

Proceedings of the 25th Meeting of the
Board of Scientific and Industrial Research
Sep 25, 1950

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Proceedings of

THE 25th MEETING OF THE

Board of Scientific & Industrial Research



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SEPTEMBER 25, 1950

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH, NEW DELHI.

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BOARD OF SCIENTIFIC AND INDUSTRIAL RESEARCH.

The 25th meeting of the Board of Scientific and Industrial Research was held in New Delhi on the 25th September 1950 at 10 A. M. The Hon'ble Pandit Jawaharlal Nehru presided and the following members were present :—

1. The Hon'ble Shri Harekrushna Mahtab, Vice-President, C.S.I.R.
2. Dr. S.S. Bhatnagar (D.S.I.R.).
3. Dr. A. Ramaswami Mudaliar.
4. Lala Shri Ram.
5. Dr. H. J. Bhabha.
6. Mr. J. J. Ghandy.
7. Dr. J. C. Ghosh.
8. Dr. K. A. Hamied.
9. Dr. K. S. Krishnan.
10. The Hon'ble Dr. Jivraj N. Mehta.
11. Dr. J. N. Mukherjee.
12. Dr. C. V. Raman.
13. Prof. M. S. Thacker.
14. Prof. M. N. Saha.
15. Dr. D. N. Wadia.
16. Mr. R. P. Bahadur (Secretary, C. S. I. R.).

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COMMITTEE OF THE BOARD OF SCIENTIFIC AND INDUSTRIAL RESEARCH.

The Committee of the Board of Scientific and Industrial Research met at 10 A. M. on Sunday the 24th September 1950 in New Delhi and discussed the agenda for the 25th meeting of the Board of Scientific and Industrial Research.

2. The following were present :—

1. Lala Shri Ram (in the Chair)
2. Dr. S.S. Bhatnagar (D.S.I.R.)
3. Dr. H. J. Bhabha.
4. Dr. J. C. Ghosh.
5. Dr. K. A. Hamied.
6. Dr. K. S. Krishnan.
7. The Hon'ble Dr. Jivraj N. Mehta.
8. Dr. J. N. Mukherjee.
9. Prof. M. N. Saha.
10. Dr. D. N. Wadia.
11. Mr. R. P. Bahadur (Secretary, C.S.I.R.).

3. Lala Shri Ram drew the attention of the Committee to the complete lack of naturally occurring sulphur in India, which was essential for the manufacture of sulphuric acid. He pointed out that sulphuric acid was the basic heavy chemical on which the industries of the country depended. After a full discussion on the subject, the Committee made the following recommendation :—

“In view of the complete absence of naturally occurring sulphur and the great importance of sulphuric acid for all industrial purposes, the Committee recommended that Govt. of India be requested to put up a plant for the manufacture of sulphuric acid from gypsum at their own cost as recommended by the Heavy Chemicals and Electro-Chemical Industries Panel. The Committee considered that in emergency this plant could be duplicated without much effort”.

The President in his opening remarks said that the Board of Scientific and Industrial Research had been reconstituted since they met six months ago. He welcomed the new Vice-President, the Hon'ble Shri Harekrushna Mahtab, Dr. A. Ramaswami Mudaliar who was the founder of the Board of Scientific and Industrial Research and who was intimately connected with the affairs of the Board of Scientific and Industrial Research and Mr. J.J. Ghandy, who had been nominated on the reconstituted Board. The President also made a brief mention of the events since the last meeting namely the opening of the Fuel Research Institute & the Central Glass and Ceramic Research Institute and the laying of the foundation stone of the Central Road Research Institute.

The Prime Minister said that among the outstanding achievements of our Government, the establishment of the National Laboratories was very gratifying. This was the view also of the people representing the general public. He also mentioned that on the other hand some people were thinking whether we were not doing more than what we could fully profit by. We had laid ambitious plans but financial limitations were now facing the Government. There had been many impediments in the way of execution of these plans such as the food problem, the refugee problem and the small war in Kashmir. We were under some kind of impression that our resources, financial and others, were more unlimited but these problems, some unexpected and some partly expected, intervened absorbing lot of money and difficulties arose. We found that the large sums we had in the sterling balances were not easily available for the execution of our plans as expected. It was therefore not good thinking in a big way without adequate resources and naturally the Government had checked themselves and had given up many of the schemes for the time being much to our regret but he hoped that this would not happen to the National Laboratories. Here he emphasized that quality was more essential than quantity.

The Board accepted the recommendation of its Committee that the plant of manufacture of sulphuric acid from gypsum be put up by the Government of India at their own cost immediately. It was also recommended that the Council should investigate copper parites and similar other sources of sulphur for the manufacture of sulphuric acid.

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

Proceedings of the XXV meeting of the Board of Scientific and Industrial Research,
held on the 25th September, 1950.

Item No.	Subject.	Reference to page in the Proceedings.
I.	Confirmation of the proceedings of the 24th meeting of the Board of Scientific and Industrial Research held on the 18th March 1950.	1
	Research Schemes :	
II.	Research scheme on addition of bromine to ethylene derivatives, by Dr. S. V. Anantakrishnan, Madras Christian College, Tambaram.	1
III.	Research scheme on role of solvent in chemical reactions, by Dr. S.V. Anantakrishnan, Madras Christian College, Tambaram.	3
IV.	Research scheme on investigation of the reaction kinetics of the vapour phase thermal decomposition of the metal alkyls -mercury and zinc dimethyls, by Dr. Lourdu M. Yeddnapalli, Ettyola College, Madras.	5
V.	Research scheme on anti-bacterial and anti-fungal compounds from naphthalene by Mr. M.L. Khorana, Bombay University.	7
VI.	Scheme on pilot plant investigation in the production of fortified rice, by Dr. S.S. De, Indian Institute of Science, Bangalore.	9
VII.	Scheme to investigate the possibilities of using groundnut oil-cake for edible purposes, by Dr. S.A. Saletore, L.I.T., Nagpur.	15
VIII.	Research scheme for investigation of Indian resources of cornwall stone used in porcelain and pottery manufacture, by Prof. G. Gopala Rao, Andhra University.	17
IX.	Research scheme on development of a new roofing material (Krisone Crete) with gypsum, particularly of low grades by Messrs. Krishan Singh & Sons, New Delhi.	19
X.	A scheme of research on surface treatment of reinforcement to improve properties of reinforced concrete, by Dr. S.R. Sengupta, Principal, Bengal Engineering College, Howrah.	23
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Item No.	Subject.	Reference to page in the Proceedings.
XIV.	Research scheme on the development of gas producer and/or a combustion chamber to accept solid fuels for use in gas turbine power plants by Dr. H. A. Havemann, Indian Institute of Science, Bangalore.	29
XV.	Scheme on development of methods to cool blades of gas turbines by Dr. H.A. Havemann, Head of the Department of Internal Combustion Engineering, Indian Institute of Science, Bangalore.	33
XVI.	Scheme of research on the production method and properties of low carbon alloyed steels containing manganese by TISCO.	35
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XVIII.	Research scheme on testing the suitability of Indian graphite for the manufacture of graphite crucibles by Mr. M.C. Seth, Mirzapur (U.P.)	47
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RESEARCH SCHEMES

Item No.	Particulars.															
I	Confirmation of the Proceedings of the 24th meeting of the Board of Scientific and Industrial Research held on the 18th March 1950.															
II	Subject : Research Scheme on addition of bromine to ethylene derivatives, by Dr. S. V. Anantakrishnan, Professor of Chemistry, Madras Christian College, Tambaram. Synopsis : 1. The object of this scheme is to study the reactivity of ethylene derivatives for a proper elucidation of the mechanism of the reaction by kinetic studies under varying conditions of temperature and catalysts. In the later stages, investigation on fast reactions will also be taken up as some of these are so rapid that the reaction is complete in less than one minute. Calorimetric method for computing the rate in such cases is proposed to be used. Earlier work on the subject has indicated that differences may be expected between the reaction in polar and nonpolar solvents with a possible mechanistic change with structure. The author has published about a dozen papers on the previous work in the subject dealing with a competitive method of comparing reaction rates in solution with a few unsaturated acids. An analysis of the Arrhenius parameters and the role of catalysts in the reactions studied so far have clearly indicated the need for a fuller investigation especially as differences could be noticed in reactions below 25°C and those above that temperature. The problem is also under investigation in the U.K., U.S.A. and elsewhere but the subject has not been taken away from the field of controversy with the result that further work is necessary for elucidating the problem. Mention has also been made of the work being carried out in the laboratories of the Shell Chemical Corporation and Universal Oil Products in U.S.A. 2. The proposed investigation is to be conducted in Madras Christian College, Tambaram, where equipment facilities for preliminary work are available but specialised equipment for the investigation will have to be purchased. The research scheme is expected to be completed in about three years, provided there is no delay in importing some of the special equipment. 3 Dr. Anantakrishnan has asked for the following financial assistance :— <table><tr><td>Equipment</td><td>...</td><td>Rs. 7,500</td></tr><tr><td>Contingencies</td><td>...</td><td>Rs. 2,000</td></tr><tr><td>Staff :</td><td></td><td></td></tr><tr><td>One Research Assistant on Rs. 150 p. m.</td><td>...</td><td>Rs. 1,800 plus allowances</td></tr><tr><td>Clerical and menial assistance Rs. 50 p. m.</td><td>...</td><td>Rs. 600</td></tr></table>	Equipment	...	Rs. 7,500	Contingencies	...	Rs. 2,000	Staff :			One Research Assistant on Rs. 150 p. m.	...	Rs. 1,800 plus allowances	Clerical and menial assistance Rs. 50 p. m.	...	Rs. 600
Equipment	...	Rs. 7,500														
Contingencies	...	Rs. 2,000														
Staff :																
One Research Assistant on Rs. 150 p. m.	...	Rs. 1,800 plus allowances														
Clerical and menial assistance Rs. 50 p. m.	...	Rs. 600														

Recommendations of the Committee of the Board.	Recommendations of the Board.
Item I p. 1. The Committee recommended that the proceedings of the 24th meeting of the Board of Scientific and Industrial Research held on the 18th March 1950 be confirmed.	Item I p. 1. The Board confirmed the proceedings of the 24th meeting of the Board of Scientific and Industrial Research held on the 18th March 1950.

RESEARCH SCHEMES

Item No.	Particulars.																												
III	4. The scheme was referred to the Chemical Research Committee for opinion. Majority of the members have expressed the view that the scheme is too generic with no well defined objective and should be encouraged by University authorities only.																												
	Subject : Research Scheme on role of solvent in chemical reactions, by Dr. S. V. Anantakrishnan, Madras Christian College, Tambaram.																												
	Synopsis : 1. The object of the scheme is to study the influence of solvent on the course and mechanism of different types of reactions (ion-dipole, dipole-dipole and free radical) selecting some hydrolytic reactions, alkylation of amines, and molecular rearrangements in several pure solvents and also mixtures of solvents. The investigation is of a purely fundamental character. Considerable work has been done in U.K. and U.S.A. in this direction particularly on the hydrolysis of alkyl halides and elimination reactions. The work done in America provides the only available data on dielectric constants of solvent mixtures. Dr. Anantakrishnan has conducted investigation on hydrolysis of esters in glycerol-water systems, dioxan-water and acetone-water systems. He has also developed a heterodyne-beat apparatus of high degree of accuracy for carrying out parallel measurements of dielectric constants of solvent mixtures. Part of the work has been reported in the Proceedings of the Indian Academy of Sciences. 2. The investigation is proposed to be carried out in the Madras Christian College, Tambaram where apparatus for measuring dielectric constants and trained personnel for the work are available. 3. Dr. Anantakrishnan has asked for the following grant :— <table><tr><td>Equipment</td><td>...</td><td>Rs</td><td>7,000</td></tr><tr><td>Contingencies</td><td>...</td><td>Rs.</td><td>1,500</td></tr><tr><td>Staff :</td><td></td><td></td><td></td></tr><tr><td>(Two Research Fellows on Rs. 150 p. m.</td><td></td><td></td><td></td></tr><tr><td>Allowances to Clerical and Menial staff</td><td></td><td></td><td></td></tr><tr><td>Rs. 50 p.m.)</td><td>...</td><td>Rs.</td><td>4,200 plus allowances</td></tr><tr><td>Total</td><td>...</td><td>Rs.</td><td>12,700 plus allowances</td></tr></table> 4. The scheme was referred to the Chemical Research Committee for opinion. The consolidated opinion of the Committee has been received from the Chairman.	Equipment	...	Rs	7,000	Contingencies	...	Rs.	1,500	Staff :				(Two Research Fellows on Rs. 150 p. m.				Allowances to Clerical and Menial staff				Rs. 50 p.m.)	...	Rs.	4,200 plus allowances	Total	...	Rs.	12,700 plus allowances
	Equipment	...	Rs	7,000																									
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Staff :																													
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Allowances to Clerical and Menial staff																													
Rs. 50 p.m.)	...	Rs.	4,200 plus allowances																										
Total	...	Rs.	12,700 plus allowances																										

Recommendations of the Committee of the Board.	Recommendations of the Board.
Item II p. 1-3 The Committee agreed with the opinion of the Chemical Research Committee and did not recommend the scheme for a grant-in-aid from the C.S.I.R.	Item II p. 1-3. The Board did not recommend the scheme for sanction.

RESEARCH SCHEMES

Item No.	Particulars.																		
	In the opinion of the majority of members the scheme appears to be too generic with no well defined objective and should be encouraged by University authorities only.																		
IV	Subject : Research Scheme on investigation of the reaction kinetics of the vapour phase thermal decomposition of the metal alkyls—mercury and zinc dimethyls, by Dr. Lourdu M. Yeddanapalli, Loyola College, Madras. Synopsis : 1. Dr. Yeddanapalli says that the object of the investigation is to determine the kinetic order of the decomposition of the metal alkyls, namely mercury and zinc dimethyls, which is expected to be fractional order involving free radical mechanism. The scope of the investigation comprises the elucidation of the primary steps involved in these complex reactions and the extension of the fractional order mechanism to some of the so-called quasi-unimolecular reactions. The investigation is essentially of fundamental scientific value with the object of bringing out the primary, elementary steps involved in complex reactions. Incidentally it is intended to arouse interest in the study of fundamental nature of chemical reactions and train up research scholars in high vacuum techniques with the object of equipping them for work in reaction kinetics Dr. Yeddanapalli has already investigated on the thermal and photo-chemical decomposition of aluminium dimethyl, on the photo-chemical polymerisation of ethylene by free radicals and on the decomposition of methane in flow discharge at liquid air temperatures. 2. The investigation is to be conducted in the Chemical Laboratory of Loyola College, Madras, which has facilities of specialised equipment required in the research, such as high vacuum pumps, gauges, micro-chemical gas analysis apparatus etc. 3. The investigator has asked for the following grant : <table><tr><td>Equipment</td><td>...</td><td>Nil</td></tr><tr><td>Contingencies</td><td>...</td><td>Rs. 1,700</td></tr><tr><td>Staff :</td><td></td><td></td></tr><tr><td>(Two Research Asstts. in the scale of 160-10-330.</td><td></td><td></td></tr><tr><td>One Technician & Lab. Asstt. at Rs. 60 p.m.)</td><td>Rs. 5,720 plus allowances</td><td></td></tr><tr><td>Total</td><td>Rs. 7,420 plus allowances</td><td></td></tr></table> 4. The scheme was circulated to the members of the Heavy Chemicals & Chemical Industries Research Committee. The consolidated opinion of the Committee as recommended by the	Equipment	...	Nil	Contingencies	...	Rs. 1,700	Staff :			(Two Research Asstts. in the scale of 160-10-330.			One Technician & Lab. Asstt. at Rs. 60 p.m.)	Rs. 5,720 plus allowances		Total	Rs. 7,420 plus allowances	
Equipment	...	Nil																	
Contingencies	...	Rs. 1,700																	
Staff :																			
(Two Research Asstts. in the scale of 160-10-330.																			
One Technician & Lab. Asstt. at Rs. 60 p.m.)	Rs. 5,720 plus allowances																		
Total	Rs. 7,420 plus allowances																		

Recommendations of the Committee of the Board.	Recommendations of the Board.
Item III p. 3-5. The Committee agreed with the opinion of the Chemical Research Committee and did not recommend the scheme for a grant-in aid from the C.S.I.R.	Item III p. 3-5. The Board did not recommend the scheme for sanction.

RESEARCH SCHEMES

Item No.	Particulars.
V	Chairman was that the scheme was of a theoretical nature and of academic interest only. As fundamental scientific research was not outside the purview of the Council the scheme has been referred to the newly constituted Chemical Research Committee for consideration with the clarification that the scheme need not be rejected purely on this ground.
	Subject : Research scheme on anti-bacterial and anti-fungal compounds from naphthalene, by Mr. M. L. Khorana, Reader in Pharmaceutical Chemistry, Bombay University.
	Synopsis : I. Mr. Khorana has stated that while much work has been done on the derivatives of phenol and cresols as antiseptics, very little work has been done on the derivatives of naphthols. Of the two naphthols, a-naphthol is a stronger antibacterial while b-naphthol which is considered safer for internal use is official in B.P.C. 1949 and has been used as an anthelmintic. Cole, Prouty, and others have tested 10 such compounds for their germicidal properties by 'wet filter paper method', and these compounds have been shown to be active against disease bacteria in varying degrees. Mr. Khorana has already carried out some investigations in which a large number of derivatives of a-naphthols, such as chloro-naphthols, sulphides, hydroxy and dihydroxy, acidic, aldehydo and keto derivatives and esters were prepared and tested for their antibacterial and fungicidal properties. Many of these derivatives have been found to exhibit general or selective antibacterial action against Bacillus typhosus and Staphylococcus aureus. In general, alkylation of a-naphthols produces compounds with increasing antibacterial activity. Derivatives with chlorine in the side chain although bactericidal are very irritant to the skin. The nitro and nitroso derivatives are found to be inactive. Naphthyl amine dye soluble in water and with no irritant action can find application in wound healing medicines. The esters in general also show good bacteriostatic activity. In the present scheme of research it is proposed to continue the work further on the naphthol series and prepare a number of derivatives not so far studied for their anti-bacterial and antifungal activities. The programme of work will comprise the following :— (i) Study of other derivatives of polyhydroxy naphthalene by introducing these groups alone or in combination with others in different positions of naphthalene series. (ii) Since homologues of Vitamin K have given promising results as antiseptics and preservatives, the introduction of groups like chloro, iodo in their derivatives might provide a fruitful field of investigation.

