee

OF THE

Madras Agricultural Students' Union,

1918-19.

The Working Committee begs to submit the following report on the working of the Madras Agricultural Students' Union for the period ending November 1919. On account of various inconveniences experienced in the usual July celebration of the College Day, it has been decided to celebrate the same about December, with the result that the Committee finds itself in the rather unusual position of having to record seventeen months of its activities in this annual report.

PEACE.

The dreadful war is over and we are happy to be assembling here under the wings of peace. Our devout prayers go forth to the God Almighty for restoring this disturbed world to its peaceful ways and our warm thanks are offered to all the gallant men that fought for right. It is a source of some little satisfaction to us that the Union has contributed its humble best both in men and money to this noble cause.

His memory will for ever be associated with the Munagala Prizes which he was instituting. One of the founders of the Union and for many years its Vice-President S. L. D'Silva is a name we all revere. Pious and venerable, he always felt he was an Old Boy and in losing him, we have lost his pleasant humour and sage advice.

Coming to the other events of the year, one of our active helpers, Dr. C. A. Barber, C. I. E., has retired and we would very much miss his presence at our annual sports. We note with satisfaction that two of our members Messrs. J. Chelvaranga Raju and Rai Bahadur K. Rangachari have been promoted to the Indian Agricultural Service. We congratulate Rao Sahib M. R. Ramaswami Sivan, one of the pillars of the Union, on the honour conferred upon him by the Government. Messrs. P. V. Isaac and Christian Bhaktha have gone to England for further studies, and we trust that they would come back to us with wider knowledge and experience. Three of our members Messrs. Y. Ramachandra Rao, B. Viswanath and S. R. Venkatakrishna Mudaliar have joined temporarily the Agricultural service in Mesopotamia, and we feel confident that they will do ample justice to the work in their new sphere.

PERSONAL.

During the year under report the Union gained in strength by an addition of 115 members distributed as follows:— Patrons 7, Honorary Members 3, Associate 1,

First Class Members 25, Ordinary Members 79, bringing the total number of members on the rolls to 497. It would interest members to know that among the additions to our Patrons are the Rajah of Dharakota (announced at the last conference), Kumara Zamindar of Uttukuli, Rao Sahib A. P. Patro of Berhampore, Messrs. C. P. Ramaswami Ayyar and Lodd Govindas of Madras and Messrs. T. A. Ramalingam Chettiar and M. Sambanda Mudaliar of Coimbatore. We express our grateful thanks to these gentlemen for their munificent patronage. Dr. R. V. Norris, Messrs. P. H. Rama Reddi and R. C. Broadfoot have become Honorary Members of the Union.

MEMBERSHIP.

Our Journal, the only one of its kind in Southern India, has passed through another year of usefulness with 568 subscribers on its rolls. This large number notwithstanding, its upkeep could hardly be called self supporting, owing to the continuance of the abnormal cost of printing and stationery. While expressing our thanks to the few that have given the journal the benefit of their contributions, we would appeal to every member of the Union to make it a point to send the journal at least once in the year, an article, a note, extract, or a record of any of his many observations. Two prizes upto about Rs. 50 were promised to be given from the Union funds, to the students who make the best contributions to the journal, and these have this year been awarded to M. P. Sankaran Nambiar and K. L. Ramakrishna Rao of Class III.

JOURNAL.

AID TO STUDENTS.

The Union has rendered during the year financial aid to two more students to the extent of Rs. 175. We hope in the coming years to be able to show a larger record on this line of usefulness.

PRIZE ESSAYS.

Of the prize of Rs. 250 announced by Messrs. Ranga Raju and Brothers for "The best series of Experiments on the cultivation of Avasarasamba Paddy," a sum of Rs. 150 was awarded to the only competitor Mr. K. S. Sankaran Pillai, L. Ag., Farm Manager, Koilpatti. We congratulate him on the award. The thanks of the Committee are due to the donors of the prize, to Messrs. K. Gopalakrishna Raju and V. Dhanakoti Raju for having kindly watched the progress of the experiments, and to Messrs. R. C. Wood, D. Balakrishnamurthi and D. Ananda Rao for having acted as Judges.

