Farming will never be a success unless the farmer had more voice in the disposal of his produce—P. Morrel.

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EDITORIAL

The Change. The Journal enters a new sphere of life this month. It has changed its garb, assumed another name. Nevertheless, it will as heretofore continue to serve the cause of the "Commonsense Farmer" and live up to the ideal "Science combined with practice." It will deal with man's relation with man, not in a spirit of soul-killing competition, but of enduring harmony. In its own humble way, it will show the way to increased production of food and other necessaries of life, less discomfort of man and better understanding of Nature's laws. In attaining these ends and in the performance of this task we need the wholehearted co-operation of all and we hope they will not fail us.

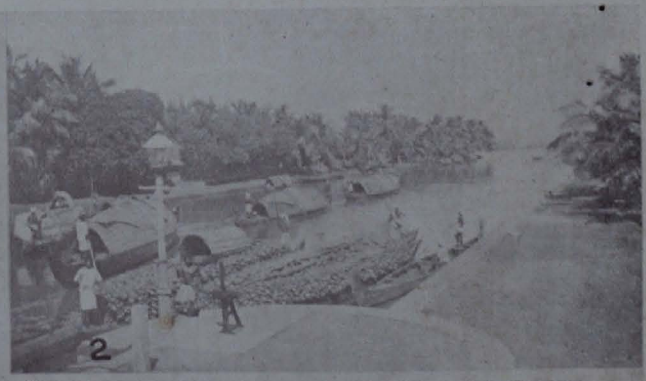
The Clarion call:—We understand that all provincial governments have, as the result of discussions held at the Ministers' conference, agreed to make adequate provision for increased expenditure on 'Agriculture' in their respective budgets for the next year. This is as it should be. It has been calculated that the expenditure on agriculture in Indian budgets does not exceed one anna per head of the population. Any progressive readjustment within a limited time or steady increase under this head should therefore be welcome. We hope that the local legislators who have always entertained a kindly feeling towards the nation building departments will respond to the clarioncall of the Finance member and find their way to grant the demands asked for.

Economics Made Easy:—Economics is mystifying, bewildering, exacting. Few can understand its laws and it is therefore very gratifying to peruse a readable article on the subject which Sir Daniel Hamilton of Calcutta has written to the "Young Men of India." A disciple of Ruskin, Froude and Carlyle, Sir Hamilton emphasises the human element as the fundamental basis of all economics and asserts that man and not money creates wealth and that when this elementary principle is clearly understood and intelligently and faithfully applied, the conditions of the Indian countryside will exhibit a marvellous change for the better within a short time. Sir Hamilton is no theorist but a practical man of business with over 40 years experience in India and possesses unrivalled knowledge of conditions in European countries. His sympathy is not for this or that section of society or this or that nation but for the whole humanity and his suggestions are therefore entitled to be treated with respectful scrutiny and regard.

The Faith that Endures —Blessed are the meek in spirit; for they shall inherit the kingdom of Heaven—so spoke Lord Jesus 2000 years ago. Similar sentiments have been expressed by great seers in other climes both before and since. What applies to the spiritual kingdom has its origin in and applies to the mundane world as well. This trait of man's character has not been the heritage of any one class or country but certain conditions have more than others tended to favour the growth of this quality in particular men or regions. Unescapable contact with Nature, the occurrence of floods, earthquakes, pests, pestilences and scourges on a stupendous scale and the feeling of helplessness that in consequence springs in him have made the toiler in the field meek and when to this is added rustic simplicity that often characterises oldcountry conditions, the peasant comes to entertain beliefs and ideas of God and Institutions which seem puerile and unthinkable to an ordinary scientist who relies on inferences drawn from syllogisms of his own creation. The unlettered farmer believes and believes wholeheartedly in the blessings and curses of the " All-Pervading Principle "(and in the doings of Government which to him stands as the embodiment of God on earth. Whatever Deists, Pantheists, Agnostics or Nihilists may say or do anything that upsets the belief of the farmer is sure to cause him pain and confusion in the rural society and ruin its structure which continues to supply vigorous manhood, native simplicity and strong vitality for the continuanee of the race or the nation. Therefore it behoves all to co-operate in the maintenance of the countryside in all its vigour and purity. He will be a sinner both unto God and man who does not do his little bit in this direction.

It shall be the endeavour of this magazine to advocate such measures as will bring about this end and strengthen the faith that endures.

Second year B. Sc., on Tour.—See Page 21.



(1) Sea Bath at Cape Comorin.
(2) Back-water Canal Near Aleppey—Note Coconut Husks in Boats.
(3) Students visiting Mr. Marar's Rubber Plantation Near Trichur.
(4) "Chakkaram" (Wheel) in action in kole cultivation.

Photo by—S. V. D.

A NOTE ON SCINDHE BREED OF CATTLE.

BY

R. W. LITTLEWOOD AND M. P. KUNHIKUTTY.

THIS breed is found in large numbers in Karachi, Hyderabad (Scind) and along the valley of the Indus. Scindhe is one of the purest and most distinct of Indian breeds of cattle. It is one of the best breeds of Dairy cattle in this country which can be obtained in fairly large numbers. In its own district Scindhe is a dual purpose animal. The cow is a good milker and the bullock, although not so swift or agile in his movements, as that of certain other beeds, is a steady worker. However it is as a milch herd that the breed is known outside Karachi and it should be developed as such. The purity of the breed is largely due to the isolated nature of the district in which the cattle have been bred for centuries The most remarkable feature of this breed is their adaptability to varying climatic conditions when removed from their natural habitat. Although, they are reared in a bare desert country, they have been found thriving well in a damp moist climate like that of Rangoon. In their native soil, they have to search diligently for their feed. Now Scindhe cattle are exported to Mesopotamia, Formosa, Burma, Baluchistan, the Northwest Frontier Province, Mauritius, Borneo, Ceylon etc. In fact no other Indian breed of cattle can adapt itself to the varying climatic conditions, as the Scindhe does. They are naturally bred to overcome hardships and appear to be immune to many contagious diseases. The Scindhe breeds true to the type showing thereby that there is no admixture of other blood.

The Scindhe is invariably red in colour with occasional white spot or markings on the under or hinder parts of the belly; some are fawn and roan in colour. The most common colour is a fine dark red. Grey or white animals are not true Scindhe cattle. The animals both male and female are of medium size and weight. In shape they are compact and symmetrical with true wedge shape in the case of cows. The head is short, the forehead broad and generally slightly protruding. The ears are large and slightly drooping and the eyes clear and well set apart. The horns vary

considerably in shape and type, but the most common form, is a short thick type. The muzzle is broad and the neck is generally short and fairly thick. The whole frame of the animal is deep and wide and is set on short legs. The chest is broad and there is the development of the loose skin on the dewlap and naval of the cow and on the sheath of the bull. Hump is of medium size, but well developed in bulls. The tail is long and fine with a long black switch. The udder of the cow is well developed, but a little fleshy and pendulous. The teats are of good size and evenly placed. Milk veins are prominent. The animals have good bone, thin skin and fine hair. They are docile and easily handled. The average yield of a cow is 2500 lb. although there are instances in which the cows have produced up to 10,000 lb. The cows can be milked without calves by weaning the latter at birth. The heifers are fit for service at $2\frac{1}{2}$ to 3 years if properly fed and reared.

As a Dairy animal, Scindhe may be safely recommended for any part of India. As the animals are small, feeding will not cost much and they can keep their condition even on scanty rations. They should do well on West Coast.

The following records of the yields of Scindhe cows in different parts of the country will clearly indicate that the breed can readily adapt itself to altered conditions of life:—

Number of Cow.	Length of lactation. days.	Milk yield lb.	Average daily yield lb.	Remarks.
24	417	6651·7	13·3	
	221	3840·7	17·5	
	520	8243·0	15·9	
	337	4070·5	12·0	
Average ...	374	5701·4	14·6	
25	373	6767·0	18·0	
	253	4564·0	18·0	Went dry after
	317	6139·3	19·4	inoculation.
	393	6861·0	17 5	
Average ...	334	6083·0	18·2	
26	298	2119·0	7·0	
	339	3500·0	10·2	
	531	5972·0	11·2	
	368	3666·5	9·9	
Average ...	384	3814·3	9·6	
29	283	3481·0	12·3	
	339	4390·0	12·9	
Average ...	311	3935·0	12·6	
33	308	3868·0	12·6	
	306	3601·0	11·7	
Average ...	307	3734·0	12·1	
38	366	5036·0	14·0	
39	372	5307·0	14·3	
149	254	3024·5	12·0	
	296	3755·5	13·0	
Average ...	275	3390·0	12·5	

The average for the 8 cows is 4625 lb. in 340 days with a daily average of 13·4 lb.

The above figures show the milking qualities of some of the foundation stock of this breed maintained at the Hosur Cattle Farm

The average for 8 cows at the Willingdon Cattle Farm Karachi is :

First Lactation : 4426 lbs. in 334 days.

Second Lactation : 3422 lb. in 247 days.

The highest yield of one cow in the above was 5647 lb. in 373 days with an of average 15.1 and 5158 lb. in 366 days average 14.1.

The average for 8 cows at the Agricultural College, Mandalay was .

First Lactation 2718 lb. in 284 days.

Second Lactation. 2706 lb. in 289 days.

The highest yield of a cow 4126 lb. in 378 days with a daily average of 10.9 lbs.

The average milk yield of 6 cows at the Military Dairy Farm Mhow was 3967 lb. in 310 days. One cow, in 268 days gave 5263 lb. with a daily average of 19·6 and another yielded 4869 lb. in 311 days, the daily average being 15.6 lb.