Recommendations of the Committee of the Board.	Recommendations of the Board.															
Item IV p. 5-7. The Committee noted that the consolidated opinion of the Chemical Research Committee recommending the scheme had since been received from Prof. McBain, Chairman of the Research Committee. The Committee recommended that the scheme be approved and the following grant sanctioned to Dr. L.M. Yeddnapalli (upto 28th February 1951 in the first instance) :— <table><tr><td>Equipment</td><td>...</td><td>Nil.</td></tr><tr><td>Contingencies</td><td>...</td><td>Rs. 500</td></tr><tr><td>Staff :</td><td></td><td></td></tr><tr><td>(Two Research Asstts. on Rs. 160 p.m. in the scale of Rs. 160-10-330).</td><td></td><td>Rs. 2,800 including allowances.</td></tr><tr><td>Total</td><td></td><td><u>Rs. 3,300</u></td></tr></table>	Equipment	...	Nil.	Contingencies	...	Rs. 500	Staff :			(Two Research Asstts. on Rs. 160 p.m. in the scale of Rs. 160-10-330).		Rs. 2,800 including allowances.	Total		<u>Rs. 3,300</u>	Item IV p. 5-7. The Board accepted the recommendation of its Committee.
Equipment	...	Nil.														
Contingencies	...	Rs. 500														
Staff :																
(Two Research Asstts. on Rs. 160 p.m. in the scale of Rs. 160-10-330).		Rs. 2,800 including allowances.														
Total		<u>Rs. 3,300</u>														

RESEARCH SCHEMES

tem No.	Particulars.															
	(iii) Chloramides of alkyl naphthols may be prepared. These compounds have the advantage that the parent alkyl naphthols have already been found to possess greater activity, causing less irritation at the same time. Mr. Khorana has pointed out that some of these compounds should prove to be useful as cheap antiseptics for daily use and it might be possible to obtain cheap substitutes for Dettol or other well-known antiseptics from them. It might also be possible to get a better substitute for Halozone tablers supplied to soldiers for use as water sterilizer in the war front. 2. The investigation is intended to be conducted in the Department of Chemical Technology, University of Bombay, where all necessary facilities are available. 3. Mr. Khorana has asked for the following grant :— <table><tr><td>Equipment</td><td>...</td><td>Nil</td></tr><tr><td>Contingencies</td><td>...</td><td>Rs. 1,200</td></tr><tr><td>Staff :</td><td></td><td></td></tr><tr><td>(One Research Asstt. in the grade of Rs. 160-10-300)</td><td>...</td><td>Rs. 1,920 plus allowances</td></tr><tr><td>Total</td><td>...</td><td>Rs. 3,120 plus allowances.</td></tr></table> 4. The scheme has been referred to the Pharmaceuticals and Drugs Research Committee for opinion.	Equipment	...	Nil	Contingencies	...	Rs. 1,200	Staff :			(One Research Asstt. in the grade of Rs. 160-10-300)	...	Rs. 1,920 plus allowances	Total	...	Rs. 3,120 plus allowances.
Equipment	...	Nil														
Contingencies	...	Rs. 1,200														
Staff :																
(One Research Asstt. in the grade of Rs. 160-10-300)	...	Rs. 1,920 plus allowances														
Total	...	Rs. 3,120 plus allowances.														
VI	Subject : Scheme on pilot plant investigation in the production of fortified rice, by Dr. S. S. De, Indian Institute of Science, Bangalore. <i>Synopsis :</i> 1. Dr. De has pointed out that the staple diet of the majority of population of India is rice. Recent investigations have shown wide-spread deficiencies in all age groups with regard to the intake of thiamine, riboflavine, nicotinic acid and minerals like iron, resulting from the inability of the low-income groups to supplement the rice diet with protective foods like eggs, butter, meat, vegetables etc. The situation is accentuated by the removal of thiamine and other vitamins and minerals in the polishing and washing of rice. One effective, easy and practical method of removing this deficiency is by improving the nutritional quality of the food supplied. This falls under two categories :— (i) methods based on preservation of natural ingredients of whole grain like Sidha, Sela or Josh processes as well as undermilling, parboiling, conversion and Malekizing of the material and															

Recommendations of the Committee of the Board.	Recommendations of the Board.												
Item V p. 7-9. The Committee noted that the opinion of the Research Committee recommending the scheme had since been received. It was recommended that the scheme be approved and the following grant be made to Mr. Khorana (upto 28th February 1951 in the first instance) :— <table><tr><td>Equipment</td><td>...</td><td>Nil.</td></tr><tr><td>Contingencies</td><td>...</td><td>Rs. 500</td></tr><tr><td>Staff (One Research Asstt. on Rs. 160)</td><td>...</td><td>Rs. 1,250 including allowances.</td></tr><tr><td>Total</td><td></td><td><u>Rs. 1,750</u></td></tr></table>	Equipment	...	Nil.	Contingencies	...	Rs. 500	Staff (One Research Asstt. on Rs. 160)	...	Rs. 1,250 including allowances.	Total		<u>Rs. 1,750</u>	Item V. p. 7-9. The Board accepted the recommendation of its Committee.
Equipment	...	Nil.											
Contingencies	...	Rs. 500											
Staff (One Research Asstt. on Rs. 160)	...	Rs. 1,250 including allowances.											
Total		<u>Rs. 1,750</u>											

II

RESEARCH SCHEMES

Item No.	Particulars
	(ii) the newer method of enriching polished white rice with synthetic vitamins and minerals. Processes under category (i) have received limited acceptance because of their inherent disadvantages as undermilling is difficult to regulate, parboiling entails installation of special equipment and lastly these processes have a distinct deteriorating effect on the flavour, the keeping quality and appearance of rice and the whole crop of rice has to pass through the process. The second method overcomes all the disadvantages inherent in the other methods. It is possible to make controlled additions of vitamins (now available at nominal cost) and minerals to rice at low cost ; the appearance and flavour of the rice thus fortified is acceptable and the number and concentration of nutrients can be regulated according to sound nutritional formulae. The investigator has developed a method of fortification of rice on a laboratory scale which involves impregnation of rice with vitamins. Rice so processed, retains 18% more of thiamine after cooking and draining of water as compared with the best existing methods. The cost of processing is also reasonable. By the method evolved by the investigator the cost of fortifying 1 lb. of rice costing 3 annas, is 0.15 annas. The author hopes to bring down the cost on further investigation. The following problems are to be tackled in the investigation :— (i) designing of a plant for processing economically, (ii) impregnation of additional vitamins like ascorbic acid, nicotinic acid, carotene and minerals like iron, on a laboratory scale and their extension on a pilot plant scale and lastly, (iii) development of an ideal coating to minimise the loss of vitamins in washing and cooking of rice. It is also intended to study the period and conditions of storage and to determine the tolerance of the premix to rats and the physiological availability to rats and human beings. It is also proposed to extend the investigation to pilot plant scale. The Investigator holds patents covering his work in U.S.A. of which he is the sole claimant. He claims that no complications can arise on this account. Plants for rice fortification have been established already in other countries such as the Philippines and Singapore. 2. The work is proposed to be undertaken in the Food Technology Section of Indian Institute of Science, Bangalore, where facilities regarding equipment for processing and pilot plant

Recommendations of the Committee of the Board.	Recommendations of the Board.

RESEARCH SCHEMES

Item No.	Particulars										
	experiments are available. The Food Technology Section of the Institute is well equipped with a good animal house for physiological experiments. Facilities are also available for large scale consumer trials in co-operation with the various institutions, orphanages, convents etc. The investigation is expected to take about two years for completion. 3. Details of grant asked for the first year are as under:— <table> <tr> <td>Equipment</td><td>Rs. 4,500</td></tr> <tr> <td>Contingencies</td><td>Rs. 2,000</td></tr> <tr> <td>Staff:</td><td></td></tr> <tr> <td>(A Senior Research Asstt. on a salary of Rs. 270 p.m. in the scale of Rs. 250-500. A Lab. Asstt. on Rs. 60 p.m.)</td><td>Rs. 3,960 plus allowances</td></tr> <tr> <td>Total</td><td>Rs. 10,460 plus allowances</td></tr> </table> 4. Dr. De's scheme was referred to the Central Food Technological Research Institute, Mysore for examination. The comments of the Assistant Director are given below :— “As stated by the author himself there is need for further laboratory work before starting any work on pilot plant scale. The rice problem in India has recently taken a fresh turn consequent on the decision of the Government to reduce the milling to such an extent that there will be about 72% recovery from the paddy, leaving the bran layer, together with all the associated vitamins in the rice, which is distributed to the people and supplementation with any vitamin excepting riboflavin would not be necessary. “There may still be a small demand for extra fortified polished rice. If the Council wishes to encourage this line of work, the author of the scheme may be assisted to carry out some further laboratory research in the first instance. If he perfects his method, the case for setting up a pilot plant may then be considered on its own merits”. The research scheme has now been circulated to the reconstituted Bio-chemical Research Committee for their comments.	Equipment	Rs. 4,500	Contingencies	Rs. 2,000	Staff:		(A Senior Research Asstt. on a salary of Rs. 270 p.m. in the scale of Rs. 250-500. A Lab. Asstt. on Rs. 60 p.m.)	Rs. 3,960 plus allowances	Total	Rs. 10,460 plus allowances
Equipment	Rs. 4,500										
Contingencies	Rs. 2,000										
Staff:											
(A Senior Research Asstt. on a salary of Rs. 270 p.m. in the scale of Rs. 250-500. A Lab. Asstt. on Rs. 60 p.m.)	Rs. 3,960 plus allowances										
Total	Rs. 10,460 plus allowances										

Recommendations of the Committee of the Board.	Recommendations of the Board.
Item VI p. 9-13. The Committee noted that the consolidated opinion of the Research Committee had since been received. The scheme had not been recommended for the following reasons :— 1. Combating vitamin deficiency in India by fortification of rice was not practicable and there was no industry in the country to supply the vitamins required. If an industry came into being administration of vitamins to the people would not be difficult. 2. The laboratory investigations of the author were not complete for pilot plant work to be taken up; and pilot plant investigation which involved engineering could be more adequately taken up in the C.F.T.R.I., Mysore, where facilities were available. The Committee was in general agreement with the above views of the Research Committee and did not recommend the scheme for sanction.	Item VI p. 9-13. The Board accepted the recommendation of its Committee.

RESEARCH SCHEMES

Item No.	Particulars.												
VII	Subject : Scheme to investigate the possibilities of using groundnut oil cake for edible purposes by Dr. S.A. Saletore, Director-in-charge, Laxminarayan Institute of Technology, Nagpur. Synopsis : 1. Dr. Saletore has stated that groundnut oil cake as produced in India at present is not fit for human consumption due to (a) presence of grit (b) presence of colour (c) unpleasant taste and (d) liability to rancidity on storage. The Government of India (Subsidiary Food Production Committee) are trying to popularise the groundnut cake flour, but the flour as marketed is by no means free from the defects mentioned above and unless research is done to remedy the defects, attempts to popularise the article may not meet with much success. The aim of the scheme is to obtain groundnut oil cake free from these defects, particularly unpleasant taste and liability to rancidity by employing suitable methods including a reduction in the oil content and addition of antioxidants. The investigation comprises a study of the following problems :— (i) The maximum oil content permissible for the reasonable degree of stability, (ii) Effect of moisture content and other factors on stability, (iii) Effect of mixture of other raw food materials like Jawar flour with groundnut oil cake and (iv) Effect of partial processing by heat on stability. It is also intended to investigate the possibility of preparation of palatable products from groundnut flour. 2. It is proposed to carry out the work in the Laxminarayan Institute of Technology, Nagpur where all necessary equipment including an electric baking oven are available. Pilot plant, however, will have to be fabricated when required in the later stages of the investigation. Research on laboratory scale is expected to take a minimum of one year. In the second year it should be possible to carry out pilot plant trials. 3. The following grant has been asked for the 1st year : <table> <tr> <td>Equipment</td><td>Nil</td></tr> <tr> <td>Contingencies</td><td>Rs. 1,000</td></tr> <tr> <td>Staff :</td><td></td></tr> <tr> <td>(One Research Asstt. in the scale of Rs. 160-10-330.</td><td></td></tr> <tr> <td>One Lab. Attendant on Rs. 30).</td><td>Rs. 2,280 plus allowances</td></tr> <tr> <td>Total ...</td><td>Rs. 3,280 plus allowances</td></tr> </table>	Equipment	Nil	Contingencies	Rs. 1,000	Staff :		(One Research Asstt. in the scale of Rs. 160-10-330.		One Lab. Attendant on Rs. 30).	Rs. 2,280 plus allowances	Total ...	Rs. 3,280 plus allowances
Equipment	Nil												
Contingencies	Rs. 1,000												
Staff :													
(One Research Asstt. in the scale of Rs. 160-10-330.													
One Lab. Attendant on Rs. 30).	Rs. 2,280 plus allowances												
Total ...	Rs. 3,280 plus allowances												

Recommendations of the Committee of the Board.	Recommendations of the Board.

RESEARCH SCHEMES

Item No.	Particulars.
	4. The scheme was referred to the Vegetable Oils Research Committee. So far as the importance of investigation is concerned they are agreed. It has, however, been pointed out that the solvent extraction of the cake and its subsequent processing would make the process uneconomical. The Chairman of the Committee in his consolidated opinion has made the following suggestion :— “It is not a piece of investigation to which justice can be done by just putting one Research Assistant to the job, but one which would require considerable effort of a number of investigators who can tackle the problem from various aspects. As this is feasible only at a place like the Central Food Technological Research Institute, the problem may be referred to them for investigation.” The scheme was also sent to the Central Food Technological Research Institute, Mysore for comments. They have stated that some work in the subject has already been done at the instance of the Government; double-pressed expeller cake containing about 7-8 percent oil could be used at a level of half to one ounce per day admixed with other human food. Groundnut cake of good quality is fairly safe and its keeping quality is of the same order as that of wheat atta. There is however, a certain amount of uncertainty about the secondary products left after the removal of solvent and toasting of the resulting cake. The product might be suitable for animal consumption, but it was doubtful if it could be safely used for human consumption. The successful establishment of solvent extraction industry in the country was likely to take considerable time, but in the meantime something must be done to improve the quality of the expeller cake to render it suitable for human consumption. The investigation could be taken up at the Central Food Technological Research Institute.
VIII	Subject : Research Scheme for investigation of Indian resources of cornwall stone used in porcelain and pottery manufacture, by Prof. G. Gopala Rao, Professor of Chemistry, Andhra University. Synopsis : 1. Dr. G. Gopala Rao says that cornwall stone is an important fluxing agent and a substitute for felspar in porcelain and pottery manufacture. It has great advantage over felspar as it cures the defects of warping in glazing and prevents crazing when incorporated into glazes. Several deposits of cornwall stone have been located in Nellore District by Dr. G. Gopala Rao and Dr. M. S. Krishnan. Analyses and authentic tests of samples from these deposits have been carried out by Dr. G. Gopala Rao. Cornwall stone is already in use as a fluxing material in

Recommendations of the Committee of the Board.	Recommendations of the Board.
Item VII p. 15-17. The Committee agreed with the opinion of the Vegetable Oils Research Committee and did not recommend the scheme for sanction. It was noted that investigations on the use of groundnut oil cake for edible purposes were already under-way in the Central Food Technological Research Institute, Mysore. The Committee recommended that the three separate aspects, namely, human feeding, cattle feeding and manurial uses be separately investigated and the results collected.	Item VII p. 15-17. The Board accepted the recommendation of its Committee.

SEARCH SCHEMES

em No.	Particulars.																								
	other countries as a substitute for felspar in white-ware compositions. The proposed investigation would be, therefore, of great value to the Indian ceramic industry. The object of the present scheme is to carry out comprehensive investigation and factory trials in the use of this material in pottery manufacture. 2. The investigation is proposed to be conducted at Andhra University, where facilities are available and is expected to be completed in three years. Large scale trials could be arranged in ceramic factories in South India. 3. Dr. Gopala Rao has asked for the following grant :— <table><tr><td>Equipment</td><td>...</td><td>...</td><td>Nil</td></tr><tr><td>Contingencies</td><td>...</td><td>...</td><td>Rs. 2,000</td></tr><tr><td>Staff :</td><td></td><td></td><td></td></tr><tr><td>(One Ceramist on Rs. 160-10-330</td><td></td><td></td><td></td></tr><tr><td>One Analytical Chemist on Rs. 160-10-330)</td><td>...</td><td>Rs 3,840</td><td>plus allowances</td></tr><tr><td>Total</td><td>...</td><td>Rs. 5,840</td><td>plus allowances</td></tr></table> 4. The scheme was referred to the Glass and Refractories Research Committee for opinion. Two members have recommended the scheme, but for a period of one year only. Three members have not recommended the investigation since felspar is available in ample quantities in India. One member has asked whether the investigation could not be taken up at the Central Glass and Ceramic Research Institute.	Equipment	...	...	Nil	Contingencies	...	...	Rs. 2,000	Staff :				(One Ceramist on Rs. 160-10-330				One Analytical Chemist on Rs. 160-10-330)	...	Rs 3,840	plus allowances	Total	...	Rs. 5,840	plus allowances
Equipment	...	...	Nil																						
Contingencies	...	...	Rs. 2,000																						
Staff :																									
(One Ceramist on Rs. 160-10-330																									
One Analytical Chemist on Rs. 160-10-330)	...	Rs 3,840	plus allowances																						
Total	...	Rs. 5,840	plus allowances																						
IX	Subject : Research scheme on development of a new roofing material (Krisone Crete) with gypsum, particularly of low qualities by Messrs. Krishan Singh & Sons, New Delhi. Synopsis : 1. The object of this investigation is to develop a new roofing material from gypsum, particularly of low grades. Asbestos cement sheets are mainly made at present from imported material. The proposed process will employ only indigenous raw-materials. Clay as a building material has proved its worth and stood the test of time, but no methodical progress has been made to simplify or dispense with some of the tedious and expensive processes involved in brick and tile																								

Recommendations of the Committee of the Board.	Recommendations of the Board.
Item VIII p. 17-19. The Committee agreed with the opinion of the Research Committee and did not recommend the scheme for sanction. It was recommended that the Central Glass and Ceramic Research Institute be requested to prepare a survey report on the work already done in the subject.	Item VIII p. 17-19. The Board accepted the recommendation of its Committee.

RESEARCH SCHEMES

Item No.	Particulars.																
	making. It is possible to destroy the plasticity of clay and introduce cohesion by simpler and cheaper methods which reduce or minimise the cost of brick making and the operations involved therein namely, moulding, kilning, firing and brick laying. The proposed Krisone Crete process if employed would also make it possible to utilise most of the common clays with varying compositions. The steps involved in the proposed process are given below :— (i) Calcination of the clay at temperature ranges of 350° to 950°C depending on the nature of clay, to take away its shrinkage and remove the plasticity. Water released during the process would help to disintegrate the mass. (ii) Sprinkling water at the exit end on the hot clinker, which has the double action of cooling and aerating the mass. (iii) Imparting plasticity to the calcined mass by artificial methods. The stabilizing, agents which could be used for this purpose are mud, cement, lime, gypsum, gum etc. The “retard” and “acceleration” periods are adjustable between 5 and 10 minutes and the process is quick action and can be worked efficiently. The surface of the blocks made from calcined clay can be decorated in relief or can carry a fine film of cement in the process of pressing. The burnt material can be converted into blocks, roofing tiles or roofing sheets with or without the addition of fibres for reinforcement. Preliminary work on the above lines had proved very encouraging, but it was necessary to standardise and finalize the process for adaption to commercial scale manufacture. 2. Mr. Krishan Singh, the proprietor of the firm claims that he has been carrying on development work in ceramic and building materials and has considerable experience in this line. 3. The following grant has been asked for :— <table> <tr> <td>Equipment :</td><td></td></tr> <tr> <td>plant, equipment and tools etc.</td><td>... Rs. 20,000</td></tr> <tr> <td>Contingencies :</td><td></td></tr> <tr> <td>Raw materials, labour, processing cost, fuel, power and incidentals...</td><td>... Rs. 10,000</td></tr> <tr> <td>Miscellaneous and unforeseen ...</td><td>... Rs. 5,000</td></tr> <tr> <td>Reserves ...</td><td>... Rs. 5,000</td></tr> <tr> <td>Staff : ...</td><td>... Nil</td></tr> <tr> <td>Total</td><td>... Rs. 40,000</td></tr> </table>	Equipment :		plant, equipment and tools etc.	... Rs. 20,000	Contingencies :		Raw materials, labour, processing cost, fuel, power and incidentals...	... Rs. 10,000	Miscellaneous and unforeseen ...	... Rs. 5,000	Reserves ...	... Rs. 5,000	Staff : ...	... Nil	Total	... Rs. 40,000
Equipment :																	
plant, equipment and tools etc.	... Rs. 20,000																
Contingencies :																	
Raw materials, labour, processing cost, fuel, power and incidentals...	... Rs. 10,000																
Miscellaneous and unforeseen ...	... Rs. 5,000																
Reserves ...	... Rs. 5,000																
Staff : ...	... Nil																
Total	... Rs. 40,000																

Recommendations of the Committee of the Board.	Recommendations of the Board.

