INDIAN COUNCIL OF MEDICAL RESEARCH.

Telegrams : Scientific.
Telephone : 41/318.

D. O. No. 3/1/50-R
Hutments Block No. 36 (Civil Block),
Behind South Block, Central Secretariat,
P. O. Box 494,

NEW DELHI, the 25 October 1950.

Dear Dr.Gosh,

Herewith my portion of the report. Kindly make use of it as you desire.

With regards,

Yours sincerely,

(C.G.Pandit)

Dr.J.C.Gosh,
6, Esplanade East,
Calcutta.

Copy to:-

1. Dr.K.S.Krishnan, Director, National Physical Laboratory, Pusa Road, New Delhi;
2. Dr.Baini Prasad, Fisheries Development Adviser, Ministry of Agriculture, New Delhi;
3. Dr.B.N.Pal, Joint Director, Indian Agricultural Research Institute, Pusa, New Delhi.

(C.G.Pandit)

A note on medical research organization

University of Trivandrum.

In the year 1937, the University of Trivandrum was founded and the Department of Research was instituted in the same year to promote researches in several subjects under the auspices of the newly established University. In 1939, on the recommendation of a Special Committee, a Central Research Institute was brought into being for the specific purpose of co-ordinating research work of various existing institutions in the State. In the report of the Department of Research, the work in medical fields is described under the division of preventive medicine. This specifically deals with the work carried out by the public health laboratory which is now regarded as one of the constituent units of the Central Research Institute.

It is necessary here to briefly review the history of the Public Health Laboratory. As mentioned in the Septennium report, the Public Health Laboratory was constituted primarily to meet the needs of the Public Health Department along with the re-organization of that department in 1932. The Laboratory was then an integral part of the Public Health Department and was under the administrative control of the Director of Public Health. After its transfer to the University as one of the major units of the Central Research Institute, the laboratory continued to render the same type of service as it had been called upon to do, when it was under the control of the Public Health Department. These functions have remained the same since then.

The activities of this institution can be summarized under the following main heads:-

(1) A Clinical Pathological Laboratory;

(2) A laboratory for the manufacture of essential biologicals, such as, anti-rabic vaccine, small-pox vaccine and cholera TAB and other bacterial prophylactic vaccines;

(3) A section of nutrition; and

(4) Other miscellaneous activities.

It may be mentioned that most of the activities carried on in the laboratory are of a routine nature. The section of nutrition, however, according to the report quoted above, was designed specially for promoting research in the nutritional problems in general and those relating to the State in particular. Some of the activities which this laboratory was called upon to perform before its amalgamation with the Central Research Institute, for example, the public

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water analysis section, public analyst section and water analysis section were transferred to the applied chemistry department of the Central Research Institute.

A review of the research activities in the Public Health Laboratory:-

The volume of the routine work, which this laboratory is called upon to perform, is apparent from the detailed account given of the activities under several sections listed above. The report referred to above itself points out that "volume of the routine work has increased rapidly and new items have been added without any substantial increase in the staff." The pressure of this work has had its repercussions on the research activity of the laboratory. The problems dealt with have arisen in the course of the routine work and were investigated mostly as a spare time activity. It is unnecessary here to review these various subjects in detail on which research was undertaken. It would appear that none of the research schemes have been actually carried to fruition. As the authors of the Septennium report point out, "some of these studies would have been fuller and more useful had there been more leisure and better facilities for research."

The salient features in the inception and development of Public Health Laboratory have been described above. The question which prominently comes to our mind at this stage is, to what extent the new arrangement has contributed for the promotion of medical research under the auspices of the University. From the record of work listed above, we have reluctantly come to the conclusion that medical research has not advanced materially in the University by the amalgamation of the Public Health Laboratory as an integral part of the Central Research Institute. It still functions in reality as a part of the Public Health Department but without the added advantage of the support which that department would have been able to give in matters of promoting research, at least in the public health fields. In considering our recommendations for the reorientation of the policy vis-a-vis this institution, we have also to take into account some recent developments which were brought to our notice by the Surgeon General with the Government of Travancore. We were told that in the additional wing especially built for the purpose, the Public Health Laboratory would be called upon to undertake the teaching of students for the diploma course in bacteriology and Hygiene. We were also informed that the University of Travancore had

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already decided to establish a full-fledged medical college in Trivandrum, plans for which had been drawn up and approved. We feel that in making our recommendations with regard to the promotion of medical research in the University, these two developments have also to be taken into account. It would be necessary in that case to visualise the role to be played by the Public Health Laboratory as such in the new set-up.

We feel that when the above developments are materialised, the University of Trivandrum will have unique opportunities to develop a medical research programme on sound lines. The University will possess, in the first instance, a full-fledged department of bacteriology in charge of a Professor. We specifically mention this because in many universities the departments of pathology and bacteriology are under the charge of one university professor, i.e., the professor of pathology. In view of the peculiar conditions which exist in Trivandrum, we suggest that there should be a separate chair of bacteriology in the University. The Professor of bacteriology would then be able to guide not only research activities in his own department in the medical college, but would also be able to help materially the development of a field research programme in the public health laboratory. In this manner the under-graduate students of the University would be able to learn the basic principles of preventive medicine in all its aspects, particularly the special problems relating to the State. The Professor of Bacteriology will also be conversant with the epidemic prevalence of diseases in the State, and would be able to transmit practical experience to the students in the teaching of preventive medicine. In making this recommendation we have considered the general set-up which one of us had opportunities to see in the University of Rochester(U.S.A.).

To quote:

> "The arrangements in Rochester were in some sense unique. Apart from the Strong Memorial Hospital which is the teaching hospital of the university, facilities provided by the Municipal Hospital which was situated very close to the former were utilised for the purpose. This Municipal Hospital unlike those in any other state, was part of the University and was administered as such. In its maintenance the city contributed a certain sum to the budget of the medical school on a pro rata basis of the total hospital expenditure. The city had no control whatsoever over the staff of the hospital and had no hand in directing any policy connected with its administration. This hospital provided beds for poor patients as well as for cases of some infectious diseases. In the main building of the school and the hospital were also housed the health bureau laboratories. These were regarded as part of the department of bacteriology. These laboratories were utilised for the training of public health laboratory workers and non-medical graduate students working for postgraduate degrees, such as Ph.D., M.Sc. etc. The students were also given routine work in the laboratories. Another important feature which should be mentioned was that the above laboratories were also a part of the

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"New York State Public Health System. The combination of the health laboratories with the University department of bacteriology provided a scientific basis to the general health programme in the city and t the State. Frequent conferences with all health officials resulted in measures being undertaken to investigate outbreaks of epidemic diseases and the institution of suitable preventive measures. The department of bacteriology and the laboratories mentioned above were all under one head, namely, the Professor of Bacteriology. The Professor could thus see the whole epidemiological picture of diseases occurring in the state. This arrangement greatly facilitated the teaching of preventive medicine."

If the University of Trivandrum were to adopt some such sort of a scheme, they would have made an interesting experiment for the first time in the teaching of preventive medicine in India. It is assumed, of course, that any arrangements envisaged on the lines indicated above would automatically bring some senior member of the staff of the Public Health Department in association with the teaching of hygiene in the university and in this manner the work of all the medical departments can be co-ordinated to the mutual benefit of both the university as well as the Public Health Department of the State. If these suggestions are accepted, it would not be necessary to disturb the existing arrangement whereby the Public Health Laboratory is a part of the university and not of the Public Health Department.

It is realised, however, that it would take some time before these developments are materialised. In the interim period the arrangement suggested by other members of the Board for co-ordinating research work in universities through the constitution of a special council should be accepted. The officer-in-charge of the Public Health Laboratory should be a member of the Council and should work in close cooperation with other university departments as well as the Public Health Department to further the interest of medical research in the State, both in basic as well as in applied fields.

It is needless to add that both in the interim period, as well as later, provision will have to be made for staffing the laboratories adequately, so that workers will have ample leisure to devote sufficient time for research activities. In this connection we feel that we must draw attention to the specific budget provision which is made for the work of the Public Health Laboratory. As indicated in earlier section of this report, the Public Health Laboratory is rendering and will have to continue to render the same type of service in public health aspects for the Public Health Department of the State, namely, diagnostic service and manufacture of essential biologicals. The major portion of the budget of the laboratory is necessarily

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assigned towards meeting of expenditure for these purposes. We feel that in the interest of research a certain specific sum should be ear-marked for research purposes, so that the university may have a correct appraisal of what is spent on research proper and may be able to gauge correctly the research activities of the department from year to year.