The quality of the milk yielded by the breed is also high, the percentage of fat being 5 on an average.

The average weight of a cow is 700 lb and that of a bull 900 lb. The bull is fit for service at about 3 to $3\frac{1}{2}$ years. Although owing to the comparative slowness of movement of the bullock, the Scindhe may not be suitable for classification as an ideal dual purpose breed, yet, it is an example of a dual purpose type of no mean order. One can see hundreds of Scindhe bullocks engaged in the cartage traffic of Karachi simply to realise how useful the male stock is for draught purpose. They are slow, but steady in their work.

It is proposed to use the Scindhe bulls from good milking dams at Hosur on the cows of the West Coast in South Kanara and Malabar Districts in order to increase both the size of the animals and their milk yielding capacities

Bulls of this breed will be ready for issue in the middle of 1929, prices and particulars can be obtained from the Deputy Director of Agriculture, Livestok, Hosur Cattle Farm.

BOTANY OF SOME USEFUL PLANTS.—VI

By

S. N. Chandrasekharan M. A.,

AVL

T. S. Ramakrishnan, M. A.

TERNSTROEMIACEAE.

This is a small family confined to the tropics consisting of shrubs and trees with leathery evergreen exstipulate alternate leaves. The flowers are regular and usually hermaphrodite with sepals and petals in fives (or 4 to 7 rarely). The stamens are indefinite free or connate at the base. The ovary is superior, 3 to 5 or many celled with as many styles and one or more ovules in each cell. *Camelliaceae* and *Theaceae* are synonymous terms used for this family.

Camellia thea (Tam. Theilai) is the common tea plant. Originally this genus was split up into two the *Camellia* and *Thea* but now they have been merged into one since the differences are not marked.

Two types, the Assam (*Thea assamica*) and the Chinese (*Thea sinensis*) tea may be distinguished. The latter is probably a cultivated form of the former. The Assam tea is cultivated and also occurs wild in Assam. Tea is cultivated in extensive plantations in Southern India on the slopes of the Nilgiri, Malabar and Travancore hills at an altitude of about 4000 to 6,000 feet. Tea requires a sub-tropical climate where for the greater part of the year the atmosphere is moist and the rainfall ranges from 80 to 100 inches and is distributed evenly throughout the year, and the temperature does not rise far above 90° F. A well drained loose soil rich in nutriment is necessary. Usually the plantations are started in virgin soil after clearing forests.

It is a bushy plant capable of growing to the size of a small tree. In plantations they are carefully pruned so that they remain as dense spreading bushes about 3 feet in height and the leaves are easily accessible for plucking. The plants set apart for seeds are allowed to grow into small trees. The leaves are evergreen, alternate, simple, exstipulate ovate-elliptic tapering at

either ends, serrate coriaceous and glistening. The flowers are axillary, solitary or in small clusters, whitish, about an inch across and bracteate. The sepals are five to six, orbicular and persistent. The petals are as many as the sepals and obovate. The stamens are numerous adherent to the base of the petals and very slightly united. The ovary is 3 celled with one or 2 ovules in each cell. The style is terminal and branched into 3 arms. The capsule is trigonous, and splits loculicidally. The seeds are big and nearly round and dark brown in colour.

Tea is cultivated for its leaves. Generally 2 or 3 leaves with the terminal bud of each branch or twig are plucked. These are allowed to ferment for sometime and subsequently made to undergo various treatments and finally become the tea of commerce. The different brands of tea in the market are due to the grading after treatment. It is well known that tea forms a popular beverage.

MALVACEAE.

This is a fairly large family with about 700 species and is distributed throughout the world in the warm and temperate regions. It consists of herbs, shrubs and trees. The stem is covered with stellate hairs. Mucilage is often present in the stem and leaves. The leaves are alternate, stipulate with palmate reticulate venation. The flowers occur singly or in clusters and are regular and usually hermaphrodite. The bracteoles are 2 or more rarely absent often forming an involucre termed *epicalyx* The calyx is gamosepalous with five valvate lobes. The corolla is usually showy and consists of 5 petals, twisted, and united at the base to the staminal tube. The stamens are indefinite and are usually united into a tube giving off a number of antheriferous branches above. The anthers are generally one celled and reniform. The pollen grains are large and spiny. The ovary is superior 2 to many celled and 2 to 5 or more carpelled with one or more ovules in each cell arranged on axile placentas; the styles are free or united and lie within the staminal tube; the stigmas are prominent and are usually equal to or twice as many as the carpels. The fruit is a capsule or schizocarp or rarely indehiscent. The flowers are generally pollinated by insects which come in search of nectar secreted at the base of the petals. Self-pollination is also known to occur.

Hibiscus.—This genus is chiefly distributed in the tropics and consists of herbs and shrubs. The leaves are usually palmately lobed The flowers are solitary and axillary or rarely arranged in a terminal raceme. An epicalyx of 4 to 12 bracteoles, free or connate is present. The sepals and petals are each five in number. The stamens are indefinite monadelphous and the staminal tube is truncate or five toothed at the apex. The ovary is five celled, five carpelled with 3 or more ovules in each cell. Styles are connate with capitate or spathulate stigmas. The fruit is a loculicidal capsule. The seeds are glabrous or covered with hair.

Hibscus cannabinus.—The Bimilipatam jute, the deccan hemp or the gogu is largely cultivated in many parts of India and in Madras particularly in the Ceded Districts and Circars and to some extent in Coimbatore. It is grown both in dry and in garden lands often as a hedge or as a mixed crop. It is sown about the month of July and the plants are pulled out about January. It is a tall undershrub with a sparsely prickly stem and a fairly deep taproot. It grows erect without much of branching and is fibrous. The leaves on the main stem and on the axillary shoots at the base are often undivided while those given off from the upper portion are palmately deeply lobed whith 3-5 lobes The lobes are narrow and serrate and the petiole is long, often prickly and a gland is present on the undersurface of the midrib. The flowers occur singly in the axils of leaves only in the upper half of the plant. There is an epicalyx of 7 to 10 free bracteoles with prickly margin. The calyx is persistent greenish with elongated hairy lobes armed with prickles each lobe having a prominent gland on the midrib. The corolla is yellow (sulphur yellow) with purplish centres. The staminal tube is elongated reddish in colour and is antheriferous throughout. The ovary is conical and covered with stiff hairs; the style is connate and is five branched at the tip each branch bearing a capitate stigma. The ovules are 2 to 3 in each cell and the seeds are covered with stellate scales.

The plant is mainly grown for the sake of its valuable fibre which is obtained from the stem. Ropes, coarse canvas and sack-cloth are made out of this fibre. The

tender leaves are made into chutneys and are also used as a pot herb.

Hibiscus esculentus. The Lady's fingers (Tam. Vendakai) is distributed throughout the tropics and is cultivated all over India. Several varieties are under cultivation. There are dwarf and tall forms with long and short capsules. In addition green stemmed, red stemmed, early and late forms also occur. The plant is generally grown in vegetable gardens or on the bunds of sugarcane fields. The crop is raised twice in the year; in the month of March in summer and again in the rainy season. It bears in 2 or 3 months.

It is a herbaceous annual with a rough hairy and fibrous stem. The leaves are large and broad palmately 3 to 5 lobed covered with rough hairs and mucilaginous. The flowers are axillary, large and showy. The involucre consists of 8 to 10 free linear bracts. The calyx is 5 lobed. The corolla is yellowish with purple centres. The staminal column is antheriferous throughout. The ovary is elongated, hairy with a style branched at its apex into five arms each bearing a capitate stigma. The fruit is hairy or rough and prickly, ribbed, tapering, many seeded and highly mucilaginous when young. The length of the capsule varies from a few inches to nearly a foot according to the variety.

The plant is mainly grown for the sake of its much relished unripe fruit which is used as a vegetable and also sliced and sundried and stored for use in cold weather A fibre is extracted from the stem. The mucilage from the fresh leaves is used in place of soap to remove oil (as tali).

Hibiscus sabdariffa. The *Roselle* (the Red Sorrel) is commonly cultivated in many parts of India. The seeds are sown with the rains in June and the fleshy calyx is collected from November to January. It is an erect annual under—shurb growing to a height of 4 to 5 feet. The root system is shallow. The stem is red in colour and fibrous. Branching is very poor. The leaves on the main stem are palmately 3 lobed while those on the

axillary branches are often undivided. The petiole and the veins are all red in colour. The lamina is thick and fleshy with a serrate margin. There are extra floral nectaries present on the midrib on the undersurface. On the main stem the flowers are produced in the axils while the branches are extra axillary. The pedicel is short and stout. The involucral bracts are thick, pointed, ten in number and adnate to the base of the calyx. In the earlier stages they are greenish but turn red later on. The calyx is scarlet red coloured, five lobed thick and fleshy with a prominent gland on the lower half of each lobe. Both the epicalyx and the calyx are persistent and increase in size after fertilisation; the calyx is accrescent and encloses the ovary as it matures into a fruit becoming nearly an inch and a half in diameter. The plant appears very showy owing to the large number of persistent big scarlet red coloured calyces of the flowers borne almost from the base to the top of the plant. There are stiff sharp hairs on the surface of the lobes of the calyx. The corolla is whitish pink with a dark purple centre. The staminal column is short and the antheriferous portion is limited towards the upper end; fewer anthers are formed. The ovary is globose to conical and hairy with the short style bearing five radiating capitate stigmas red in colour. The capsule is about an inch in length and the seeds are covered with stellate hairs.