RESEARCH SCHEMES

Item No.	Particulars																				
	4. The research scheme was referred to the Building Research Committee for opinion. The scheme was considered by the Building Research Committee on the 7th August, 1950. The members desired some time to study the scheme in detail and agreed to send their comments at an early date. (Vide Proceedings of the Building Research Committee Item No. 5 p. 79—83 of this Agenda.)																				
X	Subject : A scheme of research on surface treatment of reinforcement to improve properties of reinforced concrete by Dr. S.R. Sengupta, Principal, Bengal Engineering College, Howrah. Synopsis : 1. Dr. Sengupta says that failure of reinforced concrete is often the cause of deterioration of the quality of reinforcement. The object of the scheme is to develop a suitable method of surface treatment of reinforcement to prevent such deterioration. In foreign countries different protective coatings have been tried out but not with much success. No systematic work on the problem has been done in this country. Some preliminary work has been done on the subject in the Bengal Engineering College. 2 The investigation is expected to take two years and will be guided by Dr. B. Seth, Professor of Civil Engineering and Dr. Sengupta. 3. The following grant has been asked for :— <table><tr><td>Equipment</td><td>...</td><td>...</td><td>Nil</td></tr><tr><td>Contingencies</td><td>...</td><td>...</td><td>Rs. 1,000</td></tr><tr><td>Staff :</td><td></td><td></td><td></td></tr><tr><td>(One Civil Engineer on all inclusive salary of Rs. 250 p.m.)</td><td>...</td><td>...</td><td>Rs. 3,000</td></tr><tr><td></td><td></td><td>Total</td><td>Rs. 4,000</td></tr></table> 4. The scheme was referred to the Building Research Committee. The scheme was considered by the Building Research Committee on the 7th August, 1950. The members desired some time to study the scheme in detail and agreed to send their comments at an early date. (Vide Proceedings of the Building Research Committee Item No. 5 p. 79—83 of this Agenda)	Equipment	...	...	Nil	Contingencies	...	...	Rs. 1,000	Staff :				(One Civil Engineer on all inclusive salary of Rs. 250 p.m.)	...	...	Rs. 3,000			Total	Rs. 4,000
Equipment	...	...	Nil																		
Contingencies	...	...	Rs. 1,000																		
Staff :																					
(One Civil Engineer on all inclusive salary of Rs. 250 p.m.)	...	...	Rs. 3,000																		
		Total	Rs. 4,000																		

X

Recommendations of the Committee of the Board.	Recommendations of the Board.
Item IX p. 19-23. The Committee noted that the consolidated opinion of the Building Research Committee had since been received. The Research Committee was of the opinion that the information supplied by the author was not sufficient and more details should be obtained. The Committee agreed with the opinion of the Research Committee and did not recommend the scheme for sanction but recommended that Mr. Krishan Singh be requested to furnish more details as desired by the Research Committee for further consideration by them.	Item IX p. 19-23. The Board noted and accepted the recommendations of its Committee.
Item X p. 23. The Committee noted that the consolidated opinion of the Research Committee had since been received. The majority of the members of the Research Committee were of the view that the scheme was vague and no grant need be recommended. The Committee was of the opinion that research schemes should as far as possible be discussed in detail by the Research Committee before making the final recommendation as the consolidated opinion obtained by circulation alone may not represent the considered opinion of the Research Committee. It was therefore recommended that the scheme be referred back to the Research Committee for further consideration by discussion.	Item X p. 23. The Board accepted the recommendation of its Committee. The Board, however, considered that where there was unanimous recommendation by members of a Research Committee no meeting was necessary. In the case of difference of opinion in regard to important aspects of the schemes, they should be considered at a meeting of the Research Committee and it was for the Chairman to decide whether the matter was important enough for a meeting to be held. It was also recommended that not more than two meetings of a Research Committee be held in one year and at least one meeting be held to review the progress of work under its purview.

RESEARCH SCHEMES

Item No.	Particulars.																				
XI	Subject : Scheme of research on improvement of the setting properties of cement by Dr. S.R. Sengupta, Principal, Bengal Engineering College, Howrah. Synopsis : 1. The object of this scheme is to develop a method of prevention of cracks in the setting of cement. Dr. Sengupta says that introduction of certain chemicals has been tried for this purpose in foreign countries with a certain measure of success but no work has been done in India. Some preliminary investigations have been conducted. 2. Necessary equipment is available at the Bengal Engineering College Laboratory where the investigation is proposed to be carried out. The work is expected to take one to two years. Mr. P. B. Ghosh, Assistant Professor of Civil Engineering and Mr. H.C. Roy, Lecturer in Chemistry will be the principal investigators. 3. Dr. Sengupta has asked for the following grant : <table><tr><td>Equipment</td><td>...</td><td>...</td><td>Nil</td></tr><tr><td>Contingencies</td><td>..</td><td>...</td><td>Rs. 1,200</td></tr><tr><td>Staff :</td><td></td><td></td><td></td></tr><tr><td>(One Civil Engineer Research Scholar on Rs. 250 consolidated).</td><td>...</td><td>...</td><td>Rs. 3,000</td></tr><tr><td>Total</td><td>...</td><td>...</td><td>Rs. 4,200</td></tr></table> 4. The scheme was referred to the Building Research Committee for opinion. The scheme was considered by the Building Research Committee on the 7th August, 1950. The members desired some time to study the scheme in detail and agreed to send their comments, at an early date. (Vide Proceedings of the Building Research Committee Item No. 5 p. 79—83 of this Agenda.)	Equipment	...	...	Nil	Contingencies	..	...	Rs. 1,200	Staff :				(One Civil Engineer Research Scholar on Rs. 250 consolidated).	...	...	Rs. 3,000	Total	...	...	Rs. 4,200
Equipment	...	...	Nil																		
Contingencies	..	...	Rs. 1,200																		
Staff :																					
(One Civil Engineer Research Scholar on Rs. 250 consolidated).	...	...	Rs. 3,000																		
Total	...	...	Rs. 4,200																		
XII	Subject : Research scheme on engineering properties of soil by Dr. S.R. Sengupta, Principal, Bengal Engineering College, Howrah. Synopsis : 1. The aim of the research scheme is : (i) To study and classify soils for constructional purposes. (ii) To develop suitable methods for soil consolidation. Dr. Sengupta has pointed out that soil mechanics as a science has been developed in foreign countries specially in U.S.A. and in the last 25 years a great deal of work has been done in the subject. In India no systematic work had been conducted although some preliminary work had been done.																				

Recommendations of the Committee of the Board.	Recommendations of the Board.
Item XI p. 25. The Committee noted that the consolidated opinion of the Research Committee had since been received. The majority of the members of the Research Committee had not recommended the scheme as they considered it to be vague. It was recommended that the scheme be referred back to the Research Committee for further consideration by discussion.	Item XI p. 25. The Board noted and accepted the recommendation of its Committee.

RESEARCH SCHEMES

Item No.	Particulars.
XXIII	2. The investigation is to be carried out by a team of investigators consisting of Dr. B. Seth, Professor of Applied Civil Engineering, Dr. P. Chatterjee, Professor of Applied Mechanics, Dr. B.B. Sen, Professor of Mathematics and Dr. S. R. Sengupta.
	3. Dr. Sengupta has asked for the following grant :—
	Equipment ... Nil
	Contingencies ... Rs. 1,000
	Staff : Rs. 6,000
	(One Civil Engineer Research Scholar on Rs. 250 p.m.
	One Mathematician Research Scholar on Rs. 250 p.m.)
	Total ... Rs. 7,000
	4. The scheme was referred to the Building Research Committee.
	The scheme was considered by the Building Research Committee on the 7th August, 1950. The members desired some time to study the scheme in detail and agreed to send their comments at an early date. (Vide Proceedings of the Building Research Committee Item No. 5 p. 79—83 of this Agenda.)
	Subject : Research scheme on the design of suitable 'heat pump system' (reverse cycle refrigeration) to suit Indian conditions by Dr. S R. Sengupta, Principal, Bengal Engineering College, Howrah.
	Synopsis :
	1. Dr. Sengupta says that the same air-conditioning units may be employed for summer cooling and winter heating, using well water or pond water as the source of heat. The waste heat of an industrial plant may also be utilised in the same manner. Such a unit may be three to four times as efficient as an all electric system. This unit would be particularly suitable for a country like India, where on the average temperature fluctuations are of the order of 50-60° F.
	A few installations of this type have been built in U.S.A. by Ambrose and Philip Sporn of the American Gas & Electric Service Corp. New York and E.N. Kemler of Southern Research Institute, Ala, but no work of any practical nature has so far been attempted in India. Theoretical study of the subject has been made and necessary literature has been collected.
	2. The investigation is to be conducted in the Mechanical and Engineering Department of the Bengal Engineering College and is expected to take one and a half years. The investigators will be Mr. A. C. Roy, Professor of Mechanical Engineering and Mr. R.N. Banerjee, Assistant Professor.

Recommendations of the Committee of the Board.	Recommendations of the Board.
Item XII p. 25-27. The Committee noted that the consolidated opinion of the Research Committee had since been received according to which the scheme was not specific but vague. It was recommended that the scheme be referred back to the Research Committee for further consideration by discussion.	Item XII p. 25-27. The Board noted and accepted the recommendation of its Committee.

RESEARCH SCHEMES

Item No.	Particulars.																		
	3. Dr. Sengupta has asked for the following grant :— <table><tr><td>Equipment :</td><td>...</td><td>Rs. 8,000</td></tr><tr><td colspan="3">(1½ h.p. condensing unit, three room thermostats, five remote bulb recording thermometers, accessories etc.)</td></tr><tr><td>Contingencies</td><td>...</td><td>Rs. 1,000</td></tr><tr><td>Staff :</td><td></td><td></td></tr><tr><td>(One Research Scholar on Rs. 250 p.m. consolidated)</td><td>...</td><td>Rs. 3,000</td></tr><tr><td>Total</td><td>...</td><td>Rs. 12,000</td></tr></table>	Equipment :	...	Rs. 8,000	(1½ h.p. condensing unit, three room thermostats, five remote bulb recording thermometers, accessories etc.)			Contingencies	...	Rs. 1,000	Staff :			(One Research Scholar on Rs. 250 p.m. consolidated)	...	Rs. 3,000	Total	...	Rs. 12,000
Equipment :	...	Rs. 8,000																	
(1½ h.p. condensing unit, three room thermostats, five remote bulb recording thermometers, accessories etc.)																			
Contingencies	...	Rs. 1,000																	
Staff :																			
(One Research Scholar on Rs. 250 p.m. consolidated)	...	Rs. 3,000																	
Total	...	Rs. 12,000																	
	4. The scheme was referred to the Building Research Committee and the Physical Research Committee. The scheme was considered by the Building Research Committee on the 7th August, 1950. The members desired some time to study the scheme in detail and agreed to send their comments at an early date. (Vide Proceedings of the Building Research Committee Item No. 5 p. 79-83 of this Agenda.)																		
XIV	Subject : Research Scheme on the development of gas producer and/or a combustion chamber to accept solid fuels for use in gas turbine power plants by Dr. H. A. Havemann, Head of the Department of Internal Combustion Engineering, Indian Institute of Science, Bangalore. Synopsis : 1. The object of this scheme is to find out means to utilise low grade coals available in abundance in India as fuel in internal combustion engines and in particular for gas turbines. There are two methods of approach to this problem: (i) Direct combustion of the fuel inside the engine with suitable modification of the combustion chamber. (ii) Gasification of the fuel and purification external to the engine and then using it as gaseous fuel in the usual way by burning it in a combustion chamber. The first method will be applicable to stationary and mobile gas turbines. The second may be more suitable for stationary or marine gas turbines, where there are no rigid restrictions regarding space requirements and weight. Pulverised coal has been tried as a gas turbine fuel in U.S.A. and Switzerland, but no conclusive results have been achieved. Intensive and extensive experiments on the subject are also																		

Recommendations of the Committee of the Board.	Recommendations of the Board.
Item XIII p. 27-29. The Committee noted that the consolidated opinion of the Building Research Committee had since been received and that they had not recommended the scheme for sanction. It was recommended that the scheme be referred back to the Research Committee for further consideration by discussion.	Item XIII p. 27-29. The Board noted and accepted the recommendation of its Committee

RESEARCH SCHEMES

Item No.	Particulars.																												
	being conducted in England and other Continental countries. Certain types of gas producers have also been built in India, but these plants are of very limited output, bulky, inefficient and uneconomical. The adoption of these units for gas turbines is technically not possible. In the initial stages, the proposed investigation involves fundamental research on combustion, flow of gases and behaviour of very fine particles suspended in such gases. The results achieved would later be applied to the development of combustion chamber and/or a gasifier to accept solid fuels. At present most of the power supply to industry in India is from thermal stations using either coal or bunker oil (imported), resulting in low efficiency of power generation and high power costs. The present scheme if successful would result in the development of high efficiency gas turbine plants working on indigenous coals and a new industry to manufacture gas turbines would come into being in the country. Prof. Havemann has already developed a combustion chamber suitable for heavy liquid fuels at the National Gas Turbine Establishment, England, resulting in several patents. The technique developed for heavy liquid fuels could be applied to the solution of the present problem. 2. The work is intended to be carried out in the Internal Combustion Engineering Department of the Indian Institute of Science, Bangalore, where work on gas turbines has been planned and started and where some equipment is already available. The existence of a ceramic industry in the neighbourhood of the Institute, where suitable ceramic material for use in combustion chamber lining could be manufactured is also a great advantage. The investigation is expected to take a period of three years. 3. The following grant has been asked for :— <table><tr><td>Equipment</td><td>..</td><td>...</td><td>Rs. 30,000</td></tr><tr><td>Contingencies</td><td>..</td><td>—</td><td>Rs 13,000</td></tr><tr><td>Staff :</td><td></td><td></td><td></td></tr><tr><td>(Two Research Asstts. at Rs. 200 p. m. in the grade of Rs. 160-10-330.</td><td></td><td></td><td></td></tr><tr><td>Two Lab. Asstts. at Rs. 72 p. m. in the grade of Rs. 60-4-120-5-150.</td><td></td><td></td><td></td></tr><tr><td>Two Mechanics at Rs. 60 p. m. in the grade of Rs. 60-4-120-5-150)</td><td>...</td><td>...</td><td>Rs. 12,768</td></tr><tr><td>Total</td><td>...</td><td>Rs.</td><td>55,768</td></tr></table> 4. The scheme has been referred to the Internal Combustion Engines Research Committee for opinion.	Equipment	..	...	Rs. 30,000	Contingencies	..	—	Rs 13,000	Staff :				(Two Research Asstts. at Rs. 200 p. m. in the grade of Rs. 160-10-330.				Two Lab. Asstts. at Rs. 72 p. m. in the grade of Rs. 60-4-120-5-150.				Two Mechanics at Rs. 60 p. m. in the grade of Rs. 60-4-120-5-150)	...	...	Rs. 12,768	Total	...	Rs.	55,768
Equipment	..	...	Rs. 30,000																										
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Two Mechanics at Rs. 60 p. m. in the grade of Rs. 60-4-120-5-150)	...	...	Rs. 12,768																										
Total	...	Rs.	55,768																										

Recommendations of the Committee of the Board.	Recommendations of the Board.
Item XIV p 29-31. The Committee noted that the Chairman of the Internal Combustion Engines Research Committee had since informed the D.S.I.R. that there was difference of opinion among the members of the Committee on the scheme in the form in which it had been submitted by Prof. Havemann and that it would be discussed at the meeting of the Research Committee to be held in November. It was recommended that the D.S.I.R. be authorised to take necessary action departmentally on the recommendation of the Research Committee when received.	Item XIV p. 29-31. The Board noted and accepted the recommendation of its Committee.

RESEARCH SCHEMES

Item No.	Particulars.
XV	Subject : Scheme on development of methods to cool blades of gas turbines by Dr. H.A. Havemann, Head of the Department of Internal Combustion Engineering, Indian Institute of Science, Bangalore. Synopsis : 1. The efficiency of a modern gas turbine can be improved by some method of employing high inlet temperatures, as at present the inlet temperature is limited by the material used in turbine blades. There are two methods of getting over this difficulty : (i) By producing blade materials that can stand higher temperatures, and (ii) By cooling the blades. Investigation has so far been mainly directed to the first method. The search for raw materials in the field of steel alloys has not been very encouraging on account of the high cost and limitations imposed by the physical properties. Nimonic 80, a nickel alloy developed and used in the U.K., is costly and difficult to machine and would be unsuitable for India which is short of nickel. It is, therefore, the aim of the present scheme to pursue the second method i.e. cooling the turbine blades which can be made from ordinary cheap heat resistant materials such as stainless steel. The problem of blade cooling is under continued experimentation in U.K. and U.S.A. and formerly in Germany. Of the different methods detailed below, which are being used abroad, not one method has been found to be sufficiently simple and suitable for use : (i) Use of hollow blades through which cooling air is circulated. (ii) Use of stream of cold air issuing from nozzles along the leading edges of the blades. (iii) Porous blade cooling. (iv) Circulating water through passages drilled in the core of the blade by utilising the C.F. forces developed in the turbine wheel and thermal convection current set up. It is, therefore, found necessary to take up this work in India. In the early stages the problem will be of fundamental nature, pertaining to heat transfer between hot gases and blades and the coolant. Later, when a successful basic method of cooling has been evolved more work of an applied nature on the question of recirculation of the absorbed heat in the thermodynamic cycle of the gas turbine power plant by means of heat exchanger would be done.

Recommendations of the Committee of the Board.	Recommendations of the Board.

RESEARCH SCHEMES

Item No.	Particulars																		
	Dr. Havemann has long been associated with the work of internal cooling of turbine blades in Germany with Prof. E. Schmidt. Recently he has made a patent suggestion in the field of turbine blade cooling which is under consideration of the Patent Advisory Committee of the Government of India. 2. The work is to be carried out at the Indian Institute of Science, where work connected with gas turbines has already been started at the instance of the Ministry of Education, Government of India. The assistance of the Metallurgy Department of the Indian Institute of Science and Messrs. Hindustan Aircraft Factory will also be available. 3. Dr. Havemann has asked for the following grant : — <table> <tr> <td>Equipment</td><td>... Rs. 25,000</td></tr> <tr> <td>Contingencies</td><td>... Rs. 12,250</td></tr> <tr> <td>Staff :</td><td>... Rs. 7,368 plus allowances</td></tr> <tr> <td colspan="2">(One Senior Research Asstt. in the scale of Rs. 250-25-500.</td></tr> <tr> <td colspan="2">One Junior Research Asstt. in the scale of Rs. 160-10-330 on Rs. 200.</td></tr> <tr> <td colspan="2">One Lab. Asstt. in the scale of Rs. 60-4-100-5-150 on Rs. 72.</td></tr> <tr> <td colspan="2">Draughtsman in the scale of Rs. 60-4-120-5-150 on Rs. 72.</td></tr> <tr> <td colspan="2">One Mechanic in the scale of Rs. 60-4-120-5-150.)</td></tr> <tr> <td>Total</td><td>... Rs. 44,618 plus allowances</td></tr> </table> 4. The scheme has been referred to the Industrial Combustion Engines Research Committee for opinion.	Equipment	... Rs. 25,000	Contingencies	... Rs. 12,250	Staff :	... Rs. 7,368 plus allowances	(One Senior Research Asstt. in the scale of Rs. 250-25-500.		One Junior Research Asstt. in the scale of Rs. 160-10-330 on Rs. 200.		One Lab. Asstt. in the scale of Rs. 60-4-100-5-150 on Rs. 72.		Draughtsman in the scale of Rs. 60-4-120-5-150 on Rs. 72.		One Mechanic in the scale of Rs. 60-4-120-5-150.)		Total	... Rs. 44,618 plus allowances
Equipment	... Rs. 25,000																		
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One Lab. Asstt. in the scale of Rs. 60-4-100-5-150 on Rs. 72.																			
Draughtsman in the scale of Rs. 60-4-120-5-150 on Rs. 72.																			
One Mechanic in the scale of Rs. 60-4-120-5-150.)																			
Total	... Rs. 44,618 plus allowances																		
XVI	Subject : Research Scheme on the production method and properties of low carbon alloyed steels containing 1-5 per cent manganese made with electrolytic manganese by Messrs. Tata Iron and Steel Co., Ltd., Jamshedpur. Synopsis : 1. As a result of investigation conducted in the Laboratories of the Tata Iron and Steel Co., Ltd., under the auspices of the C.S.I.R., it has been shown that manganese could successfully replace part of the nickel in austenitic nickel-chromium steels. Considering the fact that very little nickel is available in India and has to be imported, the results of this investigation are of far reaching																		

Recommendations of the Committee of the Board.	Recommendations of the Board.
Item XV p. 33-35. The Committee noted that the Chairman of the Internal Combustion Engines Research Committee had since informed the D.S.I.R. that there was difference of opinion among the members of the Committee on the scheme in the form in which it had been submitted by Prof. Havemann and that it would be discussed at the meeting of the Research Committee to be held in November. It was recommended that the D.S.I.R. be authorised to take necessary action departmentally on the recommendation of the Research Committee when received.	Item XV p. 33-35. The Board noted and accepted the recommendation of its Committee.