D.O.No. 299.
EASTERN HIGHER TECHNICAL INSTITUTE
KHARGPUR, B.N.RY.

October 30, 1950.

My dear Dr Paul,

I shall be very glad if you will kindly send me your final notes on the Travancore University Research Institute, at a very early date for incorporation in my report.

With kind regards,

I am,
Yours sincerely,

J C Ghosh

(J. C. Ghosh)

Dr. B.N.Paul,
Jt. Director,
Indian Agricultural Research Institute,
Pusha, New Delhi.

EXPRESS/STATE/telegram

INDIAN AGRICULTURAL RESEARCH INSTITUTE
NEWDELHI

IV-1 DOCTOR PAL FROM DOCTOR GHOSH AAA
REQUEST EARLY SUBMISSION OF YOUR REPORT FOR
TRAVANCORE INSPECTION COMMISSION

------- TECHNOLOGY

(J.C.Ghosh)
Director, Indian Institute of Technology,
Kharagpur, BNRy, the 22nd Nov.1950.

Copy by post in confirmation to:

Dr B. N. Pal, Joint Director, Indian Agricultural Research Institute, Pusa, New Delhi. This has reference to my letters of the 30th October, 1950 and of the 16th November, 1950. It is requested that the report for the Inspection Commission for the Central Research Institute, University of Travancore, be furnished without further delay.

NO. I.I.T. 699-700.
22/11/50.

22.11.50.
(J.C.Ghosh)
Director, Indian Institute of Technology.

No. 22T/618.

Telegram: "Technology, Kharagpur." Telephone: Hijli 473

GOVERNMENT OF INDIA

INDIAN INSTITUTE OF TECHNOLOGY

KHARAGPUR (B. N. Rly.)

The 16th November 1950.

My dear Dr Pal,

I wonder if you have received my letter of the 30th October. I am anxious that the report of the Inspection Commission for Central Research Institute, University of Travancore, should be submitted without further delay. I shall be very glad if you will kindly send me your final notes at a very early date for incorporation in my report.

I hope, you are doing well.

I am,

Yours sincerely,

J.C.Ghosh

(J.C.Ghosh)

Dr B. N. Pal,
Jt Director,
Indian Agricultural Research Institute,
Pusa, NEW DELHI.

Submitted.

21/11 / 21/XI

1. A review of the origin of the Central Research Insitute in Trivandrum;
2. The ~~xixx~~ difficulties that face the organization in the developmental stages;
3. Review of the research work carried out under the auspices of this Institute;
4. Defects in the organization of this Institute;
5. Recommendations.

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1. First difficulty was that with reference to the staff and the staff was asked to do work which really was not pertaining to their normal duties of research organization;

2. Lack of equipment due because of the war;

3. The lack of accommodation in initial stages

4. Defects of the organization:

(i) The Director of Research however eminent he might be, cannot guide research to appreciate the ~~f~~ value of research carried out in several branches of science;

(ii) Also, a Director of Research, if he holds a long term appointment, human nature as it is, privately might be interested .....

(iii) Difficulties as mentioned in Sec. (ii) whole work is overloaded with routine duties and a little time is left for research in the strict sense

(iv) That possibly it will stabilize the positions as the research workers have taken over these as duties which should have been left over to other organizations

(v) Recommendations:

We recommend that where limited funds are available for research the maximum research should be obtained by that. For that a co-ordinating authority is necessary in the State for developing research activities. We think that this can best be done ~~fax~~ by having four research divisions as integral parts of a Central

Research Organisation.

1. Applied chemistry and industrial research;
2. Agriculture research;
3. Medical research; &
4. Modern biology and fisheries research.

We recommend that for each of these divisions, there should be a research Professor, who should be responsible for guiding all research activities in the State in his subject.

For co-ordinating the research activities, we recommend that a co-ordinating committee of the Council of Research should be constituted consisting of the Vice Chancellor and Chairman, the four professors as its ex-officio members and one representative of the Council of Scientific Research. The co-ordinating committee will elect every year from among the professors of research, a Vice Chancellor to whom such executive powers of co-ordination will be delegated as will be constructed by the co-ordinating committee. This co-ordinating committee should work in the very closest co-operation with the Council and with the executive bodies of the University. These professors of research should ex-officio professors of the University and should take part in the teaching, post-graduate teaching and for the guidance of research work in the University.

No.23518

30th November, 1952

Dear Dr. Ghosh,

I regret very much the delay in sending you my notes on the Travancore University Research Institute and now have pleasure in enclosing these. These are in a draft form to enable you to make the necessary changes and incorporate them in your consolidated report.

I enclose separately a statement showing tapioca cultivation expenses based on conditions existing in Travancore in 1950 as I think you wished to have this information. This is based on a note supplied to me by Dr. Abraham.

With best wishes and kind regards,

Yours sincerely,

30/11

(B.P.Pal)

Dr.J.C.Ghosh, DSc, FNI,
Director,
Indian Institute of Technology,
6, Esplanade East,
CALCUTTA.

Enclos:

Note for the report of the Inspection Commission for the Central Research Institute, University of Travancore.

The work relating to agriculture and biology, which was seen by me can be considered under the following heads :

(1) Research pertaining to agriculture:

(a) Economic botany: This is the largest and the most important section of the Central Research Institute dealing with agriculture. The history of this section, which ~~rigidly~~ originally formed part of the Department of Agriculture, is given in detail in the septennial report of the Department of Research. The most outstanding work of the Section recently has been that on tapioca. As far as I know, work on this crop on this scale is not being done anywhere else in India. This work derives its inspiration mainly from Dr. A. Abraham, who was in charge of the Economic Botany Section for some years and is now Professor of Botany in the Travancore University. At present also he exercises technical supervision over the work. The main work at the Tapioca Farm comprising an area of about 15 acres (20 more acres are to be acquired) is situated in Trivandrum. Nearly 200 varieties and hybrids are under study, the largest collection being from Travancore itself. The collection, however, includes foreign varieties from Brazil, Malaya, etc. While the average yield outside is 4 to 5 tons per acre, on the farm it is about 10 tons per acre. Individual plants on the farm have given as much as 130 pounds each. A ~~The~~ number of promising varieties are now available for final testing and distribution. Interestin work is being done on the genetics and cytology of tapioca. Selection has been done to get pure strains which will be further crossed to obtain hybrid vigour. ~~Such~~ Since tapioca ~~if~~ is vegetatively propagated it would be easy to ~~expoi~~ exploit hybrid vigour in this crop. An interesting line of work is that of crossing tapioca with ceara-rubber. The hybrids of this crop have been back crossed to the tapioca parent. The desirable characteristics.....

characteristics obtained from the ceara-rubber are longer tubers and more convenient disposition of tubers. A five year scheme of research on the breeding and cultivation of tapioca has been submitted to the Indian Council of Agricultural Research. Trials of tapioca hybrids are also being conducted at Chengannoor in central Travancore.

Paddy breeding was undertaken in the earlier years and has continued at Kayamkulam under the Central Research Institute and also elsewhere under the Department of Agriculture. Some assistance with regard to rice scheme was obtained from the Indian Council of Agricultural Research.

Work is also in progress on sesamum and one or two other plants. More recently at the Tapioca Farm work has been started on sweet potatoes and the related species of Ipomea, also on banana and pineapples.

(b) Plant pathology:

Most attention has been paid to the diseases of the coconut palm and this work has been done mainly with the assistance of a grant from the Indian Council of Agricultural Research. Under this scheme a plant pathologist and the requisite subordinate staff were provided. The work on coconut diseases will now be taken up by the newly established Indian Central Coconut Committee.

Work is also in progress on bunchy-top diseases of plantains and cardamum diseases etc.

(c) Entomology:

The Entomology Section was also originally organized in the Department of Agriculture. In 1939 it was transferred to the control of the Department of Research and was incorporated in the Central Research Institute along with other sections dealing with agricultural investigations and research. The work is now centralised in Trivandrum and there is a rice swarming caterpilla station at Pallom. Temporary stations have also been set

up some.....

up from time to time for work on special problems such as those relating to cardamum thrips.

An insect collection is maintained in the Entomology Section.

(2) Other biological research:

There is a small Section of Pharmacognosy. This consists of a small unit to identify the plants used in Ayurvedic medicine The work is controlled by a small committee ~~consisting~~ which includes the Professor of Ayurveda. Systematic work is being done by Mr. Narayan Iyer. Work in progress includes biochemi--cal assay, drawings are made and Indian names are catalogued.