The other prize of the value of Rs. 100 kindly offered by Mr. D. Balakrishnamurthi for the best essay on "The History of Agriculture from Vedic Times" was competed for by three members and the prize has been awarded to Mr. G. Jogi Raju. Messrs. H. C. Sampson, D. Balakrishnamurthi, K. Hanumantha Rao, Principal, Andra Jatheeya Kalasala, Masulipatam, Rao Sahib S. Krishnaswami Ayyangar, University Professor of Indian History and Archaeology, Madras, and Dr. Radhakumud Mookerjee University Professor, Mysore, were kind enough to act as judges and the committee is very much indebted to them for their ready help. In this connection the committee notes with regret that there has not been

larger number of competitors to these valuable prize ssays and hopes that the members of the Union will vince a keener interest in such competitions.

Before concluding, the Committee begs to express its grateful thanks to its President Mr. W. McRae for valuable help rendered, to Mr. G. A. D. Stuart, Director of Agriculture, for his warm sympathies and to Mr. R. Cecil Wood, who has, for nine years past as President of the Union and as Director of Agriculture now, been evincing an ever increasing interest in the welfare of the Union.

C. TADULINGAM,
General Secretary.

Abstract of Statement of Accounts of the Madras Agricultural Students' Union, 1918-19.

Receipts.

PARTICULARS.	Rs.	A.	P.	Rs.	A.	P.	TOTAL. Rs.	A.	P.
Opening Balance									
By Cash. ...				640	15	9			
,, Deposit in the Urban Bank	1342	6	5						
,, ,, in the Post Office Certificates ...	232	8	0						
				1574	14	5			
,, Loans advanced to Students	236	12	10						
,, Advances of 1918 recovered from Printer and General Secretary ...	83	3	6						
				320	0	4	2535	14	6
Journal.									
By Subscriptions ..	1004	1	0						
,, Advertisement Charges ..	113	8	0						
				1117	0	0			
College Day.									
By Donations ...	340	7	0						
,, Special Mess Receipts after meeting Expenditure ...	5	10	4						
,, Sale of Rosettes ...	66	8	0						
,, Entrance fees for Sports ..	6	8	0						
,, Miscellaneous ...	33	13	0						
				452	14	4			
Membership Account.									
By Subscriptions from Patrons...	300	0	0						
,, ,, Members...	65	0	0						
,, ,, Miscellaneous..	17	5	0						
				382	5	0			
,, *Interest on Deposits in the Urban Bank* ...				47	7	6			
,, *Miscellaneous* ..				1	0	0	2001	3	10
Grand Total ...							4537	2	4

Audited by Messrs. K. T. Bhandary & M. Anandan.

Madras Agricultural Students' Union, 1918-19.

Expenditure.

PARTICULARS.	Rs.	A.	P.	Rs.	A.	P.	TOTAL. Rs.	A.	P.
Journal.									
To Printing ...	1394	14	3						
,, Establishment ...	191	12	7						
,, Postage ...	153	8	6						
,, Sundries ...	20	12	8						
				1761	0	0			
College Day.									
To Students' Entertainments ...	106	15	3						
,, Union "At home" Expenses.	175	0	0						
,, Decorations to Sports Ground & Prizes. ...	184	1	9						
,, Rosettes, Badges, and Photograph ...	102	9	9						
,, Printing, Postage, etc. ...	68	12	6						
				637	7	3			
,, Repairs to furniture etc. ...				18	5	4			
,, Miscellaneous ...				8	12	3			
							2425	8	10
Closing Balance.									
To Deposits in the Urban Bank	1219	1	2						
,, ,, in Post Office Certificates ...	232	8	0						
				1451	9	2			
,, Loans for Students, (1918) ...	236	12	10						
,, ,, ,, (1919) ..	160	0	0						
				396	12	10			
,, Advance to Printer ...	75	0	0						
,, Permanent advance with Union Clerk ...	10	0	0						
				85	0	0			
				178	3	6	2111	9	6
,, Cash on hand ...									
TOTAL....							4537	2	4

(Sd.) K. Krishnamurthi Rao,
Hon. Treasurer.

Detailed College Day Account.