RESEARCH SCHEMES

Item No.	Particulars.
	importance to steel industry in this country. Ordinarily fully austenitic steels employing manganese in the steel composition have a high carbon content, but such steels have a limited application and investigation has to be directed towards the development of chromium manganese austenitic steels with a low carbon content. On the recommendation of the Metals Research Committee Dr. Schrader, Director of Scientific Services, Tisco, has submitted the following research scheme for undertaking this work :— Because of the rather high phosphorus content of the Indian coals, ferro-manganese of indigenous make contains rather high proportion of phosphorus and as such cannot be used for making alloyed manganese steels of low carbon content and high impurity degree and has consequently to be imported. Electrolytic manganese could efficiently replace the imported material. It has been pointed out that several groups of low carbon manganese-containing alloyed steels, such as sheets for railway coaches, manganese case hardening steels, welding rods for welding high carbon steels such as in armour plates and free cutting steels of low silicon and low carbon content could be produced, making use of electrolytic manganese. The compositions of some of these steels had been developed in Germany and the chromium-manganese-molybdenum steels and the chromium-manganese case hardening steels had completely replaced the chromium-nickel case hardening steels. All such steels, however, are made at present with low carbon ferro-manganese produced in electric furnaces and not electrolytic manganese metal. The proposed investigation is of practical importance to industry in India as the production of welded steels with increased strength and diminished porosity in the welding seams will assist the manufacture of welded construction, decreasing the consumption of imported nickel. The scheme will be taken up in partial problems : (i) Investigations of nickel free case hardening steels and free cutting manganese steels are expected to take about a year's time for completion. (ii) The remaining problems comprising production of manganese structural steels of increased strength and improved weldability or low as well as high alloyed electrodes involving the development of suitable coating are expected to take about two years after the necessary additional equipment has been made available 2. It is proposed to conduct investigational work in the plants and research laboratories of Tata Iron and Steel Co., Ltd., Jamshedpur where facilities for melting, working, treating, determining the physical properties and microscopical observations as well as trained personnel are available. Specialised equipment for investigating machinability and behaviour during welding, however, will have to be procured for the investigation.

Recommendations of the Committee of the Board.	Recommendations of the Board.

SEARCH SCHEMES

Item No.	Particulars.
	3. The following grant has been asked for :— Equipment : (For use of the necessary equipment available at the Tata Iron and Steel Co., Ltd.) ... Rs. 1,000 Contingencies: Rs. 9,700 1½ tons electrolytic manganese metal Rs. 3,500 Melting and Casting alloys Rs. 2,500 Forging heat treatment ... Rs. 500 Machining test pieces Rs. 1,000 Mechanical test ... Rs. 750 Chemical analysis ... Rs. 400 & Micro-examination Rs. 750 Photography and printing charges ... Rs. 300 Staff : (One Research Asstt. and One Laboratory Asstt. Rs. 500 p.m.)... Rs. 6,000 Total Rs. 16,700 4. The scheme was referred to the Chairman, Metals Research Committee for opinion. He has recommended that the scheme be approved and the grant applied for be sanctioned.
XVII	Subject: Schemes of research on : (A) investigation on aluminium alloy bearings. (B) studies on the solidification characteristics of pure metals and alloys. (C) studies on the effect on the malleabilisation cycles of cast iron by the addition of cerium, zirconium and magnesium. (D) studies on the production of aluminium metal by the electrolysis of molten anhydrous aluminium chloride.—by Dr. E. G. Ramachandran, Assistant Professor of Metallurgy, Indian Institute of Science, Bangalore. Synopsis : The Director, Indian Institute of Science, Bangalore, has forwarded the above four schemes of research for consideration of the Council. In forwarding them he writes : “the schemes have been arranged in order of priority and the investigations will be conducted under the guidance of Dr. Ramachandran who holds the Ph.D. Degree in Metallurgy

Recommendations of the Committee of the Board.	Recommendations of the Board.
Item XVI p. 35-39. The Committee noted with satisfaction that the earlier scheme of preliminary investigation on the production of austenitic steels employing manganese had been successful. It was therefore recommended that the scheme submitted by Dr. Schrader of the Tatas for development of chrome-manganese steels of low carbon content be approved for sanction subject to the usual conditions.	Item XVI p. 35-39. The Board noted and accepted the recommendation of its Committee.

RESEARCH SCHEMES

Item No.	Particulars.
	of the University of Sheffield and is well qualified to handle the schemes of research. The estimates of expenditure under the various heads have been made to secure the highest economy and efficiency." (A) 1. The object of this scheme is to conduct investigations on the manufacture of aluminium alloy bearings and to test their hardness and micro-structure and other properties for their suitability under Indian conditions so as to satisfactorily replace tin base bearings. Aluminium bearings on account of their superior fatigue and corrosion resistance are well suited for aircrafts. Investigations directed to the development of aluminium alloys for bearings are in progress in U.S.A., Germany and U.K. and some literature on the subject is available, but nothing has so far been done in this country. The investigation as far as alloying and testing of aluminium alloy bearings is concerned is of academic nature but the substitution of tin by aluminium is not only of industrial importance but has strategic value as India has to import all tin requirements from abroad. The investigation is expected to take 1½ or 2 years :— 2. The following grant has been asked for :— Equipment : (Oil fired crucible furnace, bearing testing machine, metals and alloys) Rs. 4,000 Contingencies Rs. 2,300 Staff : (Metallurgist on Rs. 160 p.m. in the grade of Rs. 160-10-330 One Assistant Mechanic on Rs. 60 p.m. in the grade of Rs. 60-5/2-75 One Lab. Helper on Rs. 35 p.m. in the grade of Rs. 35-1-50) Rs. 3,060 plus allowances. Total Rs. 9,360 plus allowances.

Recommendations of the Committee of the Board.	Recommendations of the Board.
Item XVII (A) p. 39-41. The Committee noted that the following consolidated opinion of the Metals Research Committee had since been received :— "Before undertaking experimental work on aluminium alloy bearings, an initial survey of the research work already carried out in the subject be undertaken for which a grant of Rs. 1,000 may be sanctioned. On receipt of the survey report, the scheme would be further considered regarding the experimental work to be carried out." The Committee noted that it was not the policy of the Council to finance literature survey which normally should be done by the Investigator himself, as a preliminary study of the subject was necessary before any research investigation could be taken up. It was, therefore, recommended that the Investigator be requested to furnish a survey report as desired by the Research Committee for further consideration by them. It was recommended that the National Metallurgical Laboratory be requested to give all the facilities available for the literature survey.	Item XVII (A) p. 39-41. The Board noted and accepted the recommendations of its Committee.

RESEARCH SCHEMES

Item No.	Particulars.
	(B) 1. The object of this investigation is to study the formation of chill and columnar crystals on solidification in horizontal as well as inclined moulds and to study the segregation characteristics on solidification of pure metals and alloys. Dr. Ramachandran says that the investigation is more of a fundamental nature but has possibilities of extensive application in industry. 2. Equipment for micro-and macro-structural examination as well as for study of segregation by hardness etc., are available. The investigation is expected to be completed in 1½ or 2 years. 3. The following grant has been asked for : Equipment : (Metals, melting unit electrical wire-wound) ... Rs. 700 Contingencies ... Rs. 300 Staff : (1 Lab. Asstt. on Rs. 100 p. m. in the grade 100-5-120-8-200-10/2-220 1 Lab. Helper on Rs. 35 p. m. in the grade 35-1-50) ... Rs. 1,620 plus allowances. Total ... Rs. 2,620 plus allowances. (C) 1. Dr. Ramachandran says that it is now generally accepted that the addition of cerium under certain conditions gives rise to nodular graphite which is the chief requisite constituent in malleableised cast iron. The object of the present investigation is to study the effect of cerium, zirconium and magnesium on the micro-structure and malleableisation characteristics of Indian cast irons and to evolve methods which will enable reduction in the length of the malleableisation cycle. The investigation is of importance to industry as the shortening of the malleableisation cycle will lead to a reduction of the cost of malleableised articles and increase in production output. The work is expected to take 1½ or 2 years from the commencement.

Recommendations of the Committee of the Board.	Recommendations of the Board.
Item XVII (B) p. 43. The Committee noted that the consolidated opinion of the Metals Research Committee had since been received. According to the Chairman, the scheme on solidification characteristics of pure metals and alloys was not approved, as this subject should more appropriately be taken up at the National Metallurgical Laboratory. The Committee agreed that the subject was one for long range investigation for the N.M.L. to take up and not suitable for an ad-hoc scheme and did not recommend the scheme for sanction.	Item XVII. (B) p. 43. The Board noted and accepted the recommendation of its Committee.

RESEARCH SCHEMES

Item No.	Particulars.
2.	The following grant has been asked for :— Equipment : (One melting unit, muffle furnace for malleableisation) Rs. 5,000 Contingencies Rs. 1,750 Staff : (One Sr. Metallurgist in the grade of Rs. 250-25-500) One Mechanic in the grade of Rs. 60-5/2-75-3-105. One Lab. Helper on Rs. 35 p.m. in the grade of Rs. 35-1-50) Rs. 4,140 plus allowances. Total Rs. 10,890 plus allowances. (D) 1. The object of this scheme is to investigate the possibility of the production of aluminium metal by the electrolysis of molten anhydrous aluminium chloride. Dr. Ramachandran says that the electrolysis of aluminium chloride for the production of aluminium metal as far as India is concerned appears to offer a attractive and fruitful field of study, as the established method of production of the metal from bauxite involves not only import of cryolite but also a continuous demand on the country's resources of high grade coal and coke. The operation also appears to require lower operating temperature and obviates the necessity of using high purity bauxite required for the process now in use. Laboratory scale experiments on production of aluminium by the electrolysis of molten anhydrous aluminium chloride have been conducted in U.S.A., but no work has been done in India. The work is expected to take about 1½ to 2 years. 2. The following grant has been asked for :— Equipment : (Nickel vessels, electrical meters, carbon anodes, chlorine in cylinders) Rs. 4,000 Contingencies : Rs. 1,150 Staff : (Research Asstt. on Rs. 160 p. m. in the grade Rs. 160-10-330. One Lab. Asstt. on Rs. 100 p. m. in the grade Rs. 100-5-120-8-200-10/2-220. One Lab Helper on Rs. 35 in the grade Rs. 35-1-50) Rs. 3,520 plus allowances. Total Rs. 8,670 plus allowances. 3. All the four schemes outlined above have been referred to the Metals Research Committee for opinion.

Recommendations of the Committee of the Board.	Recommendations of the Board.															
Item XVII (C) p. 43-45 The Committee noted that the consolidated opinion of the Research Committee had since been received. They had not recommended the scheme as a similar scheme on nodular cast iron, which was generally on the same lines, was already being financed by the C.S.I.R. The Committee did not recommend the scheme for sanction.	Item XVII (C) p. 43-45. The Board did not recommend the scheme for sanction.															
Item XVII (D) p. 45. The Committee noted that the consolidated opinion of the Research Committee recommending the scheme on studies on the production of aluminium metal by the electrolysis of molten anhydrous aluminium chloride had since been received. The Committee recommended that the scheme be approved and the following grant be made to Dr. Ramachandran (upto 28th February 1951 in the first instance) :— <table><tr><td>Equipment</td><td>...</td><td>Rs. 4,000</td></tr><tr><td>Contingencies</td><td>...</td><td>Rs. 500</td></tr><tr><td>Staff :</td><td></td><td></td></tr><tr><td>(Research Asstt. on Rs. 160 p.m. in the grade of Rs. 160-10-330. One Lab. Asstt. on Rs. 100 p.m. in the grade of Rs. 100-5-120-3-200-10/2-220).</td><td></td><td>Rs. 2,000 (including allowances)</td></tr><tr><td>Total</td><td></td><td>Rs. 6,500</td></tr></table>	Equipment	...	Rs. 4,000	Contingencies	...	Rs. 500	Staff :			(Research Asstt. on Rs. 160 p.m. in the grade of Rs. 160-10-330. One Lab. Asstt. on Rs. 100 p.m. in the grade of Rs. 100-5-120-3-200-10/2-220).		Rs. 2,000 (including allowances)	Total		Rs. 6,500	Item XVII (D) p. 45. The Board noted and accepted the recommendations of its Committee.
Equipment	...	Rs. 4,000														
Contingencies	...	Rs. 500														
Staff :																
(Research Asstt. on Rs. 160 p.m. in the grade of Rs. 160-10-330. One Lab. Asstt. on Rs. 100 p.m. in the grade of Rs. 100-5-120-3-200-10/2-220).		Rs. 2,000 (including allowances)														
Total		Rs. 6,500														

RESEARCH SCHEMES

Item No.	Particulars.																								
XVIII	Subject : Research scheme on testing the suitability of Indian graphite for the manufacture of graphite crucibles by Mr. M. C. Seth, B. Sc. (Met.), Mirzapur (U.P.) Synopsis : 1. Mr. M.C. Seth has submitted the following scheme of research through the Principal, College of Technology, Banaras Hindu University. The object of the scheme is : (i) To examine graphite from Indian sources and compare with Ceylon graphite in respect of chemical composition and physical properties. (ii) To examine Indian clays for their suitability as bonding material. (iii) To test the crucibles made and compare them with those of foreign manufacture as regards durability and other merits. 2. The investigation is to be conducted at the Banaras Hindu University under the guidance of Principals of the College of Mining and Metallurgy and College of Technology. 3. The following grant has been asked for :— <table><tr><td>Equipment</td><td>...</td><td>...</td><td>Rs. 4,300</td></tr><tr><td>Contingencies</td><td>...</td><td>...</td><td>Rs. 1,050</td></tr><tr><td>Staff :</td><td></td><td></td><td></td></tr><tr><td>(One research scholar on Rs. 250 p.m.</td><td></td><td></td><td></td></tr><tr><td>One Lab. Attendant on Rs. 20 p.m.)</td><td>...</td><td>Rs. 3,240</td><td>plus allowances.</td></tr><tr><td>Total</td><td>...</td><td>Rs. 8,590</td><td>plus allowances.</td></tr></table> 4. Two schemes of research on graphite crucibles had already been undertaken under the Council of Scientific and Industrial Research, one under Messrs. S.L. Mukherji and S.R. Giri at Calcutta and another under Prof. M.L. Joshi at Lahore. A Monograph on Indian Graphite and its Beneficiation embodying results of investigation on the subject under the direction Dr. J.C. Ghosh has also been published by the Council. The scheme of research along with the relevant information was circulated to members of the Metals Research Committee and the Glass & Ceramic Research Committee. Members of the Committees whose comments have been received so far, are of the view that any further work in this subject should be planned on the basis of the work already done in India.	Equipment	...	...	Rs. 4,300	Contingencies	...	...	Rs. 1,050	Staff :				(One research scholar on Rs. 250 p.m.				One Lab. Attendant on Rs. 20 p.m.)	...	Rs. 3,240	plus allowances.	Total	...	Rs. 8,590	plus allowances.
Equipment	...	...	Rs. 4,300																						
Contingencies	...	...	Rs. 1,050																						
Staff :																									
(One research scholar on Rs. 250 p.m.																									
One Lab. Attendant on Rs. 20 p.m.)	...	Rs. 3,240	plus allowances.																						
Total	...	Rs. 8,590	plus allowances.																						

Recommendations of the Committee of the Board.	Recommendations of the Board.

RESEARCH SCHEMES

Item No.	Particulars.
	Dr. D.N. Wadia has expressed the opinion that work done by Dr. J.C. Ghosh and others has shown that Indian graphite after proper treatment could be used for crucible manufacture. He has further suggested that Ceylon graphite could be imported to mix with local graphite. One Member has suggested that further work should be undertaken at the Central Glass & Ceramic Research Institute.
XIX	Subject : Application for grant of funds for the purchase of a light scattering photometer and a differential photometer by Dr. Mata Prasad, Principal, Institute of Science, Bombay. Synopsis : 1. The Ministry of Education has forwarded an application from Dr. Mata Prasad for a grant of Rs. 15000, for the purchase of a light scattering photometer and a differential refractometer for his work on scattering of light by colloidal systems. An application has also been received directly from Dr. Mata Prasad. He writes :— “I am very anxious to buy for immediate use in connection with my research the following two pieces of apparatus from Phonix Co., U.S.A. (1) Apparatus for the study of scattering of light. (2) Apparatus for the measurement of differential refractive index. May I request you to sanction a grant of Rs. 10,000 for the purchase of these apparatus and also help me in obtaining the necessary import licence for their import to India.” 2. Dr. Mata Prasad's application has been referred to the Physical Research Committee for opinion. Recently Dr. Mata Prasad has written to Prof. C. V. Raman, Chairman of the Research Committee that the cost of the two instruments would be Rs. 31,000 and not Rs. 10,000 as originally estimated. He has also explained the purpose of getting these instruments. They are to be used for investigations on the optical properties of various inorganic gels and soap gels in non-aqueous media with a view to elucidation of their structure. Dr. Mata Prasad has been conducting research work in the field for a number of years.

Recommendations of the Committee of the Board.	Recommendations of the Board.
Item XVIII p. 47-49. The Committee noted that considerable amount of preliminary investigation on the use of Indian graphite for the manufacture of graphite crucibles had already been done under various research schemes. It was recommended that further work with a view to establishing a process for the manufacture of graphite crucibles should be taken up by the Central Glass and Ceramic Research Institute in collaboration with the National Metallurgical Laboratory. The Committee did not recommend the scheme put forward by Mr. M.C. Seth for sanction.	Item XVIII p. 47-49. The Board noted and accepted the recommendations of its Committee.
Item XIX p. 49. The Committee noted that the consolidated opinion of the Physical Research Committee had since been received. The Research Committee had not recommended the application of Dr. Mata Prasad as they considered that “it should be possible at a modest cost and without undue effort to put together a photo-electric photometer capable of giving all the precision needed. This procedure would give the workers concerned useful experience besides avoiding heavy expenditure.” The Committee agreed with the opinion of the Research Committee and did not recommend the scheme.	Item XIX p. 49. The Board noted and did not recommend the scheme for sanction.