(3) University Department:

I also visited the Botanical Laboratory where Professor Abraham and his postgraduate students are engaged on cytogene--tical studies. In these studies material grown at the Tapioca Farm is utilized. The close cooperation between the Department of Botany and the Economic Botany Section of the Central Research Institute has been beneficial to both and has resulted in good work. This is, however, based on personal relationship and the fact that Dr. Abraham was previously in charge of the Section of Economic Botany. The Botany Laboratory, which is now in a new building, is well equipped.

I also paid a brief visit to the Department of Zoology, which also is housed in the new building and is also well equipped.

(4) General:

The system of bringing together the departments dealing with applied research is one which can prove beneficial when the departments concerned are in the initial stages of development and there is no doubt that the Central Research Institute has done good work. It is rather doubtful, however, whether taking a long time view of the research required by the Agriculture Department for instance can be undertaken by the Central Research Institute. If this attempt is made it would mean that the Agriculture Department would be left only with extension work and all research would be centralised in the Central

Research.....

Research Institute. In order to do this, however, the Central Research Institute would need a number ~~mx~~ of stations for work on different crop plants and it will have to expand very considerably. There is no doubt in my opinion that ultimately the Agriculture Department will have to have its own research institute and ultimately there may also be an agricultural college. In that case a set up similar to States like Bombay and Madras, where the Department of Agriculture maintains a research ~~ix~~ institute and an agricultural college, the latter affiliated with the local university, will perhaps be ~~x~~ the model most advantageously to be adopted. At the same time the Central Research Institute has done good work and its tapioca work has been outstanding. For the present, therefore, I think the Central Research Institute should supplement the work of the Agriculture Department on a few well defined items, of which tapioca should be one. Certain new lines of work have been started at this farm as mentioned earlier, e.g. on bananas, pineapples, and sweet potatoes. It would be better not to increase the number of crops dealt with beyond what is being investigated at present in order that the standard of work may be maintained.

I agree with the views of the other members of the Commission that there should be four research divisions forming the integral part of the Central Research Institute, namely :

(i) Applied Chemistry and Industrial Research;
(ii) Agricultural Research;
(iii) Medical Research; and
(iv) Biology and Fisheries Research,

and for each of the subjects there should be a Research Professor who will be in charge of the Division. To assist the Professor there should be two officers in the Lecturer's grade, one of whom will also act as Liaison Officer to coordinate work with the Agriculture Department of the State. Demonstrators, Laboratory Attendants, etc. should be provided on the usual scale. For the farm, ~~it~~ which will be mainly a tapioca farm,

there should.....

there should be a Farm Manager, a Research Assistant, a Junior Scientific Assistant, a Fieldman, a Mali, and a Chowkidar. Contingencies will depend on local conditions and these can best be worked out by the local authorities.

---oOo---

Tapioca Cultivation Expenses - based on conditions existing in Travancore, 1950.

Labour

	Rs. as.p.
1.First preparation of the land (digging) 10 men @ Rs 2/-	20- 0-0
2.Making pits and manuring: 7 men	14- 0-0
3.Preparing cuttings and planting: 5 men	10- 0 -0
4.First intercultivation and application of ash: 5 men	10- 0-0
5.Second intercultivation and application of manure: 5 men	10- 0-0
6.Weeding and heaping of soil round each plant: 5 men	10- 0- 0
7.Harvesting: 7 men	14- 0- 0
Other expenses	
8.Cuttings - 7 bundles of 100 stems each @ Rs 5/- per bundle	35- 0- 0
9.Cowdung 10 cartloads (of 25 cu.ft.each) @ Rs 7/-	70- 0- 0
10.Ash - 50 measures (each of one kerosene tin capacity) @ Re.1/-	50- 0- 0
	243- 0- 0

In round figures: Rs 250/-

Yield at 5 lbs. per plant, 3,000 plants to the acre: 15,000 lbs

Present price is 6 ps. per pound: Total price Rs 468-12-0

Net profit Rs 220/- per acre, if the land is owned by the cultivator, otherwise, rent of land ½ (Rs 80-100 per acre) has to be deducted from this.

Usual planting per acre is 3,500 cuttings. This will give a final stand of about 3,000 plants. Cost of stems for planting is included only if it is planting in new area. Otherwise stems from the previous harvest will be available.

Dried chips (raw dried or par-boiled and dried) fetch a better income. Usually the dried product will be a third of the weight of the raw tubers.

Tapioca cultivation expenses - based on conditions existing in Travancore, I950.

Labour.

	Rs. as. p.
I. First preparation of the land (digging) IO men @ Rs.2/	20 - 0 - 0
2. Making pits and manuring. 7 men.	I4 - 0 - 0
3. Preparing cuttings and planting. 5 men.	IO - 0 - 0
4. First intercultivation and application of ash. 5 men.	IO - 0 - 0
5. Second intercultivation and application of manure. 5 men.	IO - 0 - 0
6. Weeding and heaping of soil round each plant 5 men.	IO - 0 - 0
7. Harvesting. 7 men.	I4 - 0 - 0

Other expenses.

8. Cuttings -7 bundles of I00 stems each @ Rs.5/ per bundle.	35- 0 - 0
9. Cowdung IO cartloads (of 25 cu.ft each) @ Rs.7/	70 -0 - 0
IO. Ash - 50 measures (each of one Kerosene tin capacity) @ Re. I/	50- 0 - 0
	243- 0 - 0

in round figures. Rs.250/-

Yield at 5 lbs per plant, 3,000 plants to the acre - I5,000 lbs.

Present price is 6 ps per pound. Total price. Rs.468-I2-0

Net profit Rs. 220/ per acre, if the land is owned by the cultivator, otherwise, rent of land (Rs.80-I00 per acre) has to be deducted from this.

Usual planting per acre is 3,500 cuttings. This will give a final stand of about 3,000 plants. Cost of stems for planting is included only if it is planting in new area. Otherwise stems from the previous harvest will be available.

Dried chips (raw dried or par-boiled and dried) fetch a better income. Usually the dried product will be a third of the weight of the raw tubers .

A. Abraham.

(A.Abraham) 20/2/50.

History of the Postwar Industries Schemes

of the Government of Travancore,

undertaken by the Central Research Institute.

The postwar Reconstruction Committee was constituted by Government in June, 1944, with the Dewan as Chairman and the Director of Research, the Electrical Engineer to Government, the Chief Engineer or his nominee, the Director of Agriculture, the Director of Industries and the Secretary to Government in the Development Section as members. The Secretary to Government was the Convener of the Committee.

The main object of this Committee was to formulate proposals for postwar reconstruction in the State and to avoid overlapping of activities, duplication of staff and equipment and undue waste of time and money by co-ordinating the work of the different departments engaged in carrying out development schemes. The Committee was also entrusted with the task of examining new research schemes submitted by departments or private bodies and of sending up reports from time to time to enable Government to take final decisions and to gauge the progress of work already undertaken.

The first meeting of the Committee was held on the 19th June, 1944 and the Chairman in his address to the Committee indicated in broad outlines the various Postwar Schemes to be undertaken by the different departments of Government, and also pointed out the extent of financial assistance that might be available. The various schemes were classified under 4 sections and the following Sub-Committees were appointed for the respective sections:

1. Hydro-electric power.
2. Postwar Industries Development.
3. Agriculture and increased production of foodstuffs.
4. Road Transport.

The parent Committee did not meet subsequently and three of the Sub-Committees also do not seem to have transacted any

business at all. The only Sub-Committee which functioned actively is the Postwar Industries Sub-Committee, the object of which was to consider and report upon schemes and proposals for the industrials advancement of the State. The Director of Research was the Convener of this Sub-Committee and the other members were

1. The Director of Industreis
2. The Chief Electrical Engineer
3. Mr.C.P.Ogale, The Director of the Ogale Glass Works

& 4. Mr.A.G.Pandit, Manager of the Travancore Rubber works.

In November, 1944, Government nominated Shri.K.Madhava Kurup, Registrar of Co-operative Societies, Shri.K.N.Madhava Panikkar, Ceramic Expert and Shri.P.S.Narasimha Iyer, Manager, Punalur Paper Mills as additional members. In November, 1946 this Sub-Committee was re-constituted and some members of the Legislature were also included as members. In this re-constituted form the Sub-Committee consisted of

1. The Director of Industries.
2. The Chief Electrical Engineer.
3. Mr.M.L.Janardhanan Pillai.
4. Mr.T.M. Chithambarathanu Pillai.
5. Sahib Bahadur K.A.Mahomed.
6. Mr. P.S.Narasimha Iyer.

& 7. The Director of Research (Convener)

The Registrar of Co-operative Societies and the Ceramic Expert continued to be co-opted members of the Committee. Messrs.P.S.George and J.G.Gill were also co-opted to represent specific industries.