A strong silky fibre called the Roselle Hemp is obtained from the stem. The fleshy calyx is used as a vegetable in the preparation of jellies and chutneys. The leaves are also used as a pot herb. The seeds have various medicinal properties.

Hibiscus rosasinensis.—(Tam. Semparuthi) is an ornamental garden shrub. Several varieties of this are grown differing in the clour and size of the flowers. The flowers are large and showy and used for pujas. They have also medicinal properties. The plant is propagated by cuttings and seeds are rare.

Gossypium.—This genus is of great economic importance and a number of species belonging to this supply cotton. It is distributed throughout the warmer parts of

the world. It includes 40 species and several varieties. The genus consists of shrubs and arboreal forms. The plants are perennial by habit but several of them are removed, under cultivation, after each season. But in some localities the plants are allowed to remain in the soil for 4 to 5 years. The arboreal forms are of course perennial and are less common. India occupies a high place as a cotton growing country. In Madras the cultivation of cotton extends over the Central and Southern Districts and the black clayey soil seems to be admirably suited for the cultivation of cotton. Hence the soil itself has come to be called the black cotton soil. Cotton is grown both in the black and also in the red soils. The plants are small or big shrubs with a very fibrous stem. There is a fairly long tap root going deep into the soil and a number of lateral roots are given off very near the surface and these spread almost horizontally. The plants are adapted to withstand a certain amount of drought. The stem is usually erect and hairy and much branched. Generally the buds at the lowest 2 or 3 nodes do not develop. There are two sorts of buds the axillary and the extra axillary at each node. In the lower portions the axillary buds develop first and produce vegetative branches which may later on bear flowers, the extra axillary buds at this region do not develop much at first. If they develop they begin to bear flowers. In the upper portions of the plant the extra axillary buds develop into flowering branches while the axillary buds remain short or may develop later and bear flowers. The flowering branches are shorter and exhibit a sympodial growth since the flower is leaf opposed. Flowering commences at the basal nodes and proceeds in ever widening circles. The leaves are simple, palmately 3-7 lobed with a prominent extra floral nectary at the back of the prominent veins.

The flower arises on the extra axillary branches and is solitary and leaf opposed. It is subtended by an involucre of three large bracts united at the base and with divided margins. Sometimes an inner whorl of three smaller bracts is seen. At the base of each bract a gland may sometimes be present and also between the bracts on the calyx glands are noticed. The calyx is gamosepalous cup shaped with five rounded or pointed lobes and abounds

with numerous black dots. Sometimes the lobing is indistinct. The corolla is yellow, red or white, in colour with five petals. Often scarlet eyespots are present at the base of the petals. The stamens are indefinite in number and monadelphous and the staminal column bears anthers almost throughout its length The ovary is 3 to 5 celled with a fairly long style bearing as many stigmas as there are cells; the stigmas are twisted. The fruit is a loculicidal capsule. It is known in the popular language as the 'boll' and the individual cells are termed as "locks." The size and shape of the bolls vary according to the species.

The seeds may be rounded or elongated and are covered with hairs—the cotton fibre There are two kinds of hairs—long hairs called the lint or the staple, and short hairs called fuzz. The colour of the fibre is white or reddish or brownish. Some varieties have very little or no fuzz. The length and the quality of the lint vary with the species. The cotton fibre is only an outward extension of the outermost layer of cells of the integument of the seed (the seed coat). The lint and fuzz are often found mixed together and produced from the entire surface of the seed coat In some cases the fuzz may be limited to certain portions. The hair is unicellular with thickened walls and is more or less ribbon shaped or flattened; usually it is twisted It is made up of cellulose.

In the Madras Presidency the following species are largely cultivated.

Gossypium herbaceum.
„ indicum.
„ hirsutum.
„ obtusifolium.

The seeds are generally sown in the months of September—October and the first picking is done about March—April. The plants flower once more and a second picking is often made in June—July and in August the plants are pulled out.

Gossypium herbaceum. This is synonymous with the Uppam or Ukkan of Coimbatore and Tinnevelly and the westerns and northerns. But the Westerns and

northerns are mostly mixtures, the former composed mainly of *herbaceum* and the latter often made up mostly of *indicum*. It is usually grown as a dry crop in black soil. It is a small hairy plant 2 to 4 feet in height with more or less a conical form and having a deep root system. The leaves are small in size with 3 to 5 rounded lobes. The leaves are lighter in colour when compared with the cambodia or karunganni. The glands at the base of the involucre are absent and only those on the calyx are present. The calyx lobes are very short and rounded. The corolla is yellow with red eyespots. The bolls are small more or less ovoid with a blunt beak and usually 3 celled but variations occur—4 to 5 celled bolls are noticed. The seeds are small and rounded and are fuzzy. The lint is short and coarse.

Gossypium indicum. It is locally known as karunganni or yerrapathi. This is said to be the best indigenous cotton of this tract. It is taller than uppam and less hairy with the branches ascending up at an acute angle. The stem and branches are reddish coloured The leaves are darker in colour and have 3 to 5 narrow pointed lobes. The flowers are yellow, rarely white and the eyespots are present. The glands at the base of the involucral bracts are absent while those on the calyx are noticed. The calyx is studded with numerous black dots. The lobes are rounded. The bolls are small and longish with a pointed beak. They are usually 4 celled (3 to 5 also occurring). The seeds are elongated with a sharp point and are fuzzy. The lint is of a superior quality.

Gossypium hirsutum. This is what is locally known as Cambodia. It is generally grown as an irrigated crop though in some localities it may be cultivated as a dry crop The plant is more bushy. The stem and branches are hairy reddish coloured. The leaves are broad and large with 3 to 5 broad lobes. The flowers are big creamy or yellowish. The coloured spot on the petals is absent. The involucral bracts are much bigger with long teeth and glands are present at the base of the bracts. The calyx also bears the glands and is provided with with five pointed distinct lobes. Sometimes the calyx lobes show variation in size. The black spots on the calyx

are less prominent than in karunganni. The bolls are comparatively very big and globose with a very short beak. The bolls are generally four celled (3 to 5 also occurring). The seeds are bigger and densely fuzzy. The lint is much longer and finer than in uppam. The Bourbon and Dharwar-american are varieties of G. hirsutum. Bourbon has seeds devoid of fuzz.

Gossypium obtusifolium. This represents the Nadam of Coimbatore and the Cocandas of Circars and Ceded districts. The plant is grown as a perennial in Coimbatore while in other localities it is grown as an annual.

The main shoot is erect and strong while the lateral branches project outwards and upwards. The stem and branches are usually reddish coloured and slightly hairy. The leaves are small and resemble those of ***herbaceum*** but for the lobes being more pointed and less hairy. The flowers are yellow in colour with eyespots. The bolls are sharp pointed and the seeds are covered with long dense woolly fuzz. The lint is fine, short and soft. In the Cocanadas the lint is often reddish tinged.

The other species of cotton which may be seen in some parts of the Madras Presidency are :—

1. *Gossypium arboreum* which grows to the size of a small tree. The lint from this is made use of for making the sacred thread of the brahmin. 2. *Gossypium barbadense* or the Sea Island cotton. This is very rarely grown, the seeds are devoid of fuzz and the lint is long and fine. 3. *Gossypium neglectum*—the Pulichai and 4. *G. roseum* are two other species rarely met with.

The harvested cotton forms the kappas of the market which consists of the seeds with the lint and fuzz. Cotton is mainly grown for the sake of the lint. The lint is spun into thread and woven into clothing. These processes are carried out either by hand or with the help of machinery. Cotton is also used for stuffing pillows and beds. The cotton seed is valuable as cattle food. The seed contains an oil which is said to be used for cooking purposes and the cake forms a fertiliser. The seeds are sometimes roasted and used as a substitute for coffee. The cotton stalks form good fuel. The seed-coat and the bark on the stem sometimes serve as raw materials for paper making.

Bombax malabaricum and Eriodendron pentandrum.—are two other plants belonging to this family and supply the "Elavam panju" or 'silk cotton'. They are big trees often found growing wild on the west coast and other parts of the Presidency. They are also planted and cultivated

Bombax malabaricum. is the 'silk cotton tree, with a tall and stout stem devoid of branches for some height and covered with hard conical prickles. The leaves are digitate and the flowers are produced when the leaves are off the tree (during February-March). The flowers are red in colour, large and devoid of bracteoles. The calyx is cup shaped and leathery. The stamens are numerous and polyadelphous. The capsule opens by five valves. The seeds are smooth embedded in long white cottony fibres, the latter being produced from the walls of cells.

This fibre is used for stuffing pillows, cushions and beds. The tree yields a gum and a fibre is obtained from the bark and made into ropes. The timber is light but not durable. It is used for making boats since it keeps longer when under water.

Eriodendron pentandrum.—is the "Kapok". This is tall and the stem when young is covered with prickles. The branches occur in whorls. The leaves are digitate and the flowers are whitish in colour. The epicalyx is absent Stamens occur in 5 bundles opposite the petals united slightly at the base, each bearing 2 or 3 anthers. The capsule opens by five deciduous valves and is woolly within; embedded in this are the seeds. The seeds are smooth. The cotton from this is used for the same purpose as that from *Bombax* and is considered superior.

Till now these plants were included under Malvaceae but Rendle has brought them under "Bombaceae."

A CALL TO STUDENTS OF AGRICULTURE.

"Awake, Arise and stop not, till you reach the goal"
(Swami Vivekananda).

By V. Narayana Menon.