RESEARCH SCHEMES

Item No.	Particulars
XX	Subject : Proposal for creation of a Division of Oils and Fats in the National Chemical Laboratory, Poona, by the Director, N.C.L. Synopsis : A proposal for the creation of a separate Division of Oils and Fats in the National Chemical Laboratory, Poona has been submitted by the Director. He writes :— “India is the premier vegetable oil producing country in the world. Recently she has also begun to take increased interest in the production of animal and fish oils. Indian shark liver oil is being used for medicinal purposes. As regards essential oils, India was formerly the chief exporter of essences and scents. The large resources of India in these raw-materials are in no way matched by industrial development and in most respects they are neglected or treated by obsolete or inadequate methods. It is definitely a loss to the country that large quantities of oil seeds are exported as such, and that the forest oil seeds are not utilised at all. Production of essential oils is dwindling; solvent extraction is not practised, decortication is seldom employed; tallow and fish oils are obtained by inefficient methods. “Important industries to utilise these resources are soap, margarine, paints and varnishes, new drying oils, salad and edible oils, cosmetics (the fourth largest industry of the U.S.A.) many of which should lead to large export production, as well as fully meeting the needs of India. “I find that the study of these subjects is quite different from ordinary organic chemistry, whether theoretical or applied. It is a special field of peculiar importance to India. Apart from personnel, it requires little more than the already existing resources of the National Chemical Laboratory.” THE PROPOSAL. The work of the proposed Division of Oils and Fats is to fall in the following three categories namely research and development of (i) vegetable oils (ii) mineral oils and waxes and (iii) essential oils. 1. <i>Research and development work on vegetable and animal oils, fats and waxes.</i> About 8% of the total area under cultivation in India is devoted to the production of oil seeds contributing about 22% to the world production. The chief oil seeds produced are groundnut, rape and mustard, sesame, coconut, linseed, castor and mahua.

There is a large scope for the production of tallow, lard and fish oils in India.

However, these resources of oils and fats have not been properly and scientifically developed. The seeds for cultivation are not selected properly so that the maximum amount of oil may be obtained. Seeds of several allied species are sometimes mixed together with results affecting the trade. For example in mustard (*Brassica campastris*), seeds of *Eurica sativa* (taramira) and *Brassica mupus* (rape) are usually mixed. It will be one of the functions of the proposed Division of Oils and Fats to undertake analysis of different varieties of oil seeds in order to find out the species most profitable for production in this country, keeping in view their yield per unit area.

The tallow and lard obtained from cattle and hogs are also not rendered properly as regards colour, smell and purity. The fish oils are very little exploited. Only shark liver oil has recently been placed in the market as a substitute for imported cod liver oil. All these animal and fish oils could be developed so that good quality fat for export and use in medicine and various industries such as soap, paints and varnishes etc. may be obtained.

Four main industries in the country are vitally interested in oils. Their present condition and scope for future development and research in each is given below :—

(i) Oil seeds crushing industry.

About 6,00,000 tons of oil seeds are annually crushed in bullock-driven *kohlus* in different parts of the country and another about 5,00,000 tons are crushed in power driven *ghanis* and small screen pressess. Usually 10-12 percent of oil remains in the *kohlu* cake and 5-7 percent oil in the cake obtained in hydraulic presses in big factories which are estimated to crush about 24,00,000 tons of oil seeds annually. Thus a large quantity of oil goes as waste.

The solvent extraction process which allows less than 1% oil to remain in the seed cake has not so far been employed in this country. Solvent extraction plants are available from foreign countries, but they will have to be modified to suit the hot climate of this country. This work can be carried out in collaboration with the Division of Chemical Engineering.

The question of solvent also requires investigation, Supply of petroleum solvents in this country being meagre it is necessary to utilise other solvents such as alcohol, acetone and benzene as far as possible. It may also be feasible to extract castor oil from its seeds by means of alcohol alone.

(ii) The vanaspati industry.

Groundnut oil and to some extent cotton seed and sesame oils are employed for the production of vanaspati. Hydrogenation of oils is also done in factories producing soap, but oils like groundnut are not hydrogenated completely for the production of stearic acid, which is mostly imported from abroad. Supplies of other sources of stearic acid, as tallow, not being adequate in this country, groundnut oil containing about 60% oleic acid and 20% linoleic acid could be hydrogenated for the production of stearic acid. But hydrogenation of this oil at later stages is difficult and so investigations have to be undertaken for finding an easy method of complete hydrogenation of this oil.

(iii) Soap and glycerine industry.

All the laundry soap and most of the toilet soap for consumption in India is produced in the country and a modest beginning has also been made in export trade. Some soap factories have glycerine recovery plants and about 2,500 tons is produced annually. Most of the oils and fats employed in soap making at present are also edible and as there is a shortage of edible fats in India, it is necessary to conserve these and cheaper inedible fats substituted in soap making and other industries.

Preliminary work has already been done in the National Chemical Laboratory on the substitution of coconut oil in soap making and quite encouraging results have been obtained. The consumption of coconut oil in India is so large that besides 1,44,600 tons of oil extracted for home consumption 56,778 tons of copra has to be imported from abroad. Seeds rich in lauric acid fat are abundantly available from the forests of India and by proper formulations it may be possible to substitute coconut oil by these fats rich in lauric acid namely castor oil, groundnut oil and hydrogenated rosin mixtures. This work has still to be extended to practical stage.

India has vast resources of inedible oils and fats like neem seed, karanj, kapok, argemone, punnal and lang oils and khakan fat and several forest seeds like *Actinodaphne hookeri*, *Solanum kanthocarpum*, *Michelia champaca*, *Jatropha caracas*, *Hedra helix*, *Moringa pterygosperma*. By suitable formulations it may also be possible to substitute their seed fats for the edible fats at present being employed in soap making. The Government of Orissa have already approached the National Chemical Laboratory for undertaking work on the above lines.

Experiments on the proper cultivation of some of the more useful forest oil seeds will also be undertaken in the proposed Division of the National Chemical Laboratory. Their agricultural production will lead to easy availability of these fats in required amounts.

Industrial methods for the production of hydrogenated rosin also deserve investigation as this material gives a better body to soap and less discolouration on storage, than ordinary rosin.

(iv) Paint and varnish industry.

There is much scope for the expansion of the paint and varnish industry in India.

Linseed oil is almost the only oil used in the Indian paint and varnish industry, but linseed oil film has several drawbacks such as yellowing and low water resistance. The use of dehydrated castor oil as a substitute has to be encouraged.

Search will also have to be undertaken for other seed oils with better drying properties. There are good prospects for kamala seed oil for use in protective coating materials and work so far conducted in the National Chemical Laboratory has shown this oil to be almost identical to tung oil in drying properties.

Exploitation of fish oils for use in paints and varnishes has to be extended.

India is also very rich in oils with linoleic acid as major component such as those from tobacco seed, safflower, cotton seed, sesame, poppy seed etc. A patent for the conversion of these oils by isomerisation to drying oils has already been applied for from the National Chemical Laboratory. Work on further modification of these oils by co-polymerisation with better drying oils, natural resinols and synthetic resins is also in progress.

Rosin, ester gum and zinc resinate are almost the only resinous materials used at present for the production of oil varnishes. Films of varnishes made from these substances are, however, not water resistant. It is proposed to modify rosin by co-polymerisation with natural resinols and higher phenols and condensing it with phthalic anhydride and glycerine to impart greater water resistance.

The various di- and tri-valent metallic salts of polymerised fatty acids have given very hopeful results for the preparation of oil varnishes and solvent lacquers. Films of these salts have proved to be absolutely water resistant and good electric insulators. A patent has already been applied for. Conditions to get special types of varnish finishes such as wrinkle and mat will be worked out. The use of alkyd and other synthetic resins for producing oil baking enamels is also to be investigated.

Besides help to the various existing oils and fats industries on the lines mentioned above it is proposed to carry out further research work leading to the establishment of new industries, which will utilise these important indigenous raw-materials. Some useful lines of work proposed to be taken up are given below and others will gradually arise as the work develops.

(i) Dimerization of vegetable oils for the production of elastomers and resins.

Elastomers and long chain polymers have been produced in U.S.A. and England mostly from butadiene, styrene, acrylic acid, ethylene and similar materials not available in this country.

India's abundant resources of oils rich in linoleic acid have already been mentioned. Production of oils like poppy seed, grape seed, sunflower seed, melon and water melon seed, lajwanti seed, pumpkin seed and hemp seed can be increased and work may be undertaken to produce dimerised acids from the fatty acids of these oils.

A rich source of dimer acids from hydrolysates of castor oil gel was discovered during the work in the National Chemical Laboratory. Further work on the utilisation of these oils for the production of elastomers after condensing with dihydric alcohols and diamines may be carried out. The dimerised acids may also be condensed with shellac, natural resins etc., for the production of additives to rubber.

The possibilities of the preparation of coating materials from dimerised acids after condensing with polyhydric alcohols such as glycerine, penterithritol, with or without phthalic anhydride or maleic anhydride have to be investigated, as esters of these acids with higher mono hydric-alcohols may also prove useful plasticizers.

(ii) Production of 10 : 11-undecylenic acid from castor oil and subsequent conversion to long chain polymers and resins.

10 : 11-undecylenic acid readily absorbs hydrobromic acid to form 11-bromo acid which may conveniently be changed to the corresponding amino acid. This compound by suitable polymerisation may form long chain polymers.

Undecylenic acid may also be co-polymerised with isomerised linoleic acid obtained by the isomerisation of linoleic acid rich oils, to form coating materials.

Since 10 : 11 undecylenic acid is reported to have been produced from castor oil, conditions for its maximum production from this oil may be determined.

(iii) Higher homologue of adipic acid for the production of Nylon type plastics

Nylon type plastics are generally made by condensing adipic acid with the corresponding diamines. The work so far conducted in the National Chemical Laboratory on a new acid present in kamla seed oil to the extent of 50% reveals it to be a conjugated triene acid having a hydroxyl group at the terminal carbon atom. If this be the structure of this C_{18} acid, conditions for its hydrogenation on a commercial scale and subsequent oxidation of a CH_2-OH group to $-COOH$ to obtain a long chain dicarboxylic acid have to be worked out as this acid may serve as a substitute for adipic acid in the production of nylon type of plastics.

(iv) Manufacture of plasticizers from vegetable oils.

Vegetable oils are the cheapest raw-materials for the production of plasticizers in India. A very useful plasticizer is octyl sebacate, the starting materials for which may be produced by the

decomposition of castor oil soap. Preliminary work has already been done in this direction. Some of the vegetable oils may also prove good plasticizers for shellac, asphalt and pitches for the production of various products. A complete scheme on the modification of castor oil and other semi-drying oil acids so that the resulting products may be utilised as plasticizers was submitted to the Vegetable Oils Committee in 1947.

(v) Higher aldehydes and alcohols.

Sulphonated higher alcohols like lauryl, myristic, oleyl and steryl have proved good wetting and surface active agents in the textile industry. Vegetable oils containing lauric, myristic, oleic and stearic groups are abundantly available in India. Conditions for their reduction to the corresponding alcohols will have to be found out. Production of octyl alcohol from castor oil has to be investigated in greater detail. The condition of the sulphonation of these alcohols will have then to be worked out.

Aldehydes from these alcohols may be useful materials for the synthesis of resins and plastics.

(vi) Sulphonation of oils and their mono and di-glycerides for the production of substitutes for turkey red oil and soapless soaps.

(vii) Production of chemicals from vegetable oils such as higher nitriles, amines amides and ketones, and investigations about their industrial applications.

(viii) Investigations on the splitting of fats by Twitchell's reagent and enzymic hydrolysis of fats and comparison of these processes with the autoclave process.

Oleic and stearic acids have found varied uses in making cosmetics, metal polishes, medicaments and candles. It is, therefore, necessary to find out the most suitable conditions for their production from vegetable oils.

The mixed fatty acids from various oils will be very convenient and cheap sources of soap. This method has been found cheaper than that of saponification of oils by caustic soda. The glycerine is expected to be purer and obtained at a less cost.

(ix) Segregation of vegetable oils.

By low temperature crystallisation, soyabean oil has been separated into two fractions; one of high iodine value for use as drying oil, and the other of low iodine value for use as salad oil, and in making soap. It may be possible to segregate oils like cotton seed, sesame, fish oil etc. into similar fractions. The conditions of treatment for segregation and the use of segregated fractions will have to be investigated.

(x) Problems relating to rancidity of fats.

Protection of oils and fats against the development of bad odour and taste is very important especially in their use for edible purposes. The antioxidants known so far are mostly of toxic nature and cannot be used for protecting edible fats. The work so far conducted in the National Chemical Laboratory has shown that extracts of common indigenous materials possess good stabilizing properties for various oils and fats. It is proposed to examine the keeping qualities of various fats with these stabilizers for periods of one year or more.

(xi) Utilisation of seed cake for various edible purposes such as in the making of confectionary, seed cake milk etc., and for making adhesives and plastics.

Work on similar lines will be done on fixed oils and fats in the proposed Division of Oils and Fats.

The tapping of Indian resources of waxes and their utilisation will be a subject of special study of this Division.

2. Research and development work on mineral oils and waxes.

India's resources of mineral oils are not adequate. It is, therefore, necessary to undertake research work on the utilisation of vegetable oils as lubricants, in the preparation of quenching, cutting and instrument oils etc.; and in the manufacture of greases. Important work in this direction has already been done under the Council of Scientific and Industrial Research and the findings proved of great value during the last war. Further research work may prove of great utility to this country specially during national emergency.

It is also contemplated to carry out research work on the modification of some of the test methods at present employed for mineral oils so that they may be adapted for similar vegetable products. The well known Air Ministry oxidation test for lubricating oils, for example, will have to be suitably modified to suit the corresponding vegetable oil lubricants. The Conradson carbon residue method does not give concordant results even with mineral oil lubricants. Some preliminary experiments have already been conducted in this line at the N.C.L. and it may be possible to modify the method so as to give more reliable results.

3. Research and development work on essential oils.

India is famous for the special types of perfumes it produces. No branch of industry purely devoted to the supply of luxury is of such importance in India as that of perfumery. The appearance of synthetic substitutes has doubtlessly affected the trade in natural perfumes, but due to the world demand being greater than the supply, the perfumes and essential oils obtained from natural sources are likely to retain their position in the world's perfumery trade. In modern perfumery mostly based on skilful blending and requiring a great variety of aromas for the preparation of

newer notes, natural perfumes will still play an important role, even though synthetic perfumes are becoming increasingly available. In fact, the two are supplementary and must go hand in hand. Any step taken to develop natural perfumes should, therefore, be welcome. Apart from their use in perfumery, some essential oils such as citronella oil form important ingredients of insect repellent preparations commanding an ever widening use as protection against insect pests. The employment of a large variety of essential oils in various forms in medicine needs no comment.

A recent survey by Krishna and Badhwar has shown that no less than 1300 odoriferous plants are found in India. Thus a vast field of research on the isolation and extraction of essential oils from Indian aromatic plants is lying unexplored. A few foreign liverworts are known to contain essential oils, but the information is meagre and none of the Indian lichens and algae have so far been investigated. No information is available about Indian mosses. The new section of oils and fats proposes to undertake work on these raw materials.

The average essential oil contents of the various perfumery raw-materials have to be ascertained to acquire full knowledge of their nature and quality. The chemical composition and analysis of the various essential oils will also be undertaken.

The various processes in use for the winning of essential oils from their raw-materials, such as distillation, expression, enfleurage and solvent extraction and which of them is the most suitable for a particular product also deserve investigation.

Investigations will also be undertaken on the isolation of some pure compounds from various raw-materials such as thymol from ajwan seeds.

3. Statement of staff required for the section of oil and fats.

The research work on paints, varnishes and lacquers etc. has at present been partly assigned to the division of High Polymers, while the rest of the work on fixed oils, petroleum oils and essential oils is carried out in the division of Organic Chemistry. But in the extensive field of research and development work on oils and fats as outlined above it is doubtful if the above two divisions will be able to do full justice to the subject. In order to harness the vast Indian resources of both fixed oils and fats and essential oils to the fullest advantage it has been felt that a separate Division of Oils and Fats be created in the National Chemical Laboratory.

The staff requirements will be as follows:

Sectional in-charge (one post) grade ; 600-25-650-35-1,000-50-1200-100-1,500.

Senior Scientific Officers (2 posts) ; 350-30-770-40-850.

Junior Scientific Officers (3 posts) ; 275-25-500-30-590.

Scientific Assistants (7 posts) (Senior 3) grade 250-25-500. (Junior 4) grade 160-10-330.

Bearers (3 posts) grade ; 35-1-50.

Khalasies (3 posts) grade ; 30-1/2-35.

The Senior and Junior Scientific Officers will undertake research work as follows :—

(i) Collection and storage of oils seeds, research work on new fixed oils, improvements in existing methods of oil extraction, oil refining, edible oils and fats, hydrogenation, utilisation of fats in baking, frying etc., problems relating to rancidity and stabilization of oils and fats.

(ii) Polymerisation and cracking of oils, paints, varnishes, enamels and lacquers ; oil gels isomerisation, dimerization ; production of long chain and other polymers from oils and fats and plasticizers etc.

(iii) Soaps and cosmetics, sulphonation, wetting agents and soapless soaps, fat splitting, fatty acids and their derivatives as alcohols, amines, nitriles and their metallic derivatives and various other problems on fixed oils and fats.

(iv) Mineral oils comprising of kerosene, fuel oils, lubricants and waxes, utilisation of fixed oils and fats for the above purposes, quenching, cutting and instrument oils and greases etc.

(v) Extraction, physical and chemical analysis and utilisation of essential oils from Indian raw-materials and isolation of their principal constituents.

The oils and fats section will also keep close contact with the existing industries in the country which either produce oils and fats or utilise them.

4. Financial implications.

The existing building of the National Chemical Laboratory for the present will be enough to accommodate the new section of oils and fats and therefore no initial expense will be involved on building. The present grants of equipment, apparatus, and chemicals to the N.C.L. will meet the expenses on these items of this section as well. No extra staff in the administrative side, library and workshop etc. will be required. The expenses will, therefore, be entirely on the technical staff of this section, the annual estimate for which is given below :—

Section Officer incharge at Rs. 800 p.m. plus D.A. Rs. 85	Rs.	10,620
Senior Scientific Officer one at Rs. 500 p.m. plus D.A. Rs. 70	Rs.	6,840
Senior Scientific Officer one Rs. 350 p.m. plus D.A. Rs. 70	Rs.	5,040
Junior Scientific Officer one at Rs. 350 p.m. plus D.A. Rs. 70	Rs.	5,040
Junior Scientific Officer one at Rs. 300 p.m. plus D.A. Rs. 60	Rs.	4,320
Junior Scientific Officer one at Rs. 275 p.m. plus D.A. Rs. 60	Rs.	4,020
Scientific Assistants 4 at Rs. 250 p.m. plus D.A. Rs. 60 each	Rs.	14,880
Scientific Assistants 3 at Rs. 200 p.m. plus D.A. Rs. 55 each	Rs.	9,180
Bearers 3 on Rs. 35 plus D.A. Rs. 35 plus H.R. Rs. 5 each	Rs.	2,700
Khalasies 3 on Rs. 30 plus D.A. Rs. 35 plus H.R. Rs. 5 each	Rs.	2,520
Total	Rs.	65,160

Provision has also been made in the above estimates for giving higher starting salaries to some of the staff in order to attract the best men.

Recommendations of the Committee of the Board.	Recommendations of the Board.
Item XX p. 51-59. The Committee noted that most of the members of the Vegetable Oils Research Committee to whom the proposal for creation of a separate Division of Oils and Fats in the N.C.L. was referred for opinion were generally agreed on the importance of research in the subject but had recommended that the proposal be deferred for the present. The reasons given by them were :— 1. In view of the financial stringency additional funds would not be available from the Government. 2. A section of the Organic Division could be engaged on this work and allowed to develop in due course of time. The Committee was in general agreement with the above opinion of the Vegetable Oils Research Committee and did not recommend the creation of a separate Division of Oils and Fats in the N.C.L. for the present. It was also recommended that if they had any specific schemes of research requiring additional assistance, D.S.I.R. may be authorised to place them before the Indian Oil Seeds Committee who had the necessary accumulated funds for financing technological research in oils.	Item XX p. 51-59. The Board noted and accepted the recommendations of its Committee.