Between June, 1944 and August 1948 the sub-committee held 18 meetings, and recommended a number of schemes for consideration of Government. Of these nine schemes were sanctioned, and others are pending consideration.

Though all these schemes were worked in the Central Research Institute under the guidance and supervision of the Director of Research and the Heads of Divisions, the University of Travancore had no control over their finance or administration. In all matters concerning these schemes the Director of Research dealt directly with Government and this necessitated the creation of a separate office consisiting of a Secretary, an Accountant, two Clerks and a Typist to assist the Director of Research in the maintenance of accounts and records of the Postwar Industries Sub-Committee.

Under such an organisation the Postwar Industries Schemes functioned till the beginning of 1948, when as the result of political and other changes the Postwar Industries Sub-Committee ceased to function, and though recommendations were sent up to Government for reconstituting the Committee, decision was delayed and finally Government ordered that the Postwar Industries Sub-Committee may be abolished and that the office staff of the Sub-Committee be retrenched in toto. But still provision was made in the Budget for the continuance of the schemes. This meant that the large volume of correspondence with Government relating to these schemes had to be continued, all accounts had to be maintained, budget estimates and reports had to be prepared and the progress of the various schemes had to be reviewed at regular intervals. All these items of work which were formerly attended to by a Sub-Committee consisting of seven members and an efficient office staff had to be carried out by the Director of Research with only the over-time assistance of my office staff. This unexpected turn of circumstances trebled the responsibilities of the Director of Research who even otherwise had to shoulder the duties and responsibilities of two offices, namely, the Director of Research and the Professor of Marine Biology and Fisheries.

Moreover, as the result of administrative changes which followed the various schemes got allocated under different portfolios and in this reorientation their original perspective became some what blurred and distorted. The postwar schemes entrusted to the Central Research Institute were pure research schemes intended only as the basis for future industrial development. The results obtained during the investigations, if found practicable were to be placed at the disposal of Government departments to be used to the best advantage of the State. In other words, the Central Research Institute like similar institutes in other parts of the world was only charged with the task of encouraging the application of science in industry and not with the responsibility of undertaking large-scale development programmes for which the Institute does not possess the necessary facilities or staff. But unfortunately this position was misunderstood. Immediate results of statewide benefit were hoped for and when it was found that the schemes fell short of these high expectations, both the Government and the responsible public became sceptical about the possibilities and advantages of these schemes. The ultimate result was that Government sanctions were withheld or delayed in respect of many items which needed prompt attention and the schemes were allowed to drift on like a rudderless ship in an ocean of reactionary xxxxxx storms.

A few instances will illustrate this unfortunate position.

A state-wide survey of the Coir Industry was carried out under the guidance and supervision of the Bureau of Statistics at considerable expense to Government. But when all the data had been collected and the field staff disbanded it was necessary to appoint a few compilers and a Statistical Assistant for a short period to analyse the large mass of data and to prepare the material for drawing up the report. Sanction for this last and essential item of work was, however, withheld and the result was that the general public, unaware of the

actual position, began to comment that the Coir Survey was a miserable failure.

A few years ago a scheme for the distillation of essential oils was sanctioned by Government and arrangements were made for the purchase of stills and boilers for setting up a pilot plant. It is needless to add that for a country like Travancore which abounds in spices and which holds the world monopoly in lemon grass oil, any scheme for the manufacture of essential oils is bound to be of great industrial importance. But when all the preliminary investigations had been completed and promising results obtained the scheme was nipped in the bud by withholding sanction for its continuance.

Five years ago, the Central Government agreed to give financial assistance to the Government of Travancore for starting 4 research schemes intended to find out methods for improving the fish industry of Travancore.

The history of these schemes furnishes an outstanding example of the unfortunate consequences of administrative delays and the consequent mis interpretation of objects and achievements. Though the schemes were approved by the Government of India early in 1945, nearly 1½ years passed before administrative sanction was accorded by the Government of Travancore for starting work. Even after that, specific sanctions for each item of work was so delayed and the constructive programmes so much deferred, that the end of three years saw the schemes in an unfinished condition in spite of the earnestness, enthusiasm and anxiety of those entrusted with the execution of these schemes. The delays somehow tended to obliterate the original aims of the schemes and the public started giving new interpretations to the grant made by the Government of India. Some said that the Government of India had given a large grant for improving the social and economic condition of the fishermen and that this amount was diverted to other channels to satisfy the whims and fancies of a few

favoured individuals; others thought that the schemes were part of the Grow-More-Food programme launched recently by the Government of India and asked for statistical data regarding the actual increase in production which had resulted from the working of these schemes, little realising that at the time when these research schemes were sanctioned the Grow-More-Food programme had not even been thought of. However, these cross-currents of public misconception exercised a psychological influence in forming new impressions which even threatens to terminate these schemes.

Research is like a tender shoot which can survive and bring forth fruit only in a congenial environment combining steadfastness of purpose, constancy of control and promptness of action. If it is subjected to frequent changes in administrative policy, or to the adverse criticism of Council Members, who may not always be inspired by disinterested motives, the result will be stagnation or distortion and ultimate failure in the achievement of objectives.

This is the main reason why in other countries research Institutes and those engaged in research activities are completely sheltered from parliamentary comments or criticisms even at the time of demand for grants. Even in India grants to the I.C.A.R., C.S.I.R., and other research organisations are never seriously questioned in Parliament. Government and the people have confidence in the research workers, be they the bright luminaries of the world of science or the humble workers toiling day and night in some obscure corner of a laboratory with their books and problems. Sympathy, forbearance and patience are essential for the success of research and this can be ensured only in a calm academic atmosphere free from mistrust or lack of sympathy.

II. Brief Account of the Post-War Schemes.

A. SANCTIONED SCHEMES NOW WORKING.

1. Model Salt Factory:

Travancore is a salt producing country and salt is produced by solar evaporation of sea brine or high density brine obtained from pits and tube wells. There are at present nineteen salt works owned and managed by 222 licensees and distributed over a total area of 577.51 acres along a narrow strip of sea board on either side of the Cape. The average annual production during the last eight years is 16,68,539 maunds which is just sufficient for meeting ~~the~~ our total requirements

The question of increasing the production and improving the quality of the product has been engaging the attention of Government and experiments were started by the Industries Department as early as 1931. The Central Research Institute followed up these experiments and in 1945 evolved a new and efficient method of producing salt of high purity, equal to the best solar salt produced in Europe and America. The ~~me~~thod is such as can be easily adopted for large scale manufacture ~~of saline im~~ The salt produced by this method contains only 0.6 per cent of saline impurities, 0.2 per cent of insolubles and 5.8 per cent of moisture. Besides producing pure salt the new method enables the recovery of bye-products such as gypsum, potassium salts etc.

To demonstrate the advantages of this process, a small scale Model Salt Factory was set up at Thattarippu odai early in 1122 and is now being worked as one of the Postwar research schemes. This factory which is taken on lease, covers only an area of 8 acres and according to the terms of the agreement half the entire output is to be given to lessor as rent for the

saltern. So even though the Model Salt Factory produced 23,080 bags of salt till the end of 1124 the actual income to Government was only Rs.28,850/- against a total expenditure of Rs.65,060/-. Thus it will be seen that owing to the limitations of the experimental saltern and the heavy operational cost involved in the maintenance of the trained technical personnel it has not been possible to make a substantial revenue from the improved technique of production. But profit motive was at no time very strong in this research endeavour which was solely directed towards the furtherance of the salt industry in the State on scientific lines.

It is a matter for deep gratification that the results achieved by the Department have been appreciated by all the technical experts who visited the Model Salt Factory, including the Salt Experts Committee of the Government of India. The Salt Experts Committee were in fact so much taken up with the aims and objectives of the factory and with its potential value as a demonstration centre that they envisaged the possibility of converting it into a Central Salt Research Station sponsored by the Government of India and the local Government. What is perhaps even more gratifying than all praise of the experts is the increasing realisation by the licencees themselves of the efficiency of the University method.

2. Soil Survey Scheme:

The object of this survey is to determine the manurial requirements of all cultivated soils of the State. Though this work was started as early as 1920, owing to limitations of staff and equipment, only one fourth of the cultivated area was covered during the first twenty five years. The usefulness of these surveys to practical agriculture and their importance in assessing natural soil resources having been well recognised, Government sanctioned early in 1945, a scheme for speeding up the soil survey work as part of the postwar development programme entrusted with the Department of Research. Two Assistants

were additionally appointed under the Agricultural Chemist of the Department of Research and additional equipment provided. With this additional staff it is expected to finish the survey work of at least two taluks every year. The Soil Survey of Vilavancode Taluk has been completed and a report embodying the results of this survey has been published. The survey of the Neyyattinkarai Taluk was completed in 1124 and the staff is now engaged in studying the soils of Kuttanad.