What is our goal? Many say it is happiness. But none can define what happiness is. This seems very strange, although the reason is clear They crave for the ephemeral pleasures of the body. These are limited, momentary. The labourer is worried about the bread for the morrow The student is anxious about his examination. The politician is annoyed by the tactics of his opponents. Similarly there is none who is not careworn about some little thing or other. But there are some who are really happy and their happiness is absolute. Who can these be? They are those who have adopted "sacrifice and service" as the only royal road to happiness and not marriage and mammonism unlike those who wish for the "happiness" of the body.

Most of India's youth shirk work; for they cannot find happiness in work. To them happiness lies in marriage, Manchester mulls, Spencer cigars, cinemas, and dramas and what not? Work, they think, is beyond their scope. Many of them have studied about ants, bees, and termites. The relation between the workers and the young ones of the colony, they call 'Trophallamy;' because they cannot endow them with such fine ideas like 'sacrifice and service.' Among such colonies, only the king and queen breed; the rest are the workers and the soliders. We do not imitate these insects, we follow the reverse process. All of us want to propagate the species while we expect the king and queen to feed us—I mean, the craving for government employment—Nobody wants to be the worker and soldier in our colony.

I have heard many say "If all of us begin to sacrifice who is there to produce our kind.? This is only evading the real issue; for, they are sure that we cannot and will not sacrifice. Further, it is none of *our* concern to see to the continuance of the population of the world. The world will take care of itself. So we should do what we think fit

to do at present. If the population tends to become extinct in the world, then and only then, we shall consider. Now no thought about it is necessary. No time to waste on such thoughts. Work, work is our duty. How much I wish we had a Carlyle amongst us now. Even one may not be enongh ; for so adamantine is our laziness.

There are many youths of India who think it below their dignity to work. But the dignity of labour cannot be over emphasised. Refer to the Hindu Puranas. The ancient kings of India spent half the year in jungles, simply to inure themselves to the hardships of the weather. Lord Krishna was a cow herd because he wanted to show the dignity of labour. His brother, Balarama had the plough as his weapon, i. e., his profession was agriculture. We have heard that king Janaka got Sitha while he was ploughing his fields. Besides showing the dignity of labor it has a far deeper meaning Janaka was a man who had conquered his senses. "Sacrifice and service" were the two bullocks he used for ploughing; the plough was his own body; the field was his own mind; and the produce was Sitha-perfect happiness-supreme bliss.

But what is there to-day in India for such sacrifice. Have we got so much of work here? Are we in such a low condition? To understand this, simply look round and see with your eyes wide open; what do we find? Thirty-five crores of people-a large part of them half-starving seminaked invalids. Did God create all of them only in India to suffer like this. Absolutely not. It is all man's doing for most of them are only the by-products of the thoughtless actions of their parents. It is all due to weakmindedness—I would call it *Immorality*

Now the help can come mostly from teachers, doctors, lawyers, and politicians. But let us consider what they really do. The teachers manufacture graduates who cannot help themselves or the nation. Doctors of course, keep our life safe, only they are too many. As for the other two it is worth quoting Lord Irwin—"At present the tendency of the educated classes is to immerse themselves in politics or

the law. These two spheres of action are important and necessary for the constitutional administration of the country. But they are not the vital necessities on which the people of India depend for their very existence from day to day. What is the good of concentrating on good reins to drive a horse or on rubber-tyred wheels to make the carriage comfortable, if the horse is so weak that he cannot pull the carriage or the carriage so frail that it falls to pieces directly when anybody sits on it."

There is a universal cry about "*Unemployment*" in India I would say it is all due to our weakness, our dilettantism; for we have left our fields to be cultivated by the illiterate poor; what can they do without our help and guidance? No Indian youth wants to employ himself by properly cultivating his land; because he thinks it beneath his dignity. I would only say that it is really "Unofficership" and not "unemployment" that causes misery to the Indian youth; for almost all of them hunt after government jobs. They cannot handle a plough or a basket of manure. But let them remember that it is the fruits of the toil with that plough and the same manure—only in another form that they handle at the dining table. If they cannot handle the one they have no right to handle the other. So let them fall upon their knees before the sacred plough and embrace it. It will embrace them Then and only then, can they be happy.

And what can we agricultural students do in the matter? We are the best fitted for the occasion. Our work is the economic emancipation of the nation. Hence we have much to do. None else can do as much. Our scope is limitless. We can do any work social, political religious or anything that would help in the betterment of the nation. I need not enter into the methods by which we can lift ourselves up; the call is to do it.

Indian ryots are amenable to reason. If we do our duty, and when they come to realise that we have no interest in the matter except for their own good, they will come round. We have the satisfaction of having done our duty without any idea of our own advancement.

Again Indian ryots are not irresponsive. Refer to "A century and a quarter of Mysore agriculture." The ryots have harkened to reason and experience. Show him your work, make him realise you are right and at once he follows you, he loves you, and he helps you in your work. May be there are some exceptions—all cannot be of the same type–variety is the spice of life–of creation–of everything. Hence do not be disappointed. If you work on the principle of *Nishkama Karma* you are sure to meet with success and attain supreme happiness. So begin your work today. No day is inauspicious to do any good deed.

AN AGRICULTURAL EXERSION IN TAMIL LAND AND MALABAR.

The second-year students of the Coimbatore Agricultural College went out on an agricultural tour in the Tamil districts and in the Travancore and Cochin States. The tour started with a visit to the Aduthurai Paddybreeding Station in the Tanjore district on the 4th January and was projected as far south as Nagercoil and the return to head quarters on the 18th was through the States, touching important places, the last being Trichur in the Cochin territory. The route taken gave ample scope for study of some of the most important and interesting tracts of South India apart from the great delight one may experience in passing through the famous cities and pleasure resorts in Southern India.

Traversing the beautiful paddy fields interspersed with plantations and coconut groves in the Cauvery delta, the train steams up south beyond Trichinopoly, through vast undulated dry tracts poorly cultivatad with chains of hills covered with thick jungles. Passing Dindigul under the Sirumalai hills famous for its plantations, it descends into the fertile Periyar valley, the broad sheets of paddy fields once again coming into view. Leaving Madura and quickly ghding over a light red soil tract of average fertility up to about Thirumangalam, the train plunges into the reputed black soil area of the south covering large portions of west Ramnad and north Tinnevelly districts. When the train leaves Manyachi, we pass the black soil area and enter again into the borders of the rich Thambiraparani valley. From Tinnevelly the bus takes us over rather uninteresting country studded with tanks and palmyra palms in their hundreds and thousands. The cultivation is poor except under tanks and wells and the scene changes to one of pleasing paddy fields only on the approach to Nagercoil. From here the typical red soil area of the West Coast commences. The drive from Nagercoil to Trivandrum is through picturesque country winding over low hills and broad valleys which are thick with groves of coconuts, areca, jack, mangoes and plantains nodding over innumerable tapioca plots. The vegetation is typical of a tract receiving heavy rainfall. Quilon, a busy town stands in the southermost point of the back water system, with

Alleppey in the centre and Ernakulam, the San Francisco of South India at the head. Beyond Ernakulam the country gets more undulated, the Ghats being much nearer the sea than in the Travancore State where it is about 40 to 50 miles. In typical Malabar country noted for bananas and surrounded by beautiful gardens of jack and mangoes is Trichur, the last place of visit. From here upto the limits of the Palghat gap the scene consists of fine paddy fields, gardens and thick ever green forests on the slopes of hills. From the eastern limits of the Palghat gap on the Coimbatore border commences the poor dry area of this district, the change from a place like Malabar to one of low rainfall is marked.

To give some details of the visits and study in each place of halt.—At Auduturai, the centre of the delta paddy tract, the Assistant Paddy Specialist gave full information regarding the methods of selection and breeding of paddy plants. Several of the Aduturai varieties as well as the some of the manurial and cultural trials were observed in the field. Some details about the cultivation of paddy in the delta, season, varieties etc, were also gathered from ryots. At Trichinopoly the Grand Anicut was visited. It is situated at the eastern extremity of the Srirangam island, about 12 miles from Trichinopoly town. This Anicut prevents the natural flow of the Cauvery water into the Coleroon, thus diverting it into the Cauvery and the Vennar rivers which ramify further east into a number of canals for irrigation purposes. At Madura the Municipal Sewage Farm in which sewage water is used to irrigate about 100 acres of various crops, as also the fruit garden of Mr. Abbas Ali Khan were visited. After a flying visit to the demonstration plots of the Department, the party left for Koilpatti, the next place of halt. Here the selections made in the Karunganny cotton for the Tinnevelly tract and the methods followed to improve the same were studied. Seed—farms and ryots' fields adjoining the station were visited and enquiries made regarding local cultivation. The stay at Koilpatti was pleasant and profitable. At Tinnevelly paddy cultivation under the Thambiraparani river and some demonstration plots were studied. Here the party were the guests of M. R. Ry. Sadhu Ganapati Pantulu Garu.