Receipts.	Amount.			Expenditure.	Amount.		
From F. R. Parnell Esq., for medal ...	6	4	0	Munagala prize ...	51	5	0
,, M. R. Ry. Rao Sahib M. R. Ramaswami Sivan Avl. for medal ...	5	12	0	Sports prizes ...	32	11	0
Sale of Rosettes ...	66	8	0	Printing ...	62	3	0
College Day donations 1918 ...	340	7	0	Postage ...	6	9	6
Special mess receipts after meeting expenditure ...	5	10	4	Rosettes ...	53	15	3
Sales of Bamboos used for sports...	21	13	0	Volunteer badges ...	16	10	6
Sports entrance fees ...	6	8	0	Group photograph ...	32	0	0
				Drama, stage fitting etc. ...	106	15	3
				Union "At Home" ...	175	0	0
				Sports grounds, decoration etc. ...	100	1	9
Total...	452	14	4	Total...	637	7	3

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Details of Permanent Fund

Receipts.	Amount.			Expenditure.	Amount.		
Members' Subscription ...	65	0	0	Loan to student Peri Lakshminarayana ...	100	0	0
Patrons ...	300	0	0	Loan to student Achutaramayya...	60	0	0
Return of loan ...	11	4	0	Stationery and Repairs ...	18	5	4
Interest on loan to Venkatrangam.	1	2	0				
Miscellaneous ...	4	15	0				
Total...	382	5	0	Total...	178	5	4

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Journal Account.

Receipt.	Amount.			Expenditure.	Amount.		
By Subscription ...	1004	1	0	Printing ...	1394	14	3
By Advertisement ...	113	8	0	Establishment ...	191	12	7
				Postage ...	153	8	6
				Stationery, lighting etc. ...	20	12	8
Total...	1117	9	0	Total...	1761	0	0

Quarter mile Race.	1. B. Dasappa Malli.	1 min. 1 sec.
	2. K. S. Bhandari.	
	3. K. S. Krishna Murty.	
Throwing the Cricket Ball.	1 K. S. Bhandary.	81 yds.
	2. A. K. Annaswami.	
Half mile Race.	1. Dasappa Malli	2 min. 28⅘ sec.
	2. K. S. Krishnamurty.	
	3. K. S. Bhandari.	
Half mile Race (open)	1. Frederick Jesudian.	2min. 25sc. L. M. H. School.
	2. Kesavalu.	
	3. John Samuel.	Central Recruit. School.
Hurdle Race 120 yds.	1. B. Dasappa Malli	19⅘ sec.
	2. K. V. Sheshagiri Rao.	
Old Boy's Race 220 yds.	1. S. Dharmalingam.	
	2. Rangaswami Ayyangar.	
	3. K. Ramiah.	
One mile Race.	1. K. S. Krishna Murty	5min 4sec.
	2. K. S Bhandari.	
	3. C. S. Doraiswami.	
Obstacle Race	1. K V. Sheshagiri Rao.	
	2. B. Dasappa Malli	
	3. A. K. Annaswami.	
Sack Race.	1. Bhagiratha Pady.	
	2. Shiva Rajan.	
	3. Anantharaman.	
Tug-of-war.	Students' team.	
Cross Country Race.	1. K. S. Bhandari.	
	2. K. S. Krishna Murthi.	
	3. C. S Doraiswami.	

The first prize for all items excepting "Old Boys Race," "Obstacle Race," "Sack Race" and Tug-of-war" is a silver medal second & third prizes being some useful articles.

We are glad to announce that in addition to the championship cup three other cups were instituted this year. One for

Cross Country Race by Dr. R. V. Norris, one for One mile Race by Mrs. Anstead & the other for 100 yards Race by the students of the Late Saidapet Agricultural College. The institution of such cups for the various events creates keen interest in sports among the students of the college. Here it will not be out of place, if we appeal to our Patrons, Benefactors, Members and other well-wishers of our union to generously come forward and institute cups.

The Nayanar's Sports Championship Cup.

Readers of this *Journal* will be gratified to know of the relative superiority of the sports champion and the winner of the Vangail Krishnan Nayanar's Cup over his fellow Competitors. The total number of marks scored by him was 59, the highest on record as will be seen frm the table given below and the runner-up getting 34. The cup was instituted in 1914. The table below shows the marks obtained by the winners since the year 1911.

Year.	Total Number of marks obtained.	Name of winners.
1911	39	K. M. Guru Raja Rao.
1912	39	R. G. Mal.
1913	36	R. G. Mal.
1914	33	Venkatachala Modaliar (winner of the Nayanar's Cup.)
1915	32	Venkatachala Modaliar. ,, ,,
1916	53	K. S. Ramanna Rai ,, ,,
1917	39	S. Dharmalingam. ,, ,,
1918	51	A. V. Babi. ,, ,,
1919	59	B. Dasappa Malli. ,, ,,

The following are the records for the various items in the College Day Sports, that is, the best performances by students of the College. They are of interest, partly as indicating whether the standard of Athletics is going up or down, and partly as a stimulus for future competitors.