A special soil survey scheme was also sanctioned by Government in 1945 to investigate the suitability of the bed of the Kayamkulam lake for paddy cultivation. Representative soils samples were collected from the lake bed and analysed. A detailed report on the investigation has been prepared and submitted to Government with specific proposals for reclaiming part of the lake bed for paddy cultivation.

One of the Assistants appointed under this scheme, who was sent up for training in soil microbiology in the Indian Agricultural Research Institute, New Delhi, recently returned after completion of his studies.

Realising the necessity for co-ordinating soil survey work throughout India on a uniform basis, the Indian Council of Agricultural Research convened two meetings of an Ad Hoc Committee of Soil Chemists from all parts of India. The Agricultural Chemist in charge of the Soil Survey work in Travancore attended these meetings. The committee drew up lines of procedure to ensure uniformity in work all over India, and in accordance with these proposals the agricultural chemist has submitted a scheme for the survey work in Travancore.

A sum of Rs.11,938/- has been spent under this scheme till the end of 1124.

3. Fisheries Development Schemes:

On the advice of the Fisheries Development Adviser to the Government of India, who visited Travancore in 1944 to study the conditions of the Fisheries in the State, the Professor of

fish were also introduced into them. A set of 9 uniform culture ponds each sub-divided into four secondary ponds was completed for statistically designed experiments on fish growth in relation to chemical manuring of ponds. 270 inland tanks belonging to private ~~ehw~~ owners were also surveyed and stocked with fish fry ~~and~~ e in order to demonstrate to the owners of private tanks the scope and possibilities of inland fish culture. Several biological problems relating to the life history, growth and feeding habits of the fishes are also under investigation.

Group II - Deep Sea Fishing:

In June, 1946 the Government of Travancore purchased a 75 ft. Motor Vessel from the Assistant Regional Commissioner, (Disposals) Cochin. This vessel which was used during the war for mine sweeping was converted into a fishing vessel. After completion of repair, refitting and overhauling, the vessel was brought to Vizhinjam which was selected as the base of the fishing operations. This ship is intended for moored vessel fishing, a method which is very popular in Spain, China and Malaya. The ship takes in tow a number of small fishing boats and on reaching the fishing ground the parent vessel remains moored at a spot while the fishermen conduct fishing from their boats and bring the catches to the vessel where it is preserved and stored. This helps the fishermen to stay out at sea for longer periods and ensures better catches. Eight trial trips were conducted during last season but as the ship needed some more repairs the work was interrupted. However, these trial trips amply demonstrated the possibilities of moored vessel fishing and also succeeded in charting out some of the important fishing grounds. On the basis of the results obtained the West Coast Fisheries (Travancore) Ltd., have started trawling and moored vessel fishing and it is interestint to note that during their operations this year moored vessel fishing gave much better results than mechanised trawling.

The advantages of moored vessel fishing is that it not only helps to increase output but also benefits the fishermen directly by helping them to earn much higher income. Thus in spite of the chequered history of this scheme it has succeeded in paving the way for increasing fish production.

A Model Fish Curing Yard intended for demonstrating hygienic methods of fish curing is under construction at Cape Comorin. This should have been completed in 1948 according to programme. But unavoidable delays in acquisition, procurement of building materials .etc. prolonged the work so that even today the P.W.D. have not completed all items of construction.

Group III - Chemical Investigation:

Researches conducted by this section have shown that heat insulation boards, which compare favourably with cork boards can be manufactured out of cocoanut pith. Finding that this material is relatively cheap and at the same time efficient the West Coast Fisheries (Travancore) Ltd., on the advice of their Refrigeration Engineers, have asked for the supply of sufficient quantities of this material for insulating one of the large cold storage chambers of their proposed cold storage plant and also for insulating their fish transport boxes and refrigerated vans and ship's hold. Other investigations such as determination of the nutritive value of important food fishes, methods of fish preservation, researches on sargassum weed, physical and chemical survey of the ~~inalda~~ inland tanks with a view to determine their suitability for fish stocking etc. ~~the~~ have also been carried out. Sulphonation of fish oils, and the extraction of mannitol and Alginic acid from Sargassum weed are outstanding contributions, which show possibilities of industrial development.

4. Utilization of Shark Liver Oil:

During the last war the supplies of cod liver oil from Europe were cut off. This stimulated an attempt to find out

efficient substitutes for cod liver oil. The Marine Biological Section of the Department of Research carried out investigations and evolved efficient methods of extraction of two grades of shark liver oil with a vitamin 'A' content of 6,000 international units and 1,500 international units respectively. When first started this scheme was under the University. During that period in spite of poor equipment and lack of factory facilities, the shark liver oil section manufactured and sold about 5000 gallons of oil. A part of this was sold to the local hospitals and the general public, but the bulk of it was supplied to the Directorate General of Medical Supplies, Government of India. The total net profit from these transactions was Rs.7,000/- But at this stage the scheme was transferred to the postwar Industries section, with a view to continuing the work on a semi-commercial scale with modern equipment and up-to-date factory facilities.

A building for accommodating the factory is still under construction, but no equipment was purchased. Even the production of oil with the facilities available was hindered due to lack of sanction for the distribution of the oil on a commercial scale. So even though the scheme was a success when worked under the control of the University, it has fallen short of expectations after it was transferred to the Postwar Section.

On the research side, however, a number of important processes have been evolved, the most outstanding items being (i) deodourisation of the oil (ii) manufacture of malted oil and (iii) stabilisation of vitamin content. But these results are still obscure since they have not been put to commercial uses.

5. <u>Scheme for the Survey of production and Trade in Coir Yarn</u>.

A scheme prepared by the Registrar of Co-operative Societies and the Professor of Statistics for a survey of Produc-

tion and Trade in coir in the State was considered and approved by the Post-war Industries Sub-Committee and sanctioned by Government in July 1947.

The object of the scheme was to conduct a general study of the condition of the coir industry in the State by collecting statistics relating to green husks, their retting, extraction of coir fibre, spinning of coir yarn and its marketing, with a view to finding out ways and means for re-organising and developing this important industry of the State. Government sanctioned Mr.P.Sivarama Pillai, Assistant Registrar of Co-operative Societies, to be in administrative charge of this survey, the Professor of Statistics having technical control. Government also sanctioned 9 field units each with four Fieldmen and one Supervisor for the collection of the Statistics and these units were established in important coir producing centres. The survey was completed in a year from Edavom 1123 and a very large mass of accurate data was collected. As soon as this part of the work was completed the field staff and Mr. Sivarama Pillai were relieved of their duties and the Professor of Statistics sought sanction for appointing two compilers and a Statistical Assistant for compiling and analysing the data and for preparing notes for drawing up the report. Though this staff is only required for a very short period, sanction was not accorded. So all the data and information collected at an expense of Rs.68,632/- remain shelved.

6. Improvement of Agricultural Statistics:

This scheme, based on the programme of the Government of India for the collection of data for All India Crop Forecasts, is intended to improve the agricultural production of the State. The main feature of the scheme is the collection of correct statistics relating to the area under important food crops, livestock figures etc. A scheme prepared on this subject by Dr. U. Sivaraman Nair, Professor of Statistics was

~~by~~ sanctioned by Government. According to this scheme one Statistical Assistant was to be posted to each taluk for the collection of the above statistics. 31 Statistical Assistants were selected by the Public Service Commissioner and their appointment was sanctioned by Government in Thulam 1124. These Assistants were given four months' training by the Professor of Statistics and were subsequently posted in the respective taluks assigned to each of them. Work is now in progress.

7. Essential Oil Scheme:

This scheme is intended for the commercial distillation of essential oils from plant materials available in Travancore by setting up a pilot plant.

Travancore ~~produces~~ Produces lemon grass oil on a very large scale. The bulk of the oil produced is exported to Europe and America, where ionone is distilled out of it and sold back to us at a very ~~high~~ high price; The Central Research Institute under the University has been experimenting on the methods of extracting ionone locally and as the preliminary researches have reached an encouraging stage it was decided to set up a pilot plant for the extraction of ionone. The scheme was approved by the Post-war Industries Sub-Committee and sanctioned by Government. Subsequently orders were placed for the necessary stills and accessories and a few items have already arrived. But at this stage sanction for the continuance of the scheme was withdrawn. The original estimated cost of this scheme is Rs.24,616/-.