From Nagercoil the tour in the States started. Mr. Parameswaram Pillai, the Assistant Director of Agriculture

in the Travancore State met and accompanied the party as far as Alleppey, the northern border. At Nagercoil the paddy and the fruit farms were visited, the latter being about a mile from Cape Comorin. Opportunity was availed of by most to have an enjoyable sea bath at the meeting place of the seas, and visit the famous shrine of Kanyakumari. The same evening the party reached Trivandrum after a very delightful journey. At the capital of the State the visits were made to the Zoological gardens and the State Cattle Farm situated on a hill about five miles north of the city and commanding a beautiful view of the surrounding country. The cows are mainly of the Scindhi breed and there is also a Dairy attached to the the Farm. The milk is conveyed in jutkas and supplied to customers in the city. Quilon is practically the head-quarters of the Department of Agriculture in Travancore, and the Research Laboratories are located in a delightful spot overlooking the deep 'Ashtamudi kayal' or the meeting place of eight back waters. The Research staff took great pains to explain at length the results achieved and experiments that are being conducted in their several sections. Here the party were entertained at an enjoyable dinner by Dr. Sundaram who spared no pains in looking after the comforts of the staff and the students. From Quilon to Alleppey the route is through level country every inch being covered by coconut topes. For several miles before reaching Alleppey the road runs straight through the sandy beach. At Alleppey a busy trading centre, the state Coconut Farm was visited. It was interesting to study the manurial trials on the palms in a typically sandy soil. In these tracts this palm seems to thrive even without any manure, the soil, the climate and the rain-fall, all favouring its quick growth. One has only to travel along the back waters in a boat, say from Alleppey to Ernakulam, to get an idea of the magnitude of the coconut plantations. As far as the eye can reach it is a sea of coconuts for miles and miles fringing the edges of the waters. Great credit is due to Mr. Parameswaram Pillai and to the other officers of the Travancore Department of Agriculture who were responsible for the uniformly kind treatment meted out to the party at different places of visit.

The City of Ernakulam is situated on the eastern shores of a big lagoon while 3 miles across on the opposite

side is the Cochin Town. The lagoon and the entrance to this from the sea are deepened to form the Cochin harbour which when completed will be one of the best natural harbours. As may be surmised the coconut palm is responsible for some of the noted industries in the West Coast, the coconut fibre and oil extraction industries are two of them. The fibre made from the husk is twisted into ropes which again are used for making mattings, door mats etc., and these are very largely exported to Europe and America. The factory of Messrs. William Goodacre and Sons, was visited to study the manufacture of various kinds of door mats and carpets from wool. The famous Tata's Cocogem Factory where pure deodorised coconut oil is prepared was next visited. Ernakulam is connected by a railway branch joining the main line at Shoranur. Trichur lies midway. The Cochin state farm is located about three miles from Trichur town. One of the largest Government farms in India, it covers an area of about 500 acres of typical laterite soil growing almost all kinds of crops and fruit trees. There are beautiful avenes of Jack and Mango trees and extensive areas under Bananas. Varietal, cultural and manurial trials on Paddy and Plantains were well worth a study. Pine apples, graft-mangoes, oranges, guavas and different varieties of plantains are also grown in large plots. While at this place 'Kole' cultivation of paddy, which is peculiar to the West Coast was studied. During the monsoon low areas become waterlogged, often with as much as 6 to 8 feet of water. In December the operation of draining out this water with the local wheel and by machine-driven pumps, starts. Lands which are 'opened up' in this manner are sown with paddy. The utilisation of big power driven pumps is more commonly observed nowadays and primitive wooden wheel is used occasionally for baling out small quantities of water from the plots up into the drain channel. On their return from the Kole cultivation area party visited Mr. Marar's Rubber plantation. This was a typical private farm visited during the tour. Mr. Marar had kindly made arrangements to demonstrate the manufacture of sheet rubber from the latex. An old agricultural Student of Saidapet he took great interest in giving, in a lucid way, an account of the cultivation, production and marketing of rubber. The

party were then entertained to tea on a most lavish scale in his charming residence, which commands a panoramic view of Kole cultivation and the surrounding country.

The Superintendent and the staff of the Cochin Department of Agriculture had made elaborate arrangements for the party during their stay at Ernakulam and Trichur. At the latter place they were also kind enough to entertain the visitors at a grand evening party in the new Botanical gardens Nearly half a dozen dishes made out of different plantain varieties were a conspicuous feature. The success of the tour in Travancore and Cochin was entirely due to the efforts of the officers of the State Department who spared no pains to make the trip as instructive aud enjoyable as possible.

One other noteworthy feature of this tour was the successes achieved in the field of sports. The pleasurable and lively aspects of the tour were not a little enhanced by the several matches that were arranged at Trichy, Madura and Tinnevelly. At the first place, a Hockey Match was played against the St. Joseph's College team and in a field that was far from satisfactory in many respects, the visitors found themselves in fine form and had an easy win. Another contest in Badminton, the next morning, against a sturdy local team also proved the superiority of the visitors At Madura the strong Town Hockey Team narrowly escaped a defeat. In spite of ths handicap of bad pitch, new sticks and the like, the visitors played a fine game and easily held their own, though the game ended in a draw. Mr. Vital Rao of the staff played in the team with enthusiasm but could not get his old game, being long out of touch and is perhaps too old for a vigorous game. At Tinnevelly the St. Xavier's College team fared no better in football than that in Trichy in the game of Hockey. The field was good but full of the troublesome Tribulus terrestris. Student Mani easily showed himself out to be the best in both the games. The students desrve to be congratulated on their fine performances. That a single class was able to muster a team, that could hold its own against reputed teams in several places, is in itself a fact worthy of note and a matter of great satisfaction and credit to the College and to the members of the second year class.

EXTRACTS.

THE HUMAN ELEMENT IN ECONOMICS.

By

Sir D. M. Hamilton, Kt., c. s. i.

"Nevertheless, it is open, I repeat, to serious question, which I leave to the reader's pondering, whether, among national manufactures, that of Souls of a good quality may not at last turn out a quite leadingly lucrative one?

"There is no Wealth but Life. Life, including all its powers of love, of joy, and of admiration. That country is the richest which nourishes the greatest number of noble and happy human beings, that man is richest who, having perfected the functions of his own life to the utmost, has also the widest helpful influence, both personal, and by means of his possessions, over the lives of others.

"A strange political economy; the only one, nevertheless, that ever was or can be: all political economy founded on self-interest being but the fulfilment of that which one brought schism into the Policy of angels, and ruin into the Economy of Heaven."—Ruskin.

MR. GANDHI has, very kindly, invited me to write "a popular article, or a series, making banking easy for people to understand."

I shall do my best to comply with his request.

The first thing to grasp firmly in the study of finance is, that men grow rice and wheat, spin and weave, build houses and ships, and that money does none of these things. In short, man makes everything and money makes nothing A ten-year-old school-boy can understand this; but as it is too simple a truth for grown-ups, who have the idea that money makes all things, I here quote as my authority, the first twenty-five words of the world's greatest economic book, Adam Smith's *Wealth of Nations.*

"The annual labour of every nation is the fund which originally supplies it with all the necessaries and conveniences of life which it annually consumes."

Note the words "labour (not money) is *the fund* which supplies all the necessaries and conveniences of life." It is because the world has overlooked this simple truth, that money has been allowed to usurp the place of man, as the ruling power, and that finance has become so mystifying and difficult to understand.

Having shown, on the authority of the world's greatest economic teacher, that labour of an honest man is, therefore, a better monetary unit than a gold *mohur*, any intelligent school-boy can understand that the weath of a nation will grown in exact ratio to the number of its people who are employed fully on the production of useful things such as rice, or wheat, or sugar, or clothing, or houses, or the construction of irrigation canals and wells, or roads. And the obverse is equally true that the poverty of a nation is in exact ratio to the number of its people who are not so employed.

In the modern world, however, the real money or labour of a country cannot be utilized without the help of what Adam Smith calls the nominal money, in the form of silver, or gold, or paper. The nominal money being the instrument for setting men towork, or for exchanging the products of their work, any school-boy can understand that, in order to reach its maximum of production, a country should have as many of the monetary instruments in active operation as will keep every able-bodied man employed fully on the product of what Adam Smith calls "the necessaries and conveniences of life."

How does India stand with regard to the number of these monetary instruments? She does not stand at all: she lies prostrate. She is the greatest real money power in the Empire, and after China the greatest real money power in the world, but for want of these monetary instruments which can be manufactured so cheaply from paper, the productive capital is hampered in its working; consequently, India is a land of poverty, instead of the land of plenty which she will be when her people are supplied with as many of these cheap monetary instruments as are required to keep them fully employed in growing rice, and wheat, and sugar, spinning and weaving, constructing irrigation canals, digging wells, making roads, building ships, etc.

Bankers tell us that paper money is not safe unless backed by ten or fifteen per cent of gold or silver. Even if that were so, Government currency notes are infinitely safer than bank notes, for they are backed for all time by all the gold and silver goods of the nation, whereas bank notes are backed only by the property of a few shareholders. And to use gold or silver when paper will do the same work quite as well, and so much more cheaply, is folly. A child can understand this if a banker cannot. Would a golden plough yield a larger crop than one made of iron? Wound a silver *charka* spin more yarn than one made of wood?

Hard cash in the form of a gold *mohur* worth twenty rupees, will employ one man for two months in growing rice. Soft cash, in the form of Government currency notes, costing twenty rupees, will employ a man for nearly twenty years in growing rice. Which is the better currency, the gold or the paper?

Four hundred rupees will sink a well, and yield four hundred rupees worth of food every year. Four hundred rupees spent on the manufacture of paper currency will sink one hundred wells, yielding forty thosand rupees' worth of food every year Which is the better currency, the silver or the paper? Such is the difference between hard cash and credit. The one starves a nation, because there is not enough to go round; and what there is, is in the wrong hands—the hands of the money-lender or the non-producer. the other feeds it, because it can be manufactured so cheaply, and issued in quantity sufficient to employ every man in productive or constructive work.