Events.	Record.	Year.	Name.
100 Yards Race	11⅕ sec.	1916	K. S. Ramanna Rai.
Long Jump	16'—11"	1918	T. Sheshachalam.
High Jnmp	5'	1913 & 14	U. Vittal Rao.
¼ Mile Race	61 sec.	1919	B Dasappa Malli.
½ Mile Race	2min. 28⅘sce.	1919	Do.
1 Mile Race	5 min 4 sec.	1919	K. S. Krishnamurthi.
Hurdle Race.	18⅘ sec.	1918	T. Sheshachalam.
Throwing the Cricket Ball	97 yards	1918	A. V. Babi.
Putting the shot	23'—4½"	1918	Do.

It is very encouraging to note that the standard of sports during the past few years has been gradually rising and in long races competitors of this year have shown greater power of endurance.

Inter-tutorial Matches.

Last year Mr. Ananda Rao's wards secured the shields, both in "Tug-of-war" and in "Relay Race"; while this year it has been the good fortune of the wards of Dr. R. V. Norris to take their place. The institution of intertutorial matches has created a healthy rivalry amongst the wards of the several tutors and has tendered to raise the general level of sportsmanship.

NOTICE.

It is proposed to perpetuate the memory of the late Mr. Ramasastrulu Naidu, Assistant Director of Agriculture, Nandyal.

Influenza cut him off in the prime of his life. His career was very interesting from the very beginning. His school life at Masulipatam gained for him many friends amongst whom the Zamindar of Manugala, his benefactor later, was one. He joined the Xiam College which he soon left finding little scope for his venturesome spirit. He went to Japan to study some industry, but his inability to learn Japanese spurred him on to travel further afield and he crossed over to America, and he joined one of the most domestic institutions in the world—tne University of California.

Here he spent four years and got B. Sc. thoroughly inbued with the idea of dignity of labour. He obtained the B. Sc. degree and returned to India. He joined the Agricultural Department in 1910 as Farm Manager and was promoted to the Gazetted rank. He more than once acted as Deputy Director of Agriculture. He gave tangible proof of his gratitude to his benefactor, his devotion to agriculture, and his active social intelligence in the offer, until he died, of a prize known as the Manugala prize. It is hoped that this aspect of his life may suggest the fashion which the memorial may take.

A provisional committee has been formed with Mr. K. Krishnamurthy Rao as temporary Secretary, with head quarters Lawley Road. Friends and admirers are requested to subscribe.

News and Notes.

The sugar commission is visiting important centres, and will record evidence of the Madras witnesses in February next at Coimbatore.

The Indian Chemical Service Commission has making a preliminary tour and a few members visited the Agriculture College and Research Institute in the middle of this month.

Departmental Notes.

Notifications :—

Government approved the proposal of the Director of Agriculture to convert the title of the Agricultural Calendar into "Villagers' Calendar."

Appointments :—

Mr. K. Ramanatha Ayyer, Assistant Farm Manager, Sirvil is posted to Madura as Assistant Agricultural Demonstrator vice Mr. T. A. Krishna Ayyar, Agricultural Demonstrator, deceased.

Mr. V. K. Nair, G. B. V. C. is appointed on a salary of Rs. 60 a month and posted to Coimbatore to perform the duties of yard Assistant Farm Manager.

Mr. M. Raman on relief by V. K. Nair will take charge of the Northern Block.

Mr. S. Viravaradharaju on relief by Mr. Raman is posted to the First Circle.

Leave :—

Mr. J. A. Muliyil, Assistant in Entomology granted privilege leave for one month from 11th November 1919.

Mr. T. R. Ranganath, Assistant in Mycology, granted extension of leave on medical certificate for three months from 22nd November 1919.

Mr. S. Ramachandra Ayyar, Assistant Agricultural Demonstrator granted leave on medical certificate for 26 days on half pay from 20th November 1919.

Mr. G. Ganapathy Ayyar, Chemical Assistant granted privilege leave from 3rd to 23rd January 1920 both days inclusive.

Promotions :—

Mr. V. S. Ramaswami Ayyar, Assistant Agricultural Demonstrator granted an extention of privilege leave for 7 days.

Mr. K. Ramanatha Ayyar, Assistant Farm Manager, granted leave on medical certificate for [illegible] 8th December 1919.