PROCEEDINGS OF THE RESEARCH COMMITTEES

Item No.	Particulars.
XXI	<i>Subject : Proceedings of the Fuel Research Committee.</i> <i>Synopsis :</i> 1. A meeting of the Fuel Research Committee was held on the 31st March, 1950. 2. The minutes of the last meeting were confirmed. Matters arising from the minutes :— (a) Staff appointments at the F.R.I. Replying to a question it was explained that there was an anomaly in the scale of salary offered to the Senior Scientific Officers, and consequently the right type of men were not forthcoming. The salary scale fixed by the Pay Commission for Government Employees where recruitment was generally made at the age of 25 or less could not be applied to the National Laboratories, as men with very high academical qualifications and considerable research experience, (and consequently somewhat advanced in age—about 32 to 35 years) had to be recruited to the cadre of Senior Scientific Officers. The candidates for the post of Senior Scientific Officers should be offered higher salaries than the minimum fixed under the grade. Candidates who had been offered appointments in the F.R.I. secured better positions in commercial firms on a far higher salary. Due to the overlapping of scales of pay of the Junior Scientific Officers and Senior Scientific Officers, there had also been instances where the Junior Scientific Officers had requested actual postponement of their promotions. The Committee resolved : “In view of the grave anomaly in the existing pay scale of the Senior Scientific Officers of the Fuel Research Institute, the Committee strongly recommends that in future no Senior Scientific Officers be appointed on a salary less than Rs. 440 p. m. in the first instance. The salary of the existing officers should also be adjusted accordingly. Similarly Junior Scientific Officers should not be appointed on an initial salary of less than Rs. 350 p.m. to avoid overlapping with pay scales of Assistants.” (b) Scheme on two-stage Carbonisation. The Committee noted that Dr. M. S. Krishnan was not able to visit the Utah Plant in the U.S.A. for want of time. It was recommended that :— “Since the above subject is of vital importance to the country, the Committee recommends strongly that an officer of the F.R.I. be sent to U.S.A. to study the Utah Plant and other problems in the light of recent developments in fuel technology e.g., the use of oxygen in the blast furnace, oil from coal, coal washing etc.”

Recommendations of the Committee of the Board.	Recommendations of the Board.
Item XXI 1. p. 61. The Committee noted. 2. (a) p. 61. The Committee noted that the Ministry of Finance had not agreed to revise the existing scale of pay of Senior Scientific Officers. They had however agreed to consider favourably recommendations on individual cases for higher initial start on basis of merit. The Committee further noted that recently the Ministry of Finance had passed orders which would enable fixation of pay of Senior Scientific Officers at or above Rs. 380 p.m. on promotion from the scale of Junior Scientific Officers. 2. (b) p. 61. The Committee noted that Dr. A. Lahiri, Assistant Director of Fuel Research Institute who had gone to U.S.A. would be visiting the Utah Plant.	Item XXI 1. p. 61. The Board noted. 2. (a) p. 61. The Board noted. 2. (b) p. 61.

PROCEEDINGS OF THE RESEARCH COMMITTEES

Item No.	Particulars.
	3. Progress of the F.R.I. and Coal Survey Stations. (a) The Committee expressed satisfaction with the programme and the type of work being carried out at F.R.I. and the Director F.R.I. was congratulated on the excellent general progress of the Institute. It was reported that the progress would be still more rapid when the laboratories were completely built and equipped later <i>i.e.</i> in the present year. (b) Progress of F.R.I. Buildings. <i>Administrative block</i> would be completed and furnished before the official opening. <i>Laboratory block</i> had been completed and the Laboratories were already functioning. <i>Staff quarters</i>—The Committee expressed concern over the position of the staff quarters. Only 25 per cent of the quarters required had so far been completed. Another 50 per cent were to be completed during the current financial year. Although the sanction had already been given for the construction of the new quarters, work could not begin until the beginning of the new financial year. The Committee were disquieted over the undue delay in the construction of the quarters and recommended that the C.S.I.R. should promptly take up this matter with the C.P.W.D. to expedite the work. (c) Staff appointments The Committee felt that men with high qualifications and experience were required for the success of the various research schemes in hand. It was brought to the notice of the members that the services of a number of suitable candidates selected for laboratories had been lost to the Institute due to low scales of pay offered. The Committee was informed that posts of two more Assistant Directors for the F.R.I. had also been advertised. In this connection the Committee endorsed the resolution made in the first para of the minutes. (d) Coal Survey Stations. The Secretary (who is the Officer-in-charge of the Coal Survey Stations) gave a short summary of the present position of the different Coal Survey Stations. (i) <i>Jharia Station</i> had been operating from the Temporary Laboratory, Dhanbad; the work was progressing satisfactorily. Later it would operate from the F.R.I. Digwadih. (ii) <i>Raniganj Station</i> had also been operating temporarily from Dhanbad. Steps were being taken to acquire land at Dishegarh, near Asansol, for the construction of the Raniganj field laboratory. As to the question whether the survey of Raniganj area could be done from the

Recommendations of the Committee of the Board.	Recommendations of the Board.
3 (a) p. 63. The Committee noted with satisfaction the progress of work at the Fuel Research Institute and the Coal Survey Stations.	3 (a) p. 63. The Board noted.
3 (b) p. 63. The Committee noted that the building of the Fuel Research Institute was already completed and the Laboratory was functioning. In connection with the staff quarters, the Committee noted that the D.S.I.R. had already taken up the matter with the Govt. of India and the second phase in the construction of quarters would soon be completed. The third and final phase would be taken up as soon as funds were available.	3 (b) p. 63. The Board noted. The Board noted that whereas the laboratories were built by the C.S.I.R., the staff quarters were being built by the C.P.W.D. The Board considered it desirable that the laboratories and the staff quarters should be built by the same authority and it should be the C.S.I.R.
3 (c) p. 63. The Committee noted that the subject had already been considered under Item 2 (a) on p. 61.	3 (c) p. 63. The Board noted.

PROCEEDINGS OF THE RESEARCH COMMITTEES

Item No.	Particulars.
	F.R.I. itself, it was explained that the distances to be covered would be more than 100 miles involving great difficulty in carrying out the survey. The proposed site was half way between the Grand Trunk Road and Dishergarh. (iii) <i>Ranchi Station (Bokaro-Ramgarh-Karanpura Field)</i>—The Government of Bihar had placed the building "God's Gift" at Ranchi at the disposal of the F.R.I. for use as a Coal Survey Laboratory, but in the draft agreement they had incorporated conditions which were not acceptable. The most important point was the option of the Bihar Government to terminate the agreement at the end of five years. The Committee felt that the coal survey laboratories were of a permanent nature, and that this clause regarding the termination of the agreement at the end of five years could not be agreed to by the F.R.I. The Regional Advisory Committee of the area had suggested that the Council should purchase the building directly if the Bihar Government did not offer more suitable terms. The Committee supported this recommendation. (iv) <i>Madhya Pradesh Stations.</i> <i>Sagra Estate (Umaria) Vindhya Pradesh</i>, had been taken over and arrangements were in hand for the necessary modifications of the buildings. <i>Kamptee-Nagpur</i>—The Governing Body of the C.S.I.R. had approved of the establishment of a Coal Survey Station at Kamptee near Nagpur for the survey of Pench and Wardha Valley Coal-fields. The Government of Madhya Pradesh have been kind enough to place certain buildings at the disposal of the F.R.I. for the purpose. The Committee expressed appreciation of the help being given by the Madhya Pradesh Government. (v) <i>Assam Station.</i> A site near Dibrugarh had been found to be most suitable. The Council was in correspondence with the Government of Assam regarding the establishment of this Survey Station. The Secretary hoped that all the Survey Stations would start work in the current year. 4. (a) Schemes in progress. (i) Coal Blending and Coking Research Sub-Committee. The work on this scheme was being conducted in close co-operation with the F.R.I. so that the latter was kept fully informed of the progress made. The new Simon Carves Test Oven had been installed by the C.B.C.R. Sub-Committee. The Committee in expressing appreciation of the

Recommendations of the Committee of the Board.	Recommendations of the Board.
3 (d) p. 63-65. The Committee noted with satisfaction the progress in the establishment of Regional Coal Survey Stations and was gratified at the co-operation from the various State Governments. It was also noted that negotiations were under way with the Government of Bihar regarding the building for the Ranchi Station.	3 (d) p. 63-65. The Board noted.

PROCEEDINGS OF THE RESEARCH COMMITTEES

Item No.	Particulars.
	good work being done by the C.B.C.R. Sub-Committee requested that their observations should be conveyed to its Chairman and to the Secretary of the C.B.C.R. Sub-Committee. (ii) X-ray investigation of coal—Indian Association for the Cultivation of Science, Calcutta. While appreciating the encouraging results obtained in the past from the laboratory on the nature of ash in vitrain and durain, and the other radiographic investigations on coal, many of the members thought that the present trend of work (such as synthesis of coal from saw dust) had little importance in the field of fuel technology. The Committee suggested that the F.R.I. should have its own X-ray plant to carry out urgent industrial research. (iii) Spectroscopic investigations on combustion and flame—Institute of Science, Bombay. The Chairman who had visited the Spectroscopic Laboratories at Bombay expressed satisfaction at the work done. The scheme on spectroscopic investigations on combustion and flame after a period of five years had been terminated by the C.S.I.R. The Committee approved of a new scheme on "Mechanism of explosions" submitted by Prof. Tawde, and recommended that the necessary grant be given. Arising out of the discussion on (ii) and (iii), the Committee recommended that spectroscopic and X-ray apparatus should be installed without delay at the F.R.I. to deal with many practical problems not handled or even touched upon by the present schemes. (iv) Desulphurisation of Assam coal. After running for five years the scheme had been terminated with effect from the 31st March, 1950. The Committee accepted the proposal of the F.R.I. to continue the work at the F.R.I. from the current year. It was suggested that the best way to tackle the high sulphur Assam coal was by hydrogenation. In the process studied by Dr. Chowdhury about 35% of sulphur could be recovered, but the commercial aspects of this problem had not yet been studied. Assam coal was more amenable to chemical treatment than most coals: it was perhaps ideal for liquefaction by hydrogenation. The sulphur, if recovered, could be profitably used for the manufacture of sulphuric acid, thereby saving import of considerable quantity of sulphur from abroad. The idea that Assam coal could be used on any large scale for metallurgical purposes was erroneous. The best way to deal with the coal was probably low temperature carbonisation and/or hydrogenation. The Secretary stated that Dr. Chowdhury's work would be followed by pilot plant tests by the Institute.

Recommendations of the Committee of the Board.	Recommendations of the Board.
4 (a) (i) p. 65-67 The Committee noted that details of the work under the Coal Blending and Coking Research Sub-Committee would be discussed under Item XXIII and XXIV p. 83-93 of the Agenda. (ii) p. 67. The Committee noted that the comments of the Fuel Research Committee on the research scheme on X-ray investigation had already been conveyed to the Investigator-in-Charge for his guidance. (iii) p. 67. The Committee noted that the research scheme on Mechanism of explosions by Dr. Tawde of the Institute of Science, Bombay had already been sanctioned by the C.S.I.R. in their last meeting. The Committee endorsed the recommendation of the Research Committee that the Fuel Research Institute should be equipped with spectroscopic and X-ray apparatus which were essential for investigations on coal.	4 (a) (i) p. 65-67. The Board noted. (ii) p. 67. The Board noted. (iii) p. 67. The Board noted. The Board endorsed the recommendation of its Committee.

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	The Committee expressed appreciation of the excellent work of Dr. Chowdhury and accepted the F.R.I. proposals. (b) Schemes transferred to the F.R.I. (i) Low temperature carbonisation scheme. The C.S.I.R. had directed that such schemes when transferred to the F.R.I. should be merged with the work being undertaken by the Institute, no separate grant being placed at the Institute's disposal. From next year onwards the necessary provision would have to be made in the budget of the F.R.I. (ii) Electric furnace treatment of coal. The work would be combined with the work of the scheme on desulphurisation of coal. Arrangements were in hand to carry out pilot plant work in 'one ton' oven erected in a nearby coke oven. 5. New schemes for consideration by the F.R.C. (i) Microscopic examination of Indian coals by Mr. J. Sen, Calcutta University. At the suggestion of certain members, the scheme was reconsidered by the Committee. The Chairman said that such schemes in U.K. were often undertaken by the University staff themselves as a part of their normal research work. Dr. Chowdhury remarked that though the equipment etc. could be made use of, still some assistance should be given to the investigator by the C.S.I.R. and grant asked for by Mr. Sen could be recommended with some modification. Mr. K. B. Sen was of the opinion that if such grants were not recommended it might create an impression that the C.S.I.R. were not prepared to help workers outside their laboratories. After full consideration, the Committee thought that every encouragement should be given to such schemes sponsored by the Universities, but that it was important to see that the work carried out was systematic and properly oriented. It would be well if the investigators concerned tackled the problems in consultations with the F.R.I. The Committee resolved that the scheme submitted by Mr. Sen be approved with the deletion of items 2 and 3 of his application under the head 'financial requirements'. It was thought that the services of a bearer and chemicals etc. would be available at the university. The Committee also advised that the Research Assistant to be appointed should be qualified in Geology and Botany in his final year B.Sc., and that close liaison should be maintained with the F.R.I.

Recommendations of the Committee of the Board.	Recommendations of the Board.
(a) (iv) p. 67-69. The Committee noted that the problem of desulphurisation of Assam coal had been taken over by the Fuel Research Institute for further investigation and that work was continuing.	4 (a) (iv) p. 67-69. The Board noted.
5) (i) and (ii) p. 69. The Committee noted.	(b) (i) and (ii) p. 69. The Board noted.
5. (i) p. 69. The Committee noted that at the last meeting of the B.S.I.R. the scheme was considered and was not recommended for sanction as microscopic examination of Indian coals was being carried out in a number of laboratories in India. The Committee did not recommend the scheme for sanction.	5. (i) p. 69. The Board noted and did not recommend the scheme for sanction.

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Item No.	Particulars
	(ii) Scheme for the production of methane or synthetic petrol from indigenous waste by Prof. Joshi. As another department of the Government of India was undertaking this research, the Committee felt that there should be no unnecessary duplication of work and that for the present they should leave it to the Indian Agricultural Research Institute to continue their investigations. 6. Schemes under consideration of the F.R.I. (i) Pressure combustion of powdered coal. The Committee once again emphasised that the scheme submitted by the Director, Fuel Research Institute should be given full consideration by the C.S.I.R. and that the necessary funds should be placed at their disposal. The subject was of outstanding importance. (ii) Powdered coal boiler. In order to extend the use of the low grade and small coal produced in the country, the Committee felt that the study of powdered coal should be taken up seriously as soon as possible, and the necessary plant obtained so that actual operating facts might be made available on the behaviour of Indian coals when prepared for burning in powdered form. The advantages of having the plant installed at the F.R.I. were explained. At present huge sums of money were spent in carrying out such tests abroad. The Committee recommended that an experimental boiler be installed at the F.R.I. and that the necessary funds be made available for such experiments. (iii) Methanol synthesis and industrial catalysts. This scheme had been referred to the Heavy Chemicals Committee. (iv) Pilot plant for coal washing. The need for such plant was explained, especially in view of the coking coal requirements. The Committee again stressed the necessity of placing the necessary funds at the disposal of the F.R.I. for the installation of a Pilot Coal Washing Plant. The estimates submitted by a Czechoslovak firm came to about Rs. 25.50 lakhs. The Committee felt that since coal washing was of vital interest to India's coal industry, the Government of India should immediately sanction the required funds. If this expenditure could not be met from the Central Finance, the Committee recommended that a cess on coal should be imposed. A general cess on coal was likely to be levied in the near future by the National Coal Commission. If so, due consideration should be given to setting apart a portion of the cess for fuel research. A cess of one anna per ton of coal would realise about Rs. 20 lakhs per annum. The Committee resolved: (a) The problem of providing Pilot Plant for Coal washing at the F.R.I. is of vital importance and should be given top priority.

Recommendations of the Committee of the Board.	Recommendations of the Board.
5 (ii) p. 71. The Committee noted that production of methane and other fuel gases from agricultural and other wastes was the subject of laboratory and pilot plant investigations at the Indian Agricultural Research Institute. It was recommended that the results of these investigations be awaited before the Council considered taking up any work under their auspices. 6 (i) and (ii) p. 71. The Committee was of the opinion that research work on pressure combustion of powdered coal and powdered coal boiler was of immediate importance to India from the point of view of conservation of high-grade coal. It was therefore recommended that Government of India be requested to provide necessary additional funds for undertaking these investigations at the Fuel Research Institute.	5 (ii) p. 71. The Board noted and accepted the recommendation of its Committee.
6 (iii) p. 71. The Committee noted.	6 (i) and (ii) p. 71. The Board accepted the recommendation of its Committee.
6 (iv) p. 71-73. The Committee considered that installation of a Pilot Plant for Coal Washing at the Fuel Research Institute was essential and must be given high priority. The Committee noted in this connection that the Committee on Conservation of Metallurgical Coals set up by the Govt. of India had made the following recommendation: "The Fuel Research Institute may be requested to undertake research work on the following: (i) Coking of weakly coking coals on the lines of work done on Utah, Colorado and Illinois coals in the U.S.A. (ii) Carbonisation of such coals in modified Coke Ovens. (iii) Extensive washing tests in pilot plant of all seams containing good coking coal".	6 (iii) p. 71. The Board noted.

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	(b) If funds are not immediately available, steps should be taken to obtain the necessary money either on the lines indicated in the Director F.R.I.'s letter dated 24th October 1949 to Dr. S. S. Bhatnagar, or by the imposition of a general cess on coal for purposes of research. The Committee felt that this problem must not be shelved any longer. (v) Pilot plant investigation on production of synthetic oil from coal. The Committee felt that research should be fostered on pilot plant scale on the production of synthetic oil from coal. The liquid fuel supply of the country was in a precarious position and every encouragement should be given to the production of synthetic oil from coal. Pilot plant was essential and funds should be found for this work without delay. (vi) Coke from weakly caking coals. The Committee suggested that the title of the scheme should be "Coke from weakly caking coals" instead of "Two stage carbonisation". The manufacture of coke from weakly caking coals was of great importance to the country. In order to carry out investigations, the F.R.I. should install a pilot plant. M/s Koppers Corpn. had undertaken to give estimates and design. The crux of the problem was finance. The Committee thought that the Government of India did not seem to realise the importance of pilot plant investigations and were of opinion that the only solution to solve the finance problems was the levy of a cess on coal for research. (vii) Low temperature carbonisation—pilot plant. The Committee noted with satisfaction that the C.S.I.R. had given their support to the scheme and that the matter now was in the hands of the Finance Ministry. They hoped that the Finance Ministry would give the matter the consideration it deserved and sanction the requisite funds as soon as possible. (viii) Briquetting plant. (It was pointed out that the estimated capital cost was Rs. 70,000 and not Rs. 50,000 as stated in the memorandum.) Enquiries regarding briquetting coal had been received from various Government Departments and private firms. The time had now come to carry out briquetting experiments on a pilot plant scale at the F.R.I. The Committee approved of the estimate of Rs. 70,000 and recommended that the necessary sum should be made available.

Recommendations of the Committee of the Board.	Recommendations of the Board.
The Committee strongly recommended that the Govt. of India be requested to sanction immediately necessary funds for undertaking the investigations as desired by the Committee on Conservation of Metallurgical Coal and for setting up the Pilot Coal Washing Plant. It was also noted that the D.S.I.R. had already taken up the question of levy of cess on coal for fuel research with the Govt. of India. 6 (v) p. 73. The Committee of the Board noted that a Committee had been appointed to advise the Council on the subject. In view of the primary importance of this matter for national defence and self-sufficiency, the Committee of the Board was of the opinion that the Committee be asked to submit a final report not later than the 31st December 1950. In preparing its report the Committee should give the highest importance to the crucial points, namely the necessity of making petrol for civilian and military use from raw materials available in the country. In view of the urgency of the problem, the Committee of the Board recommended that it was desirable that the Planning Commission should give immediate consideration to the report and meet the Committee in person thereafter. In the opinion of the Committee of the Board this matter needed the highest priority in national planning. 6 (vi) and (vii) p. 73. The Committee noted that the Committee on Conservation of Metallurgical Coal had already recommended to the Govt. of India to grant adequate funds to the Fuel Research Institute for undertaking these investigations. The Committee, therefore, reiterated that the Govt. of India be requested to provide additional funds for instituting these investigations at the Fuel Research Institute at an early date. 6 (viii) p. 73. The Committee noted that very little work had been done in India on briquetting of coal. It was, therefore, recommended that pilot plant investigation should be started on the problem at the Fuel Research Institute and that necessary funds be made available to the Institute for this purpose.	6 (iv) p. 71-73. The Board noted and accepted the recommendation of its Committee. 6 (v) p. 73. The Board accepted the recommendation of its Committee. 6 (vi) and (vii) p. 73. The Board noted and accepted the recommendation of its Committee. 6 (viii) p. 73. The Board noted and accepted the recommendation of its Committee.