8. Breeding of Lemon Grass Scheme:

The object of this scheme is to select and evolve superior strains of lemon grass, i.e., grass with high oil content and citral content. The Officer selected to be in charge of the proposed lemon grass breeding station has returned after completing his training in the Indian Agricultural Research Institute, New Delhi. Negotiations are in progress for tak-

ing up a suitable site for establishing the station.

9. Metal Mirror Manufacture:

This is not a research scheme but only an attempt to save a dying industry from extinction. The manufacture of metal mirrors was once a flourishing industry in certain parts of Central Travancore. But with the advent of cheap glass mirrors this indigenous industry began to decline. Fearing that it would become completely extinct in the near future, the postwar Industries Sub-Committee recommended to Government a scheme for its revival. An expert artisan who still survived was brought to Kundara where, under the supervision of the Ceramic Expert, he started work on 27.10.1120. Up to the end of 1124 he manufactured 212 mirrors and also trained some selected persons. But since the demand for metal mirrors is very restricted a large number of mirrors still remain unsold. So on 16.10.1124 the artisan was transferred to the School of Arts where under the Supervision of the Supe intendent he is now engaged in manufacturing fancy articles with the metal mirror alloy. It is not possible to say at this stage how far the new endeavour will prove successful. So far a sum of Rs.6,987/- has been spent on this scheme.

B. SCHEMES SANCTIONED BUT NOT STARTED.

1. Scheme for the Survey of Coconut Acreage & Production.

This forms part of the main scheme for the Improvement of Agricultural Statistics. The object of this scheme is to estimate the area under coconut cultivation in the State. A scheme prepared by the Professor of Statistics for the survey of Coconut acreage and production in the Trivandrum Taluk was approved by the Post-war Industries Sub-Committee and sanctioned by Government. It was proposed to be started in 1124 with the assistance of school teachers during the summer vacation. But due to poor response to the notification inviting application from school masters for the post of Investigators and Supervisors the work could not be started. Sanction for a revised

procedure was sought but Government ordered that the scheme may be deferred.

2. Crop-cutting Survey of Nanjinad:

This scheme is also part of the main scheme for the Improvement of Agricultural Statistics, and is intended for collecting information regarding distribution of land under broad categories based upon general yeild capacity, yeild per acre for important varieities etc.

This work was proposed to be started during the Kumbhom crop of 1122 but that was not done due to the failure of crop, and the consequent fear that normal standards could not be set up on the basis of crop cutting of an abnormal season. However, Government have now sanctioned this survey on a State-wide basis as part of the Grow-More-Food programme and the necessary staff have been appointed.

3. Report on cost of living indices:

A joint proposal by the Labour Commissioner and Professor of Statistics for conducting a cost of living index survey in 10 important industrial centres on the same lines as the survey conducted in the year 1946 was submitted to Government in December, 1947, but Government have ordered that this survey need not be conducted.

C. SCHEMES PENDING SANCTION OF GOVERNMENT.

1. Handloom Weaving Industry:

At a meeting held on 3.6.1945 the Registrar of Co-operative Societies was aksed to draw up a scheme for the improvement of the handloom weaving industry, standardisation of handloom products and improvement of designs. The Registrar forwarded two notes for the consideration of the Post-war Industries Sub-Committee, one on the improvement of handloom weaving industry in the State and the other on the distribution of yarn by the Travancore Sri Mulam Handloom Weavers' Central Co-operative Society, Ltd., Trivandrum, These notes

were considered by the Sub Committee and recommended to Government. On 16.1.1947 the Registrar of Co-operative Societies addressed Government again pointing out the need to take definite steps to stablise the industry. This letter was again referred to the Post-war Industries Sub-Committee by Government. In the mean time the controls on textiles were withheld drawn by Government. So the Post-war Industries Sub-Committee recommended to Government that a committee be appointed to enquire into and report upon the measures to be taken for the development and rehabilitation of the handloom weaving industry, but no action has so far been taken.

2. Development of Tanning Industry:

After attending the meeting on the Panel set up by the Central Government on leather and leather goods industry in 1946, the Director of Research forwarded a report to Government on the possibilities of developing the tanning industry in the State. Government ordered to place the matter for the consideration of the Post-war Industries Sub-Committee. The Sub-Committee after careful consideration resolved that proposals received, if any, by Government, for the expansion of the tanning industry in the State as also any information that may be available with the Department of Industries be made ~~we~~ available to the Committee. Government gave the name of one firm which had sent up proposals, and stated that no information was available with the Department of Industries. The Committee therefore, felt that a survey of the present condition of the industry was essential as a preliminary step and recommended to Government to sanction a preliminary survey of the industry by Mr. K. Raghava Kurup at an estimated expenditure of Rs.5,000/-. No action has so far been taken.

3. Cashew Shell Oil Industry:

In November, 1947, Rajysevapravina Mr.K.P.P.Menon sent up proposals to the Post-war industries Sub-Committee for increasing the yeild of cashew shell oil. He pointed out that

the present method of roasting the nuts is uneconomical and injurious to the workers and that Messrs.Peirce Leslie & Co. preferred a method of extraction of the oil from the nut by the hot oil process, and that by following their method the yield of oil could be very much enhanced. He also estimated that the value of the oil which could thus be recovered would be of the order of Rs.20,00,000/- every year. This proposal was considered by the Post-war Industries Sub-Committee at which Mr. P.S.George of Quilon and Mr. Jefferies and Sir John Thorn of Messrs. Peirce Leslie & Co., were invited. The need for stepping up production of the oil was stressed and Messrs. Peirce Leslie offered co-operation. An Ad hoc Sub-Committee was formed with Mr.P.S.George as Convener, to enlist the co-operation of other producers. At a meeting of this sub-committee Mr. Thangal Kunju Musaliar on behalf of the cashew nut manufacturers' expressed serious doubts regarding the advantages of the new process of extraction of the oil. Mr.Jefferies completely deferred as it was contrary to his experience. The Post-war Industries Sub-Committee, therefore, decided that this aspect of the question be verified by conducting actual experiments in the Central Research Institute for which the sanction of Government has been sought. But no action has been taken so far.

4. <u>Power Alcohol - Establishment of a Plant in Travancore</u>:

The Post-war Industries Sub-Committee discussed the recommendations of the Government of India Panel on Sugar, Alcohol and Food Yeast with special reference to Travancore conditions and forwarded a note to Government pointing out the scope for producing about 400,000 gallons of alcohol per annum from molasses and stressing the need for the establishment of a Power Alcohol Factory in Travancore. Messrs.Parry & Co., were consulted in the matter and it was estimated that their Pamba Factory when completed would be in a position to produce nearly 10,000 tons of molasses per annum which would be

sufficient to produce 600,000 gallons of power alcohol. The difficulty in enforcing legislation for the blending of petrol with power alcohol was pointed out by Government. However, Government stated that they would order the compulsory use of petrol alcohol blends in the State Transport Vehicles and all vehicles owned by Government and local bodies. Estimate for putting up a power alcohol factory were obtained from Messrs. The Travancore Sugars & Chemicals Ltd. They specified a condition that all the output of the factory should be purchased by Government at a reasonable cost. Alternatively they suggested that the Government may invest the necessary capital and that they would act as managing agents. This matter was considered by the Sub-Committee, who recommended that the question may be taken up with the company by Government direct. Though no action has been taken on this recommendation so far, I wish to submit that this is a matter which deserves serious consideration. We cannot always depend upon foreign supplies for petrol. Any time without notice supplies may be cut off especially if a war breaks out. It will, therefore, be to our advantage if we make provisions for alternative sources. There is also the question of balance of trade and the need to restrict imports as much as possible.

D. NEW SCHEMES INCLUDED IN PART II OF THE BUDGET FOR 1950 - 51.

1. Experimental Cultivation of tobacco:

The idea of cultivating tobacco in the sandy tracts of the coast, originated during the discussions on the famine relief work at Shertallai. The Director of Agriculture expressed doubt about its practicability. So a small scale cultivation was immediately started in the grounds of the Aquarium at the Trivandrum Beach. The variety of Tobacco tried was the "Harrison Special" cigarette tobacco and the result obtained was very encouraging. It was, therefore, felt that the experiment

may be repeated on a larger scale in the same area and arrangements may be made for curing the tobacco, to test the quality of the cured product. If the proposed experiment proves successful from all relevant aspects, it would pave the way for the large scale cultivation of Harrison tobacco in Travancore.