It will thus be seen that a bank or Government, which has the power to manufacture and issue paper currency, requires neither capital nor deposits. The capital is the living man who requires only the nominal money to turn his labour into profitable channels which will enrich himself and his country. Only two things are necessary. These are:—

1. Reliable men.
2. Government paper currency, or the instruments of credit, in quantity sufficient to turn the labour of every reliable man on the growing of food, the spinning and weaving of

cloth, the construction of irrigation canals, the digging of wells, the making of roads, and other useful purposes; and it must not be issued in excess of this, otherwise it will defraud the country, by giving men the power to purchase goods without producing or giving anything in exchange for such goods.

I place reliable men first; for the money can be issued and lent only to men who can be trusted to turn it to profitable use and return it, or to honest men who will construct and hand over one rupee's worth of road, in exchange for one rupee's worth of food which the money will enable them to buy. The manufacture of reliable men is, therefore, the first essential for the enrichment of a country, and the welfare of a nation. And may I here quote Ruskin's *Unto this last ?* "*Neverthless, it is open, I repeat, to serious question, which I leave to the reader's pondering, whether among national manufactures, that of Souls of a good quality may not at last turn out a quite leadingly lucrative one*"?

As it is a physical impossibiliy for a joint stock bank to reach, individually, the tens of millions of small men who are crying out for someone to save them from the money-lender, it is the imperative duty of Government, through its co-operative department to do so. The masses must be financed co-operatively in groups, or not at all. It is, therefore, the business of the co-operative department to manufacture the reliable men, who are the real foundation of every sound banking system, and to form them into groups who will stand shoulder to shoulder, to guarantee the return of the money borrowed by themselves and their neighbours. And it is the duty, as well as the business of Government, which holds the monopoly of the manufacture of the money, to print and issue as much as may be required for productive and constructive purpose; otherwise, so far as the great masses of the people are concerned, their life will remain the empty one it is to-day. And be it noted that the money so manufactured and issued is not Government money, but the money of the people; that is to say, their labour monetized and converted into solid assets.

The British Government, at the instigation of the bankers, has acted very unwisely of late in handing over

to the Bank of England the manufacture and issue of the £1 Treasury note, which is the people's own currency; for this means that the nation has to pay six per cent for the use of its own money; whereas, if the money came direct from the Treasury the people might have it at one per cent for the growing of corn, the building of houses, etc.—Government having no large dividends to pay to bank shareholders, and no interest to pay to bank depositors. The Government of India must make no such blunder, but retain the manufacture of currency in its own hands as a monopoly to be used freely for the benefit of the people and the development of the country.

The Retrenchment Committee which, to save a printer's bill abolished the one rupee note, struck a deadly blow at the development of India; for, without a credit system which can be expanded according to the needs of the people, India's only future will be one of stagnation and poverty. India's banking system must be framed to suit the people; the soul of a nation must not be dwarfed to suit the banking system. Better to curtail bank dividends than the life of 320 millions of people. A restricted supply of productive credit money means a restricted life, a shrivelled body, a shrunken soul. The people of Great Britain would have something to say if a Retrenchment Committee dared to tamper with its small paper currency.

The one rupee note must come back if India is to move forward; and the sooner it comes the sooner will India take her place among the nations And the paper currency must be issued not only in exchange for silver received, but (as in Scotland) as capital for the growing of rice, and wheat, and sugar; and the more plentifully it is issued for these purposes the geater will be the inflow of gold and silver, and the firmer the foreign exchanges. India now imports every year sixteen crores' worth of sugar which a productive paper currency would enable her to grow within her own borders. If this were done, sixteen crores' worth of gold and silver would flow into India instead of sixteen crores worth of sugar. There would then be no fear of falling exchanges. To regulate the issue of credit money by the output of gold and silver mines situated at the other ends of the earth is sheer

stupidity and bad finance. To say that the people of India should stop growing rice because some wretched miners in South Africa stop raising gold is folly. To regulate the food supply of India by the silver output of Mexico would be a sign of senile decay in the finance department of Government. Even the simple mind of Mr. Gandhi can understand this.

It is because India is starving for the paper money called credit that the people are starving for more and better food, and good milch cows, and doctors and medicine and education, and all else to which every man willing to work is entitled, but which he cannot get while the false money dominates the true.

What then is the way out of the darkness into the light of a better day? The road lies by way of Scotland, where money was (until crippled by the English Gold Reserve Bank Act of 1844) the servant of man, not his master. The Scottish Credit System is explained thus in Mr. Dunning Macleod's *Elements of Banking:*

"We have now to describe a species of credit invented in Scotland, to which the marvellous progress and prosperity of that country is mainly due.

"The Bank of Scotland began to issue £1 notes about the beginning of the last century. In 1727 another bank was founded named the Royal Bank. In the very contracted sphere of Scottish commerce at the time, there were not sufficient commercial bills to exhaust the credit of the banks. They had, as it were, a superfluity of credit on hand, and the Royal Bank devised a new means of getting it into circulation.

"It agreed, on receiving sufficient guarantees, to open or create credits in favour of respectable and trustworthy persons.

"A cash credit is therefore simply a drawing account, created in favour of a customer, upon which he may operate in precisely the same manner as on a common drawing account. The only difference being that, instead of receiving interest upon the daily balance to his credit, as is very commonly the custom in Scotland, he pays interest on the

daily balance at his debit. It is thus an inverse drawing account.

"All these advances are made exclusively in the Bank's own notes, and they are not made on the basis of any previous transaction.

"Cash credits are applicable to a totally different class of transactions from those which give rise to bills of exchange, and we will now explain their nature more fully.

"Almost every young man commencing business in Scotland does it by means of a cash credit. A young solicitor, for instance, in England must have a very considerable amount of ready money to begin business with any ease to himself, as he is expected to make disbursements from his clients. But in Scotland this is done by means of a cash credit which is guaranteed by his friends.

"These credits are granted to all classes of society, to the poor as freely as to the rich. Everything depends upon character. Young men in the humblest walks of life inspire their friends with confidence in their steadiness and judgment, and they become sureties for them on a cash credit. This is exactly the same thing as money to them, and they then have the means placed within their reach of rising to any extent to which their abilities and industry permit them.

"It was in this manner that the prodigious progress in agriculture was made in Scotland. There were immense quantities of reclaimable land, and abundance of unemployed people, but no capital or money to set their industry in motion. Seeing this state of matters the banks opened branches in numerous parts of the country, and set down boxes of £1 notes and granted cash credits to the farmers. These notes were universally received as readily as coin. The farmers made their purchases and paid wages with them, and immense tracts of barren land were changed into fertile cornfields. Now these £1 notes were not a substitute for any specie; they did not supersede or displace any previously existing money; they were a pure *addition* to the existing money; they were, in fact, exactly equivalent to the creation of so much gold.

"Commerce and agriculture, therefore, received their prodigious stimulus from these cash credits. But they were of equal use in a public point of view. Almost all the great public works of every description were created by means of these cash credits. One witness stated that the Forth and Clyde Canal was executed by means of a cash credit of £40,000 granted by the Royal Bank. And in exactly a similar way, whenever any other great public works are to be done, such as roads, bridges, canals, railways, docks, etc., the invariable course is to obtain a large cash credit at one of the banks.

"All these marvellous results, which have raised Scotland from the lowest state of barbarism up to her present proud position in the space of 150 years are the children of pure CREDIT. It is no exaggeration whatever, but a melancholy truth, that at the period of the Revolution 1688, and the establishment of the Bank of Scotland, that country, partly owing to such a series of disasters as cannot be parallelled in the history of any other independent nation, and partly owing to its position in the very outskirts of the civilized world, and far removed from the humanizing influence of commerce, divided in fact, into two nations, aliens in blood and language, was the most utterly barbarous, savage and lawless kingdom in Europe. And it is equally undeniable that the two great causes of her rapid rise in civilization and wealth have been her systems of national education and banking. Her system of banking has been of infinitely greater service to her than mines of gold and silver. Mines of the precious metals would probably have demoralized her people. But her banking system has tended immensely to call forth every manly virtue. In the character of her own people, in their steadiness, their integrity, their honour, Scotland has found wealth infinitely more beneficial to her than the mines of Mexico and Peru.

"Now, we observe that these cash credits which have produced such marvellous results are not based upon any previous operations, nor upon the transfer of commodities already in existence. They are created for the express purpose of creating or forming future products, which would either have no existence at all but for them, or, at

all events, they would have been deferred for a very long period, until solid money could have been obtained to produce them. Thus we have an enormous mass of exchangeable property (the £1 notes) created by the mere will of the bank and its customers, which produces all the effects of solid gold and silver; and when it has done its work, it vanishes again into nothing, at the will of the same persons who called it into existence.

"Hence we see that the mere will of man has created vast masses of wealth out of nothing, and then DECREATED them into nothing, which, having served their purpose, after a time were

'MELTED INTO AIR, INTO THIN AIR.'

"But their solid results have by no means faded like the baseless fabric of a vision, leaving not a rack behind. On the contrary, their solid results have been her far-famed agriculture; the manufactures of Glasgow and Paisley; the unrivalled steamships of the Clyde; great public works of all sorts—canals, railways, roads, bridges; and poor young men converted into princely merchants."

Like the Scotland of 150 years ago, India is starving for money, but she need starve no longer. If the poor Scottish banks of those days, with the assets of only a few shareholders behind them, could manufacture all the money required to regenerate Scotland, the Government of India with the entire property of 320 millions of people behind it, can manufacture all the money required to send India on her way rejoicing. Let me repeat, however, that it is not money which regenerates a nation but the labour of men's souls and bodies, their hand and heads: this is the real working capital of all nations, and "the fund" of Adam Smith, which supplies all the necessaries and conveniences of life. Money is only the instrument which sets the man agoing, the real capital being the man himself. A bank does not create credit; it only monetizes the credit or trust and labour which live in the man who borrows. Money is merely the instrument for switching on the productive power—the real capital which enriches a nation—Man himself.