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Item No.	Particulars.
	(ix) With regard to the pilot plant schemes of the F.R.I. the Committee adopted the following general resolution:— “In view of the fact that almost all the above schemes are interlinked, the installation of pilot plants more or less simultaneously will effect considerable economy. The Committee, however, is perturbed over the inadequacy of the funds placed at the disposal of the F.R.I. for plant work. Without the necessary pilot plant, fuel research cannot attain fruition, and give practical results. The Committee, therefore, request the authorities to levy a cess on coal to meet the expenditure of the Institute for research on the above lines since it is apparent that funds are not available from other sources.” 7. Coal Tar Sub-Committee. The minutes of the meeting of the Coal Tar Sub-Committee held in Calcutta on the 18th March 1950, and the report on the work of the Coal Tar Sub-Committee were circulated to the members. The Committee accepted the following recommendations of the Sub-Committee: (i) That the F.R.I. should undertake investigations of the properties of tar produced in Indian coke ovens with special reference to the operating conditions of the ovens. (ii) That the F.R.I. should also carry out fundamental investigations on the nature of tar from Indian coals and on the relation of the composition of tar to the petrographic constituents of coal (including effect of mineral matter). (iii) That the F.R.I. should instal pilot plant high temperature ovens of suitable design for carrying out investigations into the carbonisation of high volatile (weakly and medium caking) coals with a view to obtaining increased yields of tar and by-products. The nature and yield of the products obtained from these ovens would be compared with those of high temperature ovens normally used in the country. The Government should be requested to place necessary funds and staff at the disposal of the F.R.I. for carrying out pilot plant work. 8. Publications. (i) C. P. Coals. (ii) Studies in Coal Washability. The Committee was informed that the publication of the above reports were in hand and they would be published in the near future. 9. Official opening of the F.R.I. The Chairman announced that the official opening ceremony of the Fuel Research Institute would be performed by Dr. Rajendra Prasad, President of the Republic of India on Saturday the 22nd April, 1950.

Recommendations of the Committee of the Board.	Recommendations of the Board.
(ix) p. 75. The Committee was in general agreement with the views of the Fuel Research Committee and noted in connection that when the plan for the Fuel Research Institute was originally drawn up, no provision had been made for the installation of pilot plants. The Committee considered that without pilot plant experiments, results of fuel research could not be applied on a large scale to industry. The Committee therefore recommended that the Government of India be requested to provide adequate funds for this purpose either from their general revenues or from the income from cess already levied on coal and if this was not possible a fresh levy of one anna per ton of coal be made. p. 75. The Committee generally was of the opinion that the investigations suggested by the Coal Tar Sub-Committee were important especially in view of the fact that efficient utilization of coal-tar and coal-tar by-products had been largely neglected in the past in India. However, it would not be possible for the Fuel Research Institute with the present resources or even with immediately possible additional resources to undertake a large number of pilot plant and laboratory investigations at the same time. The Committee therefore recommended that the Fuel Research Committee be requested to draw up a planned programme of work which could immediately be undertaken at the Fuel Research Institute giving due consideration to priority, availability of funds, availability of personnel and equipment. p. 75. The Committee noted that a brochure on Studies in Coal Washability had since been published. p. 75. The Committee noted	6 (ix) p. 75. The Board accepted the recommendation of its Committee. 7. p. 75. The Board accepted the recommendation of its Committee. 8. p. 75. The Board noted. 9. p. 75. The Board noted.

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	10. Any other business. The letter of resignation from the Committee of Mr. A. Farquhar was placed before the members. The members expressed regret that Mr. Farquhar's advice and guidance would no longer be available to them, and wished to record their appreciation of his work over a period of years. The Chairman thanked the retiring members for their valuable co-operation and help. On behalf of the members Dr. West and Mr. K. B. Sen congratulated the Chairman on the efficient and courteous manner in which he had conducted the work of the F.R.C.
XXII	<i>Subject : Proceedings of the Building Research Committee.</i> <i>Synopsis :</i> 1. A meeting of the Building Research Committee was held on the 7th August, 1950 at New Delhi. The D.S.I.R. welcomed the new members of the reconstituted Building Research Committee. He regretted the delay in the erection of permanent buildings for the laboratory due to difficulty in land acquirement and thanked Dr. Hart, Vice-Chancellor, Roorkee University for his help in acquiring 10 acres of land from the Government of Uttar Pradesh in the University area and for which letter of approval had already been received from the Chief Minister of Uttar Pradesh. The terms of transfer being mere formality, the D.S.I.R. suggested that if Dr. Hart agreed, work on the construction of the Institute could be taken on hand immediately. He said that very good work had already been done by the Unit which was praised by no less an authority than Prof. J.D. Bernal. The pamphlet on 'Low Cost Houses' had been shown to a number of industrialists who were prepared to undertake construction for their factory areas if a test certificate was given. The D.S.I.R. also paid a tribute to the Chairman who had been at the head of the Committee since its inception and had been re-nominated. On the suggestion of the Director, Scientific and Industrial Research, it was recommended that Dr. Ernst Zipkes, Director, Road Research Institute be co-opted as a member of the Committee. The Chairman thanked the new members for having consented to work on this Committee, and expressed his sense of gratitude to the D.S.I.R. for the active interest he had been taking in the activities of the Unit. 2. Activities of the Unit since its inception and the work done by the old Building Research Committee : The members were supplied with copies of the report of the work and activities of the Building Research Unit since its inception together with a list of publications of the Unit and the

Recommendations of the Committee of the Board.	Recommendations of the Board.
10 p. 77. The Committee recommended that Mr. A. Farquhar be thanked for the valuable services rendered by him as Chairman of the Fuel Research Committee for some time and then as Member of the Fuel Research Committee.	10 p. 77. The Board accepted the recommendation of its Committee.
Item XXII 1. p. 77. The Committee noted with satisfaction the progress made in acquisition of land at Roorkee for the establishment of the Building Research Institute. It was recommended that the Vice-Chancellor, Roorkee University and the Chief Minister, U.P. be thanked for offering a site in the University area. It was recommended that the co-option of Dr. Ernst Zipkes, Director, Road Research Institute on the Building Research Committee be approved.	Item XXII 1. p. 77. The Board noted and accepted the recommendations of its Committee.

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Item No.	Particulars.
	bulletin on 'Low Cost Houses'. The Secretary acquainted the members with some of the salient points regarding the work done by the Building Research Committee. 3. (a) Report of the work done in the Building Research Unit, since April 1950. The Committee adopted the report of the Unit for the year 1949-50. The Secretary informed the members about the present position of work relating to 'Low Cost Houses' (Village Housing), stabilization with lime-sludge and sodium silicate and studies on bricks and brick-clays etc. The report was discussed and members gave valuable suggestions for further work. (b) Current problems. The problems in hand, a list of which was circulated to the members, were discussed and approved by the Committee. 4. (a) To define clearly the scope and functions of the Building Research Institute with special reference to its relation with the Provincial Organizations carrying out similar work. (b) Future programme of the Building Research Unit and Institute : Although an outline of the scope and functions of the Institute had been given in the Plan it was considered necessary to study these in order to make clear cut recommendations regarding the scope and functions of the Institute. Some members suggested some sort of co-ordination of building research activities in the country. There was a general agreement on undertaking both long and short range problems and for the establishment of an Intelligence and Information Section for collection of literature. The members agreed to send further suggestions in the matter. It was decided that the Secretary would send to the members the list of problems approved by the former Committee and the list of problems approved by the Building Research Board in England. The members agreed to send their suggestions regarding the problems to be undertaken at the Unit, in the order of priority. 5. Research Schemes. (i) Scheme on bamboo concrete (Shri Desai's Scheme). (ii) Improvement of setting properties of cement. (iii) Engineering properties of soils. (iv) Surface treatment of reinforcement. (v) Design of suitable heat pump system. } Schemes submitted by Dr. S. R. Sen Gupta.

Recommendations of the Committee of the Board.	Recommendations of the Board.
2 p. 77-79. The Committee noted.	2 p. 77-79 The Board noted.
3. (a & b) p. 79. The Committee noted.	3. (a and b) p. 79. The Board noted.
4. (a & b) p. 79. The Committee noted.	4. (a and b) p. 79. The Board noted.

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Item No.	Particulars.
	(vi) An overall scheme of work on vermiculite. (vii) Use of timber in place of steel as reinforcements, a scheme submitted by Shri A. K. Datta. (viii) Krisone crete, a new roofing material—a scheme by Mr. Krishen Singh. (ix) Durability of building stones—a problem suggested by the Director General, Archaeology. (x) Studies on the factors affecting life and work in the tropics ("Comfort Studies"). The Committee discussed these schemes in a general way. The members said that they required some time to study them in detail and agreed to send their comments at an early date. Scheme on engineering properties of soils. It was suggested that the title was too general and that Dr. Sen Gupta be asked to make definite suggestions. Major Gen. Williams thought that scholars fresh from the University would not be able to conduct this work efficiently and that trained Technical Assistants be put on this work. This scheme has already been considered under item XII p. 25-27 of this agenda. Scheme on 'Design of suitable heat pump system'. The members suggested that the information was too scanty. This scheme has already been considered under item XIII p. 27-29 of this agenda. Schemes on Vermiculite and 'Durability of building stones'. The Committee noted that some work was already being done by the Unit and recommended that detailed work in collaboration with other National Laboratories should soon be started. 5. Scheme on 'comfort studies'. The Scientific Liaison Office in London is representing India on the British Scientific Official Conference and the Officer-in-Charge, Building Research Unit, Roorkee has been nominated to work as a corresponding member on the scheme on building practices and allied subjects. In India such data is wanting. However, some useful work has been done by Indian Research Fund Association and a few other organisations. A report on this subject has already been published in the Journal of Scientific and Industrial Research in an article entitled 'Environmental Factors and Human Comforts' by Dr. N. K. Fatwardhan, Officer-in-Charge, Building Research Unit, Roorkee.

Recommendations of the Committee of the Board.	Recommendations of the Board.

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Item No.	Particulars.
	The Committee thought that the scheme was very interesting and suggested that the Secretary should draw an overall scheme on which work should be carried out at the Unit and other places in the country for examination by the Committee. The scheme on the use of earth-stored heat and cold, by Prof. W. C. Thoburn and a note on the proposal were placed before the members who said that they would study them and give their opinion. 6. Consideration of suggestions made by the Secretary, Publics Work Department, Bombay Government, that a meeting of workers engaged on building research be convened by some central organisation to discuss matters of common interest and draw up a programme of work to be carried out by various units. During the discussions on item No. 4 (a) it was agreed that there should be an annual meeting of all research workers engaged in building and allied research. At this stage some members remarked that there are a number of engineering bodies and it is very essential to clearly indicate the scope of each body and its relation with other similar organisations. The Secretary referred to the recommendations of the older Building Research Committee for moving the Government for the creation of a Central Housing Authority. The Committee was informed that the creation of a Department of Housing is under the consideration of the Government of India, and a Board of Engineering Research had been set up under the auspices of the Council for co-ordinating engineering research work in India. It was, therefore, considered that for the time being no action on this item was necessary. 7. Suitable arrangements to be made for publications of the Building Research Unit. During the past, publications of the Unit were either sent to the Editor, Journal of Scientific and Industrial Research or were cyclo-styled or printed after approval by the Publication Sub-Committee of the Building Research Committee. During the year a number of such publications were published. It was agreed that such papers be sent to all the members of the Building Research Committee and their opinion invited within a time limit. After their recommendations the same may be published. There was no need for a Sub-Committee. XXIII <i>Subject: Proceedings of the Coal Blending and Coking Research Sub-Committee (I).</i> <i>Synopsis:</i> A meeting of the Coal Blending and Coking Research Sub-Committee was held on the 12th May, 1950 at Jamshedpur.

Recommendations of the Committee of the Board.	Recommendations of the Board.
5. p. 79-83. The Committee noted that the Research Schemes submitted by Dr. S. R. Sen Gupta had already been discussed under items X, XI, XII and XIII p. 23-29 of this Agenda, and the scheme on the so called Krisone crete by Mr. Krishen Singh had been considered under item IX p. 19-23 of this Agenda. Regarding the investigations on Vermiculite and Durability of building stones, the Committee endorsed the recommendation of the Research Committee that the work be taken up in collaboration with the other National Laboratories. The Committee also recommended that the Officer in-charge of the Building Research Unit be requested to draw up an over-all scheme on Comfort studies for further scrutiny by the Research Committee. As regards the problem on the use of earth-stored heat and cold by Prof. Thoburn, it was noted that the Research Committee had since recommended that the problem may be undertaken at a later stage when the Building Research Institute had more staff and equipment. The Committee endorsed the recommendation of the Research Committee. 6. p. 83. The Committee noted. 7. p. 83. The Committee agreed with the opinion of the Research Committee and did not recommend the formation of a Sub-Committee for publications of the Building Research Committee and the Institute.	5. p. 79-83. The Board noted and endorsed the recommendations of its Committee. 6. p. 83. The Board noted. 7. p. 83. The Board accepted the recommendation of its Committee.

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Item No.	Particulars.
	1. Accounts : (i) Renewal of grant for the year 1950-51. Members were informed that the Council of Scientific and Industrial Research, New Delhi had sanctioned the sum of Rs. 36,000 as block grant for the year 1950-51. A reminder had also been sent to Bombay Office of M/s Tata Iron & Steel Co., Ltd., requesting for a sanction of their 50% share of the grant. (ii) The Secretary stated that the expenditure in the months of February and March 1950 were higher than the previous months, mainly due to the very high price of carbon tetrachloride lately purchased for washing of coal as also labour charges against works order placed for repairs to the surface drain and passage near the Testing Plant and for fixing up a hooter for the air blower. The Secretary was advised to produce before the Committee at every meeting a statement showing total expenses incurred to date together with the budget sanction, to avert any possibilities of an over-run in the budget. (iii) Cost of purchase of a spare blower. The Committee approved of the cost of about Rs. 1,600 for the purchase of a spare set of air blower for the $\frac{1}{2}$ ton test oven against capital account. (iv) Cost of additions and alterations to the sampling room. The Committee approved of an approximate expenditure of Rs. 1,000 to be incurred against revenue account for necessary additions and alterations to the sampling room. 2. Staff. (i) Appointment of a Jr. Chemical Assistant. Out of a total of 351 applications received, the Superintendent Labour Bureau, Tisco, had recommended the names of 13 candidates to be called for interview. Nine candidates out of these and 12 others were recommended by the Chairman for being called for an interview. (ii) Joint applications from the staff. The Committee was informed that two joint applications had been received from the Shift Foremen claiming that (i) the cadre of shift foremen should be considered next in line with that of the Fuel Technologist and that (ii) they should be given chances of acting in place of the latter

Recommendations of the Committee of the Board.	Recommendations of the Board.
Item XXIII. 1. (i) p. 85. The Committee noted that the grant of Rs. 36,000 for the year 1950-51 had already been placed at the disposal of the Coal Blending and Coking Research Sub-Committee.	Item XXIII. 1. (i) p. 85. The Board noted.
1. (ii), (iii) & (iv) p. 85. The Committee endorsed the recommendations of the Research Committee.	1. (ii), (iii) and (iv) p. 85. The Board endorsed the recommendations of the Research Committee.

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	in preference to the Senior Chemical Assistant. The Committee was informed of the action taken by the Chairman. 3. Programme of work :— (i) Tests on utilisation of coke-breeze. Further tests would be conducted using coke-breeze in finer sizes of 100% through 20 Tyler mesh instead of 100% through 16 Tyler mesh as hitherto used, under strictly comparable conditions. (ii) Bokaro coals. About 2 tons of Bermo seam top section coal had already been washed at 1.40 sp. gr. with a recovery of hardly 14% with the ash content coming down from about 27 to 19 per cent. A 50 : 50 blend of this 'floats' with Sijua 14 seam coal had yielded hard coke as indicated from Breslau tests (b) and that Bermo seam, bottom section coal was being washed to collect enough quantity for coking tests. (iii) Kasta seam coal, Raniganj. A further quantity of Kasta seam coal had been washed to carry out confirmatory pilot oven tests with blends of the 'floats' since result of the previous test was not reliable, the physical testing equipment being out of order when the tests were carried out. (iv) Special coking tests as suggested by Dr. Whitaker. Results of screening tests carried out with a few coal samples as informed in the previous meeting had been sent to Dr. Whitaker, inviting his further views on this subject. (v) Pasang seam, Gartanga. A wagon load sample of Passang seam (Gartanga) coal, Surguja State, had been received from M/s Tata Iron & Steel Co. and tests would be carried out with blends of this coal under varying carbonising conditions. Coke obtained from a pilot test conducted in previous experiments with a blend containing 15% of this coal procured earlier and 85% of 'Tatas' Coke Ovens coal mixture had yielded soft cokes as indicated by Breslau test. 4. Miscellaneous : (i) Tests on washability, slurry recovery, etc. It was suggested that, in as much as problems on washing of coals were at present assuming greater and greater importance, the Coal Blending and Coking Research Sub-Committee's

Recommendations of the Committee of the Board.	Recommendations of the Board.
2. (i) & (ii) p. 85-87. The Committee noted. 3. p. 87. The Committee noted with satisfaction the progress of work in the scheme and endorsed the recommendations of the Research Committee on the future programme of work.	2. (i) and (ii) p. 85-87. The Board noted. 3. p. 87. The Board noted and endorsed the recommendations of the Research Committee.

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	activities should now be extended further to include a study of washability of coals and related problems, such as secondary washing, slurry recovery and reduction of phosphorus and sulphur in the coal. After a thorough discussion it was felt that, since there was enough work to be done in the line of blending investigation originally envisaged by the C.B. C.R. Sub-Committee, it was inopportune to switch over from the present activities to other items of work or to widen its scope at present. (ii) The high cost involved in using carbon tetrachloride and benzol for washing of bulk samples of a coal (several tons in certain cases) and the danger of exposure to the injurious vapours during the washing operation, as explained by the Secretary, caused some concern to the Committee. (iii) The purchasing of a pilot scale washing plant, of moderate capacity, working on the principle of heavy media separation, was considered to be helpful in obviating these difficulties. The propriety of the C.B.C.R. Sub-Committee's funds being spent for this purpose was, however questioned, since the possession of such an equipment by the C.B.C.R. would considerably narrow down the scope of its utility in that the C.B. C.R. would use it only to wash coals at particular sp. gravities to collect enough samples for coking tests, whereas, this equipment could conveniently be employed full time to carry out systematic and exhaustive tests on the washing characteristics of different coals in general. Therefore, it was considered advisable for the research department of Messrs Tata Iron & Steel Co Ltd., to purchase this pilot plant, in which case advantage could be taken of also by the C.B.C.R. Sub-Committee, if necessary.
XXIV	Subject : The Coal Blending and Coking Research Sub-Committee (II). Synopsis : 1. A meeting of the Coal Blending and Coking Research Sub-Committee was held on 5-8-50 in Jamshedpur. 2. ACCOUNTS : (i) Renewal of grant for the year 1950-51 : The Committee was informed that a formal letter sanctioning the sum of Rs. 31,000 and 36,000 for the years 1949-50, and 1950-51 respectively towards M/s. Tata Iron & Steel Co's 50% share of recurring expenses had been received. It was noted in this connection that the management of the Steel Co., had drawn the attention of the Committee that while approving in 1941 the principle of the Steel Company bearing

Recommendations of the Committee of the Board.	Recommendations of the Board.
4 (i) p. 87-89. The Committee endorsed the recommendation of the Research Committee. (ii) p. 89. The Committee recommended that the D.S.I.R. be authorised to ascertain from the C.B.C.R. Sub-Committee what action had been taken by the Secretary in the matter. (iii) p. 89. The Committee endorsed the recommendation of the Research Committee. Item XXIV. 1 p. 89. The Committee noted.	4 (i) p. 87-89. The Board endorsed the recommendation of the Research Committee. (ii) p. 89. The Board accepted the recommendation of its Committee. (iii) p. 89. The Board endorsed the recommendation of the Research Committee. Item XXIV 1. p. 89. The Board noted.