2. Scheme of Research on Tapioca & Sweet Potato.

The University of Travancore has been maintaining a Tapioca Research Farm near Kowdiar, where as the result of work carried out during the last seven years a number of new and better yielding varieties of Tapioca have been evolved. The work at this farm has reached a stage when further expansion is necessary, if the good results so far obtained are to be made available to the public. This, however, will be possible only by increasing the field staff and by opening a few large sub-stations in the important tapioca growing areas, such as Thiruvalla and Moovattupuzha. Such an expansion will require much greater finance than what we have at our disposal at present. A comprehensive five year scheme was, therefore, drawn up and submitted to the Indian Council of Agricultural Research with the approval and sanction of the Travancore Government. This scheme has been accepted by the Indian Council of Agricultural Research on the usual condition that all items of capital expenditure and one half of the recurring expenditure will be borne by the Travancore Government and the other half of the recurring expenditure will be paid by the Indian Council of Agricultural Research.

The total estimated expenditure for three years is:

Non-recurring Expenditure	... Rs. 68,000
Recurring expenditure.	... Rs.1,39,647
Share to be borne by this Government	... Rs.1,37,823
Share of the I.C.A.R.	Rs. 69,823.

The existing 15 acre farm, building, and equipment of the University farm could be evaluated and the salary of the

existing staff could also be reckoned as part of this Government's contribution, if the scheme is handed over to the University. In that case the additional expenditure to be borne by this Government will be only very nominal. However, for the sake of official precision the estimate as accepted by the Indian Council of ~~of~~ Agricultural Research is submitted for budget sanction.

3. Scheme for the expansion of the Ayiramthengu Fish FarM:

At Ayiramthengu the nucleus of an estuarine fish culture station was established in 1946. The area put under operation during the first three years is approximately 30 acres including 20 acres taken on an annual rent of Rs.300/-- The present average income from this Station from the sale of fish is only Rs.3,000/- per annum. This income though it has justified the establishment of the station is hardly sufficient to make it self-supporting. So it is proposed to increase the total area under fish culture by acquiring 60 (sixty) acres of poromboke waters adjoining the existing pond.

The cost of bunding up this area is the only additional expenditure. But when this is done the toal yield at the rate of Rs.200/- per acre will be Rs.18,000/- for 90 acres (including the existing pond). This will not only make the scheme self-supporting, but also at the same time it may be able to produce an additional supply of 50,000 lbs. of fish per annum.

4. Scheme for the Construction of an Ice Plant for the Preservation and Transport of Fish.

This is a scheme for utilising the cold storage in the Connemara market which has been lying idle for the last six years due to its unsuitability for the purpose for which it was originally installed. This plant was erected at a cost of Rs.60,000/- by the Department of Fisheries in the year 1113 and it was actually worked only for about 19 calendar months. If it is allowed to remain idle like this it will

result in serious loss to Government.

The present scheme is, therefore, a practical method for utilising this plant to meet a very urgent need in connection with the distribution of fish in the fresh condition. It is proposed to convert the cold storage into an ice plant using the same machinery. The only alteration will be in the lay out of the pipe lines, insulation of ice freezing cans and the construction of a suitable building at a more convenient place in one of the important fishing centres. The total cost of conversion including the cost of the building and acquisition charges will be about Rs.51,200/- and the recurring expenditure and contingencies will be Rs.17,350/- per annum.

5. Fish Stocking in the Hydro-electric Reservoirs in the High Ranges.

In the Munnar Region at an elevation of about 5,770 ft. a new reservoir known as the Sethuparvathipuram Reservoir" has been constructed covering an area of 160 acres. The advantage of this reservoir is that its bed is not covered with tree stumps as in the Periyar and Pechipara reservoirs, and water will not overflow even during rainy season. At present there are only certain small varieties of fish in this reservoir. Mirror carps and other varieites such as Catla, Mirgal and Rohu which are found in the Nilgiris region at similar elevations appear suitable for this region. It is, therefore, proposed to open a small station at Sethuparvathipuram to study the possibilities of introducing Mirror carps. The Madras Fisheries Department have kindly agreed to supply the required number of fingerlings and the Chief Electrical Engineer sanctioned the use of the reservoir for fish stocking. If this experiment proves successful, the Kundala Reservoir covering an area of 800 acres and other Reservoirs in the same region which are now under construction, can be stocked with mirror carp. Munnar is an important tea plantation area, where fish

is now very scarce. So if this attempt proves successful the problem of fish supply at Munnar can be easily solved.

6. Paddy-cum-fish Culture in the Kayamkulam lake:

It is proposed to reclaim 520 acres of the Kayamkulam lake in the vicinity of the Ayiramthengu fish farm for Paddy cultivation and fish culture. For paddy cultivation the entire area will be divided into blocks of 5 acres each and allotted to private individuals, who will do their own cultivation under the direct supervision of the staff of the Kayamkulam Paddy Research Station of this Department while fish stocking will be done by the staff of the Ayiramthengu fish farm.

7. Opening of an Agricultural Research Station in Kuttanad.

Kuttanad is one of the most important agricultural tracts in Travancore. Rice is the principal crop and it covers an area of about 120,000 acres. The paddy lands in this tract are of three main types, viz., Karapadams, Kayal reclamations and Kari lands. These three soil types have distinct morphological and chemical characteristics and the fertility problems they present are varied and intricate. Over large areas in Kuttanad crop yields are reported to be steadily declining due presumably to adverse soil conditions and, the kari land particularly, are noted for their extremely low fertility level.

During the past few years the attention of the Department of Research has on several occasions been drawn to various soil problems of Kuttanad by some of the leading cultivators of this tract. The more important of these are indicated below:

i. The effect on soil fertility and crop yields of letting-in saline water into punja lands after harvest.

ii. The specific manurial requirements of the different types of soils in Kuttanad and the fertilisers best suited to them.

iii. The influence of lime on the productivity of punja soils and the most suitable form and best time for its application.

iv. The effect of fallowing on crop yield.

v. The factors responsible for the wiltings of seedlings which is a common occurrence in punja soils.

vi. The possibility of cultivating deep-water paddy in Kuttanad.

Such problems can be satisfactorily taken only by carefully planned field experiments in Kuttanad itself. This is true also of the other soil and crop problems which have to be urgently investigated; hence the need for opening an agricultural research station in Kuttanad. In this scheme, it is proposed to acquire an area of 20 acres and 16 cents from the Kandukrishi lands and open a field station very near the Rice Swarming Caterpillar Research Station established by the Department of Research at Pallom. The estimated expenditure for 1950-51 is only Rs.9,988/-.

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Entomology Section.

(Trivandrum)

Staff.

		Present Pay	Proposed Pay
1	Entomologist	Rs. 175-10-225	125-10-225 10-275-10-275
2	Asst. Research Officer	125-10-175	do
3	Technical Assistants (3)	30-3-45-5-75 80-5-100.	
4	Laboratory Assistant (1)	25-1-30	
5	Attenders (2)	20-1-22	
6	Peon (1)	20	

(Besides these there is one Field-man and one gardener, under Contingency).....

Paddy Research Station, Pallom.

Staff.

1	Asst. Entomologist	125-10-175	do
2	Technical Assistant (1)		
3	Attender (1)		
4	Peon (1)		

(Besides these there are two field men under contingency)

ENTOMOLOGY SECTION.

Staff.

		Present pay	Proposed pay
1	Entomologist.	Rs. 175-10-225	125-10-225-10-275-325.
2	Asst. Entomologist	125-10-175	do
3	Asst. Research Officer	do	do
4	Technical Assistants (2)	30-3-45-45-5-75 80-5-100	
5	Laboratory Assistant (1)	30-3-45	
6			

Accommodation.

Trivandrum.	Insectary Building	1750 sq. ft.
	Insect. Testing Lab.	350 .. ..
	Store	400 (approx)
Pallom.	Laboratory	1200 ..

Problems.

Trivandrum

1 Collection, identification and preservation of crop pests.

2 do do of insects in general.

3 Investigations on Paddy Pests. (chiefly at Pallom).

4 Biological evaluation of insecticides.

5 Borer attack on felled bamboos with special reference to season of felling and sugar content.

6 Population studies on banana aphis with special reference to topography and season.

7 Pests of vegetables.

8 Biological control of the coconut caterpillar pest and other biological control experiments.

9 Plant protection experiments using insecticides.

Pallom

1 Investigation on Paddy Pests.

2 Breeding of Eulophid Parasites.

DETAILS REGARDING RESEARCH STUDENTS IN THE DIVISION OF STATISTICS.