As Mr. Gandhi, like myself, is deeply interested in the preservation of village life and the handloom, he may

be interested in hearing how the development of the linen handloom industry led to the development of banking throughout Great Britain. The story here given is taken from Graham's History of the £1 note.

"So deep had been the poverty of Scotland during the first half of the eighteenth century, and so small the amount of accumulated wealth, that even their proverbial honesty could scarcely have ameliorated the condition of our ancestors, had the note issue not stepped in to occupy the place of capital. Ignorant as they may have been of the modern philosophy of paper money, the Scotsmen of the eighteenth century keenly appreciated the opportunities which their banks placed in their way. Their credits through their notes were to them capital, not currency merely, but a fund of capital with which they could buy aud sell and realize a profit on their transactions. Conveniently enough, notes did serve as a currency, but their primary nature, in the opinion of the time, was that of capital.

"With the battle of Culloden, the hopes of the Jacobites were crushed for ever. Immediately afterwards, the King was approached by the Dukes of Queensberry and Argyle, the Earls of Lauderdale and Glencairn, Lord Provost John Coutts, the banker, and other notables, for the purpose of obtaining a charter for a new company, to be established for the encouragement of the linen trade. The time was thought opportune, as 'it was considered to be of much importance, with a view to tranquilize the country, and call forth its resources, that the attention of the Scottish people should be directed to the advantages to be derived from trading and manufacturing enterprise.' It was anticipated that, by affording the direct encouragement of a Government institution to the linen manufacture, it would become the great staple manufacture of Scotland, and would provide ample employment for the population; while extensive markets for the produce of this labour would be found within the United Kingdom and in the Colonies then chiefly supplied with linen form Germany.

"A charter was granted, dated 5th July, 1746, in which the capital was stated at £100,000, of which only £50,000 was to be subscribed for; the company having power in addition to dealing directly in linen, to do everything that might conduce to the British Linen Company.

"The new bank began business in Tweedale Court, in the High Street, and its first years and its manner of business are deeply interesting, for in them was laid that widespread system of branches which has given such an impulse to banking in Scotland. It is largely owing to the branch system that the poverty-striken Scotland of 1700 has now £100,000,000 lodged in her banks, and it was by means of the note issue,—the one pound note issue—that these branches were established and maintained. How often it is that the greatest advances in human knowledge are made by outsiders, who have not been trained in, nor had connection with, the particular profession which their genius has advanced. The sudden burst of discovery and invention that marked the period 1750 to 1800 witnessed many examples of this fact. The spinning frame was invented in 1767 by Richard Arkwright, a poor barber. In 1760, James Watt, a maker of mathematical instruments, was beginning those experiments with steam which have revolutionized the world; and the originators of the plan whereby note issues, deposits and cash credits were to receive the widest extension were the partners of a linen company. Before any idea of banking was entertained, extensive correspondence was held throughout Scotland with the weaving industries. Weaving was then chiefly carried on by the lower orders, who having little or no capital, were only too glad to work for the new company. In a very short time accounts were opened by men in every portion of the land from Shetland to London. Material was supplied to the workmen, who were paid for their labour on returning the manufactured goods. In this way the need of small amounts of capital by a vast number of individuals was satisfactorily met. Gradually, as industries gave hopes of success, new agencies were opened. By these means the Bank laid its foundations broadly and securely in such a manner that temporary pressure at one point might be relieved by support given at others. By its branch system the British Linen Company attained a circulation of its notes unknown to any of the other banks, a position which in 1845 gave it the advantage of having the largest authorized circulation of any bank in Scotland, at which time £1 notes formed 73 per cent of the entire issue of £3,000,000."

The British Linen Company is, to-day, one of the strongest of the Scottish banks; and it owes its strength to the development of its branch system and its manufacture of £1 notes which were issued to the poor handloom

linen weavers of Scotland. The one rupee note, harnessed to the raiyats and the handloom weavers of India, by the opening of co-operative bank branches throughout the length and breadth of the land, will do for India what the £1 note, based not on gold or silver but on the labour of poor reliable working men, did for Scotland.

Let India beware of Reserve Bank Acts, and gold exchange standards, and central gold reserves. The gold mines of the world are dying assets, and to claim young India to a dying gold mine would be like marrying a girl bride to a dying man.

Western financiers do not like India's power of absorbing gold: it weakens their so-called gold base : and for this reason they would like India to join their gold ring. But one of the greatest services which India can render to the world is, so to organize her own people and develop her own strength and resources that she will draw every gold bar eastwards in payment of her increased exports. For, in so doing she will teach the world that its welfare, as well as its credit, rests not on gold, but on hard work and the assets which only hard work can create.

"For God, work hard", was the advice given to the Scottish students by Livingstone, the great explorer. These four words are the only sound base of credit, and the only strong foundation for a healthy progressive State The land will still be fertile when all the good mines of the world have closed down, and India will still grow rice when the Mexican mines have yielded up their last ounce of silver. It is not by gold or silver that men live, but by labour and bread, and the word of God. Give India a banking system based not on gold or silver, or tinsel and sham, but on living men and the solid assets which their labour will create, and she will lead the world in the paths of peace and prosperity.

That a money system based on gold is "satanic" in its origin, is shown clearly in Milton's *Paradise Lost*.

Let India, therefore, beware of ribs or bars of gold, as a base of credit, lest she too lose her Paradise.

GANDHIPUR.

An ounce of practice is worth a ton of theory; and, as an object lesson in sound currency and "heavenly" finance, which Sir Bhupendra Nath Mitra and Mr. Gandhi will have no difficulty in understanding, I put forward the following proposal for the favourable consideration of Government.

If Government will provide a square mile of suitable land, and if Mr. Gandhi will provide one hundred reliable cultivators, and if Government will manufacture and lend me fifty thousand rupees in ten and one rupee notes, costing only a few rupees to manufacture, I shall hand over to Government, in exchange, a zamindary which will yield half-a-lakh's worth of crops every year, besides clothing for the people—the currency to be paid out by Government as the work progresses, so that neither the Government nor the country would run the slightest risk of the money not being made good in solid assets.

A zamindary which would provide homes for a hundred families, and half-a- lakh's worth of crops, *plus* clothing every year, in exchange for the loan of some scraps of paper costing only a few rupees, would be a good bargain both for Government and people.

The money would be returned at the rate of six per cent every year, one per cent of which would pay for the manufacture of the money and the accounting; the remaining five per cent would go towards repayment of the loan. The money would thus all return to Government, and disappear; but the zamindary yielding half-a-lakh's worth of crops every year, *plus* clothing, would remain to enrich the nation. Its name would be Gandhipur.

CLEANINGS.

A series of feeding trials was conducted at the Roseworthy Agricultural College, South Australia. The object was to determine the best economic ration for calves. Whole milk, skim milk and linseed meal, skim milk and Faterine' were compared with each other. The results, show that although whole milk is the natural food for calves the expense is far too great to use it as a ration when supplements to skim milk are available.

The calves fed with 'Faterine' showed no digestive troubles which was the case with the lot fed with linseed meal and it appeared an effective means of substituting butter fat removed from milk by the separator.

Ehrharta Villosa var Maxima:—(South African Pyp. grass) has been reported to have established itself in Australia as an excellent sand binder in regions with an annual rainfall of 16 inches and over. It is propagated by cuttings. It is a fairly good fodder. It has a decided advantage, as it ceases to continue to spread when it reaches heavy soil.

A deficiency of ***manganese*** in the soil has been determined by G. Samuel and C. S. Piper as the cause of a disease in oats in South Australia which was characterised by the dying of the tissue in the middle of the leaves.

'Rains' of fishes are not a figment of imagination as some way opine but the explanation given has not satisfied scientists. After a study of 75 records from 15 countries encircling the globe, E. W. Grudger believes that the explanation of the waterspout is the only one tenable.

APPENDIX I.

List of important books received in the college library during 1928.

Author's Name.	*Nome of Book etc.*
Baker E C. Stuart.	The Game Birds of India, Burma and Ceylon Vol. I Ducks and their allies. II Snipe, bustards and sand-grouse. 1921 (Bombay Natural history society).
Balakrishnamuiti D.	Balakrishna Readers in Telugu, Book I 1928.
Bear F. E.	Soil Management 2nd Edition 1927.
Blatchley W. S.	Gleanings from Nature.
Bower F.O. & Others.	Evolution in the light of modern knowledge 1925.
Buck J. Lossing.	An Economic and Social Survey of 150 Farms Yenshan County, Chinli Province, China June 1926.
Castle W.E. & Others.	Our present knowledge of heredity. 1925.
Clarke H. T.	Handbook of Organic Analysis 4th Edition '26.
Clarke J. W	Pumps, their principles and construction 2nd Edition 1919.
Clayton H. H.	World Weather Records, 1927.
Coatman J.	India in 1926-27.
Cole S W.	Practical Physiological Chemistry 8th edition 1928.
Comber N. M.	Introduction to the Scientific study of soil '27.
Cooper E. A. & Nicholas S. D.	Aids to Biochemistry 1927.
Corrie F. E.	Manures and Manuring 1927.
Cox H. E.	Chemical Analysis of Foods 1926.
Craib W. G.	Florae Siamensis Enumeratio Vol I Part 3 '28
Crowther J. A.	Molecular Physics 4th Edition 1927.
Davidson J. B.	Agricultural Engineering 1926 (Revised edn).
Dendy A.	Outlines of evolutionary biology 1924.
Donisthorpe J. K.	British Ants, their life history and classification 2nd Edition revised 1927.
Doolittle R.E. & others.	Official and tentative methods of analysis '25.
Drummond & others.	Lectures on certain aspects of Biochemistry 26
Edwards Dr. J. T.	Some Diseases of Cattle in India 1927.
Fabre J. H.	The Life of the Spider 1927.
Fairrie G.	Sugar 1925.
Fenton H J. F.	Physical Chemistry for Schools 1920.
Fisher C. E. C.	Gamble's Flora of the Madras Presidency 1928 Part VII.
Fraser S.	American Fruits 1927.
Freundlich H.	New conceptions in colloidal chemistry 1926.