Name of Research student	Year of registration	Degree for which registered	Title of Thesis	Year in which Degree was awarded
1. Miss Aleyamma George	1940	M.Sc.	Researches into Statistical Sampling Theory	1943
2. Sri. K.C. Sreedharan Pillai	1941	M.Sc.	Studies in Statistical Methods	1945
3. Sri. K. Sankara Pillai	1941	Ph.D.		Left in 1942
4. Sri. S. Janardana Iyer	1942	Ph.D.		
5. Sri. N. Gopalakrishnan Nair	1946	M.Sc.	Matrix Methods in Statistical Theory	1950
6. Sri. K. Bhaskara Varma Thirumulpad	1946	Ph.D.	Studies in Sampling Theory	1950
7. Sri. R. Velayudhan Nair	1946	Ph.D.		

SCHOLARSHIPS & FELLOWSHIPS

No scholarships or Fellowships have been separately allotted for this Division.

One special Scholarship of Rs.125/- instituted by the University has been awarded to a student working here.

Government of India, Ministry of Education, has sanctioned two scholarships, One Senior (of the value of Rs. 200/- p.m.) and One Junior (of the value of Rs.100/- p.m.) in this Division.

DETAILS RELATING TO M.Sc. (STATISTICS) CLASSES.

YEAR	Number in I.Year	Number in II.Year	Number appearing for examination	Result I.Class	Result Pass	Number of non-Travancoreans
1945 - 46	8					
1946 - 47	8	8	8	2	4	1 Cochinite
1947 - 48	9	8	7	2	5	-
1948 - 49	10	9	9	1	6	1 from Rajasthan 1 from Madras
1949 - 50	14	9				1 Government of India Scholar from Ceylon 2 from Madras

DETAILS RELATING TO B.Sc. (STATISTICS) CLASSES.

Year		No. of Students.
1949 - 50	B.Sc. (Main)	17
	B.Sc. (Subsidiary)	16

SCHEMES OF INVESTIGATIONS UNDERTAKEN IN THE BUREAU OF STATISTICS.

		Staff employed	Cost	Year
1.	Preparation of Cost of Living Indices	28 Field Investigators at Rs.60/- p.m. in seven centres.	Rs. 7,000/-	1946-47
2.	Survey of the Production and Trade in Coir in Travancore	9 Field Units consisting of 32 Fieldmen and 9 Supervisors. Compilation Staff: 1 Analyst 1 Typist 1 Clerk	76,100/-	1948-49
3.	Collection of Agricultural Statistics in Travancore	30 Statistical Assistants (One in each Taluk of the State)	52,000/-	1949-50
4.	Crop-cutting Survey to assess the results of the Grow More Food Campaign	102 Field Assistants working under the Statistical Assistants	60,00/-	1950

LIST OF PAPERS PUBLISHED FROM THE DIVISION OF STATISTICS.

AUTHOR		Year	Title of Publication	Journal
Dr. U. Sivaraman Nair	1.	1939	The application of the moment function in the study of distribution laws in Statistics.	Biometrika, XXX, 274-294.
Dr. U.Sivaraman Nair & Bishop	2.	1939	A note on Certain Methods of Testing for the Homogeneity of a Set of Estimated Variance.	Supp. J. Roy. Sta. Soc. VI, No. I, 89-99.
Dr. U. Sivaraman Nair	3.	1941	Probability Statements regarding the ratio of standard deviations and correlation coefficient in a bivariate normal distribution.	Sankhya Volume V, ii, 151-156
"	4.	"	A comparison of Tests for the Significance of the Difference between two variances.	" "
"	5.	"	The application of Factorial Series in the Study of Distribution laws in Statistics (Abstract).	" "
"	6.	"	The application of Matrices to the solution of Normal Equations.	Proc. Ind. Sc. Cong. XXIX, iii,3.
Dr. U. Sivaraman Nair & Mahajani	7.	1945	Generalisation of a Certain Definite Integral	Mathe. Stud. XIII, 2, 55-56.
Dr. U. Sivaraman Nair	8.	1947	Symposium on Methods of Testing Hypotheses	"The Mathematical Student" Vol.XVI, 1948, pp.80-84.
"	9.	1949	Presidential Address to the Statistical Section, Indian Science Congress.	-
Miss. Aleyamma George	1.	1942	On the Problem of Interval Estimation	Sankhya, VI, ii.
"	2.	1944	On the Stirlings' Approximation for (x).	Proc.Ind.Sc. Cong. Abs. XXXI, iii, 8 and Math.Stu. XXII, 1.
"	3.	"	Analysis of Medical Inspection Cards of College Students, Trivandrum.	University of Travancore
"	4.	1945	On the Accuracy of the Different approximations of the L_1 Distribution.	Sankhya, VII, I.
" & M.A.U. Menon	5.		On the variation of Female Palpal Bands in Anopheles Jeyporiensis, James 1902	-
Miss.Aleyamma George	6.		On the confidence region for Bivariate frequency distributions.	-
"	7.		On the Statistical Analysis of chemical constituents in milk of cows and buffaloes.	Proc. Ind. Sc. Cong. 1950.
K. Sankara Pillai	1.	1943	A Note on Poisson Distribution	Proc. Ind. Ac. Sc. XVIII, No.4, A, 179-189.
"	2.	1945	An Asymptotic Expansion	Math. Stu. XIII, 3.
S. Janardana Iyer	1.	1944	On the Arithmetic and Geometric Means from a Type III population.	Math. Stu. XIII, 1.
"	2.	1945	On a class of Bivariate Frequency Surfaces as an Extension of Pearsonian.	Proc.Ind.Sc.Cong. XXXII, iii, Abstracts, 1945.
"	3.	1946	On an Empirical Method of Fitting two parameter family or curves to observational Data.	Proc.Ind.Sc. Cong.XXXIII, iii.
	4.		Analysis of data regarding physical measurements on men examined for army, technical recruits from South India.	Sankhya Vol.VIII, Part I, 1946.
"	5.		The ogive curve as curve of population growth.	Proc.Ind.Sc. Cong. 1947.
"	6.		On a certain class of integrals	Proc.Ind.Sc.Cong. 1949.
K.C. Sreedharan Pillai	1.	1943	Trend Analyser	" " XVII, 6.
"	2.	1944	Confidence Interval for the correlation coefficient	Sankhya VII, 4.
"	3.	1944	On the construction of Bivariate Distribution Functions Satisfying the condition of Zero Correlation.	Proc.Ind. Sc.Cong. XXXI, iii.
"	4.	1946	On the Construction of the means of the extreme values in samples from a Normal Population.	" " XXXIII, iii.
"	5.		On the Distribution of the median in even samples from a Normal Population	Proc. Ind.Sc. Cong. 1947.
"	6.		On the distribution of the mid-range and semi-range in samples from a normal population.	" " 1948.

AUTHOR	Year	Title of Publication	Journal
V. J. Chacko	1.	On the Method of Group Averages in Estimation of regression coefficients.	Proc.Ind. Sc. Cong. 1949.
"	2.	On the Control of Caterpillar Pest of Paddy plants.	Proc. Ind. Sc. Cong. 1950.
"	3.	Effect of insecticides on the growth of paddy plants.	" "
N. Gopalakrishnan Nair	1.	Study of some electro-cardiograms.	Proc. Ind. Sc. Cong. 1947.
" & R. Velayudhan Nair	2. 1948	A Statistical Study of Family Budgets relating to subordinate Government Servants in Trivandrum.	-
N. Gopalakrishnan Nair	3. 1949	A Note on the size and shape of cuts in crop-cutting experiments.	-

B O O K S	Total No.
1. Mathematics	251
2. Quality Control	20
3. Probability	17
4. Statistics Applied to Psychology & Education	12
5. Mathematical Biology & Vital Statistics	19
6. Theoretical Statistics	51
7. Statistical Methods	32
8. Business & Economic Statistics	63
9. General	6
10. Theoretical Physics	52
TOTAL	523

T A B L E S	124

J O U R N A L S	
1. Supplement to the Journal of the Royal Statistical Society	Vols. I-IX
2. Duke Mathematical Journal	Vol. VIII & Vols. XII-XVI
3. Quarterly Bulletin of the Eastern Economist	Vols. I-IV
4. Biometrika	Vols. I-XXXIV
5. American Journal of Mathematics	Vols. LXV-LXXI
6. Sankhya	Vols. I-IX
7. Annals of Mathematics	Vols. XLIII-XLIV XLVI- L
8. Bulletin of the American Mathematical Society	Vol. XLVII & Vols. L - LV
9. Annals of Eugenics	Vols. I-XV
10. Monthly Bulletin of Statistics	Vols. XXIV-XXVII
11. Econometrica	Vols. I-VII & XIII-XVII
12. Transactions of the American Mathematical Society	Vols. XLIX & L
13. The Annals of Mathematical Statistics	Vols. I-XX