Garrad G. H.	Principles of Dairy Farming 1926.
Gatenby & Cowdry.	Lee's Microtomist's Vade mecum 1928.
Gilman H.	Organic Synthesis Vol. 6, 1926.
Haldane Sir H.	Farming Experiences 1927.
Hegner R. W.	College Zoology, Revised Edition, 1926.
Hobbs W. H.	Earth features and their meanings 1926.
Hobhouse L. T.	Development and purpose, 1926, New Edition
Holmes H. N.	Laboratory Manual of Colloidal Chemistry '22
Holmes S. J.	An Introduction to General Biology, 1928.
Howard and Mrs. Howard.	Development of Indian Agriculture, 1927.
Jamieson A.	Elementary Manual on Heat engines—stem, gas and oil 18th edition 1924.
Jordon E. O.	Standard methods for the examination of water and sewage, 1928.
Kale V. G.	Introduction to the study of Indian Economics Vols. I & II, 6th Edition. 1927.
Kingsbury B. F.	Histological Technique. 1927.
Kinsey A. C.	An Introduction to Biology 1926.
Lacy J. M.	Hydrology and ground water 1926.
Lloyd D. J.	Chemistry of proteins and its economic application 1926.
Lynch C. A.	Science—leading and misleading 1927.
Mallory W. H.	China: Land of Famine 1926.
Marshall J. F.	Principles and Practice of Mosquito control 28
Maeterlinck-Trans by Sutro A.	The life of the White Ants. 1927.
Mendiolo N. B.	Manual of Plant Breeding for the tropics 1926
Michealis L. Trans by Perizweig.	Hydrogen ion concentration, Vol. I. 1926.
Mitra N. N.	Practical earthwork tables and calculation '18
Martin A. J.	Activated Sludge Process 1927.
Morgan T. H.	Evolution and Genetics 2nd Edition 1925.
Mukerji B.	Rasa-Jala-Nidhi, Vol. II, 1927.
Osborn H. F.	The Origin and Evolution of Life 1925.
Ostwald W.	Practical Colloid Chemistry 1926.
Pick W. H.	A short course in Elementary Meteorology 2nd Edition, revised, 1927.
Reed Sir S.	The Indian Year Book 1928.
Reese R. M.	Outlines of Economic Zoology 1924.
Richardson J. H.	Method of conducting family budget enquiries 1926.
Ripper W.	Heat Engines New Edition 1927.
Russell E. J.	Plant Nutrition and Crop Production, 1926.
Scott G. G.	The Science of Biology, 1925, 5th printing.
Seshadri P.	Handbook of Indian Universities, 1927.
Smith G. E.	Evolution of Man. 2nd Edition 1927.
Soddy F.	Science and Life, 4th impression 1929.

Spencer J. F.	Experimental course of Physical Chemistry Part I Statical & Dyanamical Experiments 21
Spillman V. J.	Farm Management 1923.
Strange W. L.	Indian Engineering, 1923.
Sudborough J. J. & James T. C.	Practical Organic Chemistry. 1926.
Sundaracharya M.	Mrigra-Pakshi Sastra by Hamsadeva, 1927.
Van Slyke L.	Fertilizers and Crops. 1927 Edition.
Von Wyes C.	Living Creatures, Studies of animal and plant life, 1927.
do.	The Teaching of Nature Study 1927.
Waksman S. A.	Principles of Soil Microbiology, 1927.
do.	Translation of Dr. Gedroize's papers on colloidal chemistry and soil science. Volumes I and II.
Whitney M.	The Soil and Civilization, 1926.
Wright L & Drew A. H.	The Miscroscope—a practical handhook 27

APPENDIX II.

DEPARTMENTAL NOTIFICATIONS FOR JANUARY, 1929.

Gazetted. Mr. R. C. Woodford, Superintendent, Central Cattle Farm, Hosur, leave on average pay till date of joining his appointment under Government of Assam. Mr. T. Murari is appointed to the temporary post of Superintendent, Hosur.

Mr. G. R. Hilson, Cotton Specialist, extension of leave for one month and 27 days on half-average pay from 1st January 1929.

Mr. H. E. R. Dunhill, Assistant Agricultural Engineer, leave on average pay for two months from date of relief.

Non-Gazetted. Appointments, transfers, etc: Mr. S. P. Fernando assistant manager, Buffalo Breeding Station, Guntur is transferred to 3rd circle Mr. T. V. Srinivasacharlu, assistant demonstrator, Kumbakonum is transferred to IV Circle on the expiry of the leave.

Leave etc: Second circle. Mr. L. Narasimhachari, manager Guntur leave on average pay for 10 days from 15th January 1929.

Third circle. Mr. K. L. Ramakrishna Rao, Cotton assistant, leave on average pay on medical certificate for two months and two days from 3rd. Mr. C. Subba Rao Nayudu, assistant demonstrator leave on average pay for one month and 16 days from 7th November 1928.

Fifth circle. Mr. T. V. Srinivasacharlu, Assistant demonstrator leave on average pay for 4 months from 1st February 1929. Mr. K. Sitarama Ayyar demonstrator, Musiri, leave on average pay for one month from 15th January 1929.

Sixth circle. Mr. C.S. Sankaranarayana Ayyar demonstrator, Sivakasi will relieve Mr. A. Ramalinga Ayya, demonstrator, Sholavandan who has been granted leave on average pay for one month from 20th January 1929. Mr. V. Ayyaswami Ayyar, assistant demonstrator, Srivaikuntam, leave on average pay for 10 days from 25th January 1929. Mr. P. R. Subramanya Ayya, assistrnt demonstrator, extension of leave on half-average pay on medical certificate for 3 months from 16th December 1928.

Seventh circle. Mr. E. K. Nambiyar manager, Kasargod leave on average pay for one month and 15 days from or after 4th January 1929. Mr. K. Govindan Nambiyar, demonstrator, Calicut, extension of leave on average pay for one month and 11 davs from 23rd December 1928. Mr. K. Soopi Haji, assistant demonstrator leave on average pay for one month from 10th February 1929. Mr. G. Sakaram Rao demonstrator leave on average pay for 15 days from 1st February '29

Eighth circle. Mr. S. Viravarada Raju, demonstrator, leave on average pay for three months from 16th January 1929.

Live-stock Section. Mr. A. Venkatarangam, manager leave on average pay for 11 days from 24th January 1929. Mr. T. V. Krishnaswami Rao manager, leave on average pay for 10 days from 19th January 1929.

C. S's Section. Mr. N. Kesava Ayyangar assistant leave on average pay for 15 days from 3rd January 1929. Mr. V. K. Subramanya Mudaliyar, assistant, leave on average pay for 9 days and extension of leave on medical certificate for one month from 3rd January 1929.

M. S's Section. Mr. N. Krishnaswami, assistant leave on average pay for one moth from 3rd January 1929.

G. A. C's Section. Mr. M. R. Balakrishnan assistant leave on average pay on medical certificate for two months from 8th January 1929.

APPENDIX III.

Mosaic Disease on Sugarcane.

The following letter dated 6th December 1928 from the President, International Institute of Agriculture, Rome to the Director of Agriculture Madras is published for general information.

" I have the honour to inform you that at the meeting of the Permanent Committee of the International Institute of Agriculture on 19th November last, M. Deeclecio de Campos, Delegate of Brazil, presented a highly interesting communication with reference to an international award offered by the " Instituto de Fomentoe Economia Agricola do Estado de Rio de Janerio " for the discovery of the cause of the " Mosaic Disease of the Sugarcane."

It is wellknown that most of the sugarcane producing countries of the world suffer serious losses each year in consequence of the ravages of the so-called " Mosaic Disease " and the position is all the more serious, seeing that up to the present at any rate, it has not been found possible to ascertain the true cause of the malady.

Hence the " Instituto de Fomentoe Economia Agricola do Estado de Rio de Janeiro" was of opinion that the time was ripe for taking special steps to attain the solution of the problem and decided on 10th May to make a special award of the value of 1,00,000 milreis (equivalent to about D. 2,400 at the present rate of exchange) to the first scientist, whether of Brazilian or other nationality, to discover the cause of the disease and a practical and effective means of its control or prevention.

Priority of discovery will be settled by the date of the telegram sent by the person interested to the office of the Director of the "Instituto de Fomentoe Economia Agricola de Estado de Rio de Janeiro" and to the Bureau of Agricultural Science of the International Institute of Agriculture at Rome, in accordance with the terms of the resolution of the Instituto de Fomento, which contains all the conditions of the award and will be printed in full in the International Review of Agriculture published by this Institute.

I desire therefore to ask you to be so good as to call the attention of the societies, institutions and individuals, which in your opinion are likely to be interested, to the present communication, with the object of securing their assistance in the solution of a problem which is of the highest importance for the agriculture of many countries.

I should be grateful also if you would kindly note that any person desiring to receive further information with regard to the award can apply to the Instituto de Fomento at Rio de Janeiro or to this Institute."