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	50% of the total expenditure of the C.B.C.R. Sub-Committee, had limited their financial commitment to Rs 26,000 a year and, had desired that the C.B.C.R. Sub-Committee should not commit the Steel Company in excess of this amount (Rs. 26,000 a year), without obtaining their prior sanction. The Secretary was advised to be guided accordingly when submitting applications for renewal of grants in future. (ii) Statement of revenue expenditure . It was noted that the total expenditure incurred during the quarter amounted to approximately Rs. 17,620. The Chairman stressed the necessity of keeping within the sanctioned renewal grant of Rs. 72,000 a year. The Secretary was advised to maintain all expenses to a minimum and to try and keep the monthly recurring expenses within the sanctioned amount for the remaining 8 months of the year. Total expenses for the period in consideration was rather high owing to a sum of over Rs.1,800 being paid to some of the staff in April, 1950 as grade increments, with retrospective effect from July, 1949 in accordance with the recommendations of the New Wage Structure Committee and duly approved by the management of the Steel Company. 3. STAFF : Appointment of Jr. Chemical Assistant : The Committee was informed that on the recommendation of the Selection Committee, Mr. R. L. Kapoor B.Sc. (Tech.) now working as chemist in Kandra Glass Works, had been appointed Jr. Ch. Assistant and was expected to join shortly. 4. PROGRAMME OF WORK : (i) <i>Further tests on utilisation of coke-breeze</i> : Sufficient quantity of coke-breeze from stock had been screened to collect a sample of about 2000 lbs. of the material passing through 20 Tyler mesh. The proposed tests using blends of the same with Tatas' coke oven coal mixture would shortly be undertaken. (ii) <i>Tests with Pasang seam, Gartang coal (Bisrampur field)</i> : It was noted that 10 to 15 percent of the coal in blends with coking coals yielded medium hard to hard coke (according to Breslau tests). Better results were generally obtained from tests carried out (i) by using finer sizes of the coal ; (ii) by carbonising in ovens of reduced width (6") and (iii) by using stamp charges. It was agreed that full size tests should be undertaken, after completion of necessary pilot tests at Simon Craves test oven. (iii) <i>Tests with Bermo seam coal (Bokaro field)</i> : Since hard coke (indicated by Breslau tests) could be obtained, it was decided to carry out pilot tests using 100 percent of the

Recommendations of the Committee of the Board.	Recommendations of the Board.
2. (i) & (ii) p. 89-91. The Committee noted and endorsed the recommendations of the Research Committee. 3. p. 91. The Committee recommended that the appointment of Mr.R.L. Kapoor as Junior Chemical Assistant in the C. B. C. R. Scheme be approved.	2 (i) and (ii) p. 89-91. The Board noted and endorsed the recommendation of the Research Committee. 3. p. 91. The Board accepted the recommendation of its Committee.

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	straight floats in the Russel oven in preference to the Simon Carves test oven which needed a much larger charges, since the yield on washing was very low. This would require proportionately less amount of the expensive carbon tetrachloride. (iv) <i>Tests with Kasta seam coal, Raniganj field</i>: Results so far obtained had indicated the possibility of obtaining medium hard to hard coke (according to Breslau tests) using 40 to 50 percent of the raw coal and its washed fraction (cut at 1.58). The Secretary was advised to carry out some full oven tests and subsequently make out a report to decide if fresh samples should be procured for further confirmatory tests. 5. ANNUAL REPORT: It was noted that the annual report for the year 1949-50 would soon be ready. XXV Subject: Proceedings of the meeting of the Joint Sub-Committee of the Nutrition Advisory Committee of the Indian Council of Medical Research and Vanaspathi Research Advisory Committee of the Council of Scientific & Industrial Research. <i>Synopsis:</i> 1. A meeting of the Joint Sub-Committee was held on Friday the 30th June, 1950 at Bangalore. In his opening remarks, the Chairman pointed out that the Joint Sub-Committee had been entrusted with very strenuous and responsible duties:— (a) To collect information from the available literature on the use of edible oils and fats and the effect of processing them ; (b) To keep watch on the public opinion with respect to these foodstuffs ; and (c) To keep abreast of world development in all its aspects in respect of hydrogenated fats and oils. The Sub-Committee did not, however, possess the necessary organisation or assistance for doing this work, not even a Secretary and consequently could not effectively discharge the duties that were assigned to it. He proposed that the Sub-Committee should elect a Secretary and recommend the setting up of an organisation at a selected centre for collecting the material and preparing the necessary reports. The Sub-Committee elected Dr. V. Subrahmanyam as the Secretary. The Sub-Committee also recommended that Dr. Subrahmanyam should have the necessary technical and other assistance

Recommendations of the Committee of the Board.	Recommendations of the Board.
4. p. 91-93. The Committee noted and endorsed the recommendations of the Research Committee on their future programme of work. 5. p. 93. The Committee noted that the annual report for 1949-50 had since been received by the Chairman, Fuel Research Committee.	4. p. 91-93. The Board noted and endorsed the recommendations of the Research Committee. 5. p. 93. The Board noted.

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	and a provision for contingencies to carry out the work. The Sub-Committee left it to Dr. Subrahmanyam to formulate the necessary proposals through the Council of Scientific & Industrial Research.								
	Dr. Subrahmanyam accepted the Secretaryship and agreed to take up the main work after the necessary assistance and facilities were provided.								
	Dr. Subrahmanyam has since written to the D.S.I.R. asking for the following assistance:—								
	<table> <tr> <td>Contingencies</td><td>Rs. 1,000</td></tr> <tr> <td>Staff :</td><td></td></tr> <tr> <td>(One Junior Scientific Officer on Rs. 300 p.m. and one Steno Typist)</td><td>Rs. 4,500 plus allowances.</td></tr> <tr> <td>Total</td><td>Rs. 5,500 plus allowances.</td></tr> </table>	Contingencies	Rs. 1,000	Staff :		(One Junior Scientific Officer on Rs. 300 p.m. and one Steno Typist)	Rs. 4,500 plus allowances.	Total	Rs. 5,500 plus allowances.
Contingencies	Rs. 1,000								
Staff :									
(One Junior Scientific Officer on Rs. 300 p.m. and one Steno Typist)	Rs. 4,500 plus allowances.								
Total	Rs. 5,500 plus allowances.								
	2. Adulteration of vegetable oils with mineral oils :								
	The Sub-Committee considered a note by Dr. K. Mitra on denaturation of white oil.								
	The Sub-Committee recommended that denaturation of white oil, in such a distinctive way that its presence could be noticed even at low concentrations, was the most practical way of dealing with the problem. At the same time, the Sub-Committee felt that the denaturant should not, in any way, interfere with the industrial uses of the oil. With this in view, the Sub-Committee suggested that further systematic trials should be carried out in one of the C.S.I.R. laboratories, preferably the National Chemical Laboratory and the results reported to the Sub-Committee in as short a time as possible. In addition to carrying out the trials with the denatured mineral oils, the general characteristics of mixtures of the denatured product with the vegetable oils at different levels, should also be noted.								
	3. The Sub-Committee decided to refer the progress report on the scheme of research entitled "Nutritive value of Vanaspati and Vitamin (A) content of ghee" from the Indian Veterinary Research Institute, Izatnagar to the Vanaspati Research Advisory Committee of the C.S.I.R. It was also recommended that further reports on the same and allied subjects may be referred to the same Committee.								
XXVI	<i>Subject :</i> Proceedings of the Power Alcohol Sub-Committee. <i>Agenda :</i> 1. A meeting of the Power Alcohol Sub-Committee was held on the 3rd April, 1950.								

Recommendations of the Committee of the Board.	Recommendations of the Board.												
Item XXV. 1. p. 93-95. The Committee recommended that the appointment of Dr. V. Subrahmanyam as Secretary to the Joint Sub-Committee of the C.S.I.R. and the I.C.M.R. be approved. It was also recommended that (provided the Indian Council of Medical Research was willing to share half the expenses) the following assistance be made available to Dr. Subrahmanyam for this purpose :— <table><tr><td>Contingencies</td><td>Rs. 250</td><td></td></tr><tr><td>Staff :</td><td>Rs. 2,185</td><td>(upto 28th Feb., 1951 in the first instance.)</td></tr><tr><td>(One Tech. Asstr. on Rs. 250 p.m. in the grade of Rs. 250-25-500. One Steno-typist on Rs. 55.</td><td></td><td></td></tr><tr><td>Total</td><td>Rs 2,435</td><td></td></tr></table>	Contingencies	Rs. 250		Staff :	Rs. 2,185	(upto 28th Feb., 1951 in the first instance.)	(One Tech. Asstr. on Rs. 250 p.m. in the grade of Rs. 250-25-500. One Steno-typist on Rs. 55.			Total	Rs 2,435		Item XXV 1. p. 93-95. The Board accepted the recommendations of its Committee.
Contingencies	Rs. 250												
Staff :	Rs. 2,185	(upto 28th Feb., 1951 in the first instance.)											
(One Tech. Asstr. on Rs. 250 p.m. in the grade of Rs. 250-25-500. One Steno-typist on Rs. 55.													
Total	Rs 2,435												
2. p. 95. The Committee viewed with anxiety the problem of adulteration of edible vegetable oils with mineral oils prevalent in the country. The Committee endorsed the recommendation of the Joint Sub-Committee that investigations be instituted in the National Chemical Laboratory for establishing suitable denaturants for mineral oils which were most likely to be used for adulteration purposes and also methods for the detection of adulteration.	2. p. 95. The Board accepted the recommendations of its Committee.												
3. p. 95. The Committee noted that the report had already been circulated to the Vanaspati Research Advisory Committee for opinion.	3. p. 95. The Board noted.												
Item XXVI. 1. p. 95. The Committee noted.	Item XXVI. 1. p. 95. The Board noted.												

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Item No.	Particulars.
	2. The Committee considered the report submitted by Dr. G. P. Kane and Dr. N. R. Kuloor of their studies in acid hydrolysis of bagasse and the results obtained. D.S.I.R. suggested that the Committee should consider the economic feasibility of the process developed. Dr. Kuloor said that he considered that the process would be economical as, besides alcohol important by-products such as pentoses could be obtained. The non-fermentable sugars could also be recovered from the acid hydrolysate. Mr. Sreenivasaya suggested the manufacture of torula (food yeast). He said that the manufacture of furfural would be more economical than crystallising sugar from the acid hydrolysate. Lala Shri Ram suggested that all these questions could be settled by setting up a pilot plant and working out the process under semi-large-scale conditions. D.S.I.R. was of the opinion that a pilot plant should be set up as he considered that such a pilot plant was not available in India and would be very useful to determine the economics of the process and for scientific work. Dr. Daruvalla told the Committee that such a plant could be rigged up in India and placed on the table a blue print prepared by him and Dr. Kuloor. L. Shri Ram said that he was of the opinion that the plant would not cost more than Rs. 10,000 as some of the equipment was already available. The plant could be later used for experiments on agricultural cellulosic wastes. Mr. Sreenivasaya suggested that the acid hydrolysis should be tested for the percentage of convertible sugars and non-convertible sugars. He offered to carry out the tests at the Indian Institute of Science. The Committee made the following recommendation :— “The Committee noted the details of the work done so far by Dr. Kuloor and considered that the results obtained were encouraging and scientifically and industrially promising. The Committee recommended that fermentability tests of the acid hydrolysate obtained by Dr. Kuloor be carried out by Mr. Sreenivasaya at the Indian Institute of Science for which purpose samples be sent to him. The Committee approved the blue print of the pilot plant as drawn up by Dr. Kuloor and Dr. Daruvalla and it was recommended that the C.S.I.R. be approached for a suitable grant not exceeding Rs. 10,000 for the fabrication and installation of the pilot plant at the Shri Ram Institute of Scientific Research.” XXVII <i>Subject : Proceedings of the 20th meeting of the B.S.I.R. Hyderabad (Dn.).</i> <i>Synopsis :</i> A meeting of the Board of Scientific and Industrial Research, Hyderabad Dn. was held on the 5th July, 1950.

Recommendations of the Committee of the Board.	Recommendations of the Board.
2. p. 97. The Committee noted the progress of work undertaken by the Power Alcohol Committee for the manufacture of alcohol from bagasse and other agricultural wastes. In view of the fact that the results obtained had been encouraging, the Committee recommended that a suitable grant not exceeding Rs. 10,000 be made to Dr. N.R. Kuloor for undertaking the pilot plant investigation. The Committee also recommended that the programme of work as suggested by the Power Alcohol Committee be approved.	2. p. 97. The Board noted and accepted the recommendations of its Committee.

CEEDINGS OF THE RESEARCH COMMITTEES

m No.	Particulars.
	1. Report of the action taken on previous recommendations. (i) Help to Hand-made paper industry :—The Director, Central Laboratories pointed that out of the three hand-made paper factories only one (Seth Ismailji's) was manufacturing card-board and the Central Laboratories will be able to meet its requirements of the pulp. Mr. Dawar Hussain Kazi said that there was demand for hand-made paper in the State and he was of the opinion that Government help was necessary at present. The President said that Government help was there, giving concession in quality and price and that special instructions were issued to the Government Stationery Department in that direction. The Director, Central Laboratories pointed out that from the pulp obtained from the Central Laboratories they could expect a very good quality of paper. The President requested the Director, Commerce and Industries to continue his efforts to induce the hand-made paper manufacturers to start their factories. (ii) Allocation of funds to Research Committees for 1950-1951 :—The Board noted the allotment of funds to the various Research Committees made by the Director, Central Laboratories out of the sanctioned grant of Rs. 80,000 for the year 1950-51. 2. Report of work done from 1-1-1950 to 31-3-1950. (i) Vegetable oils utilisation committee : (a) Investigation of custard apple seed oil : It was resolved to continue the work, as the quantity of seethaphal available in the State would justify the attention paid towards this problem. (b) Dehydrated castor oil :—The Director, Central Laboratories reported that there were some enquiries regarding exploitation of the scheme from abroad, and in the State the Hindustan Oil Mills appeared to be interested. (ii) Pharmaceuticals and Drugs Committee : (a) Preparation of fructose from cane sugar : The Director, Central Laboratories informed that the Nizam Sugar Factory was concentrating on products of sugar only whereas sugar was the starting material for preparation of fructose and other valueable products. Dr. K. H. Hassan agreed to take up the exploitation of this problem in the Hyderabad Chemical and Pharmaceutical Works Ltd. (b) Nux vomica : The Director Central Laboratories reported that work on this problem was completed and that Dr K. H. Hassan would take it for exploitation in the Hyderabad

Recommendations of the Committee of the Board.	Recommendations of the Board.
Item XXVII 1. p. 99. The Committee noted. 2. (i) p. 99. The Committee noted that considerable amount of work on dehydrated castor oil had been done under the auspices of the C.S.I.R. and that the relevant information had been furnished to the B.S.I.R., Hyderabad.	Item XXVII 1. p. 99. The Board noted. 2. (i) p. 99. The Board noted.

PROCEEDINGS OF THE RESEARCH COMMITTEES

Item No.	Particulars.
	Chemical and Pharmaceutical Works Ltd. The Forest Department had no information about the approximate quantity available of nux vomica and other important forest products. The Director, Central Laboratories stated that the industrialists did not appear to be interested in exploiting the processes. Dr. Syed Husain suggested that the process for the manufacture of alumina ferric be referred to the Hyderabad Chemicals and Fertilizers Ltd., or to the Mysore Fertilisers Factory at Belagula. It was pointed out that alumina ferric was no more being manufactured by them. The President wondered if scientific research was far in advance of the industrial capacity of the country. The Director, Central Laboratories replied that it was certainly so. (iii) Preparation of active charcoal from groundnut husk : The Director, Central Laboratories informed the Committee that active steps were being taken for getting the large plant for carbonisation of coal. (iv) Ceramic Research Committee : Dr. Raju informed that work was done with groundnut and paddy husks as fillers for heat proof housing materials. (v) Fibre Research Committee : The sample bottles containing purified cotton waste of various types from Textile Mills were exhibited. The President was interested in the cost involved with a view to using in the Sir Silk Factory which was nearing completion. (vi) Forest Products Utilisation Committee : a) The Director, Central Laboratories suggested that small plants for wood seasoning and timber testing be set up in the Central Laboratories. Mr. Kazi suggested that a wood seasoning kiln be set up by the Government at Mancheri. The President said that he would take up this matter with the Forest Department. b) Utilisation of mohwa : The Director, Central Laboratories reported that there was not much mohwa in the State and a good deal had to be planted. As the actual quantity available was not properly known, it was suggested that a complete detailed survey of mohwa and all other useful plants and trees be carried out in the State. The Board recommended to the Forest Department to start immediately the survey of all useful forest products.

Recommendations of the Committee of the Board.	Recommendations of the Board.
2 (ii) p. 99-101. The Committee noted. 2 (iii), (iv), (v), (vi) p. 101. The Committee noted. It was also recommended that the B.S.I.R. Hyderabad be requested to send reports of completed investigations for information of the National Laboratories and the Research Committees.	2 (ii) p. 99-101. The Board noted. 2 (iii), (iv), (v), (vi) p. 101. The Board noted and accepted the recommendation of its Committee.

PROCEEDINGS OF THE RESEARCH COMMITTEES

Item No.	Particulars.
	3. Proceedings of the Committees under the Board. (i) <i>Fibre Research Committee</i> : The following programme of work was approved :— (a) Purification of textile waste for use in acetate rayon industry. (b) Preparation of vanillin from lignin. (c) Preparation of corrugated card board. (d) Hand-made paper from rags, cotton waste, waste cotton and hosiery cuttings. (e) Preparation of masonite boards using locally available resins (New item). Regarding item (d) Dr. K. N. Mathur stated that in Delhi Japanese machinery had been installed for conversion of rags into cloth of good quality in connection with the refugee rehabilitation scheme. The President desired that the Director, Commerce and Industries should study this scheme and the machinery on his next visit to Delhi. (ii) <i>Vegetable Oil Utilisation Committee</i> : The following research programme was approved :— (a) Investigation of custard apple seed oil. (b) Preparation of dehydrated castor oil. It was decided to take up work on the refining of castor oil. (c) Investigation of ramphal seed oil which is closely related to custard apple. (d) Preparation of sodium ricinoleate. (e) Preparation of detergents other than soaps from vegetable oils. (f) Preparation of soaps from fatty acids obtained by the splitting of oils. (g) Preparation of lubricants from vegetable oils. (iii) <i>Fuel Research Committee</i> : The following programme of research was approved :— (a) Ground nut oil-alcohol mixture as fuel for diesel engines. (b) Low temperature carbonisation of Hyderabad coal. (c) Complete gasification of Hyderabad coal. (d) Fluidization of coal. (e) Combustion of liquids. <i>Petrol alcohol mixture as fuel for petrol engines :</i> Dr. Husain Zaheer reported that from the tests carried out in the Central Laboratories it was found that the proportion of alcohol in the motor fuel supplied to consumers was not constant. For the last few weeks there was no alcohol in the petrol supplied to the public. Dr. K. N. Mathur described the work on petrol alcohol mixtures done under the Council of Scientific and Industrial Research. It was found that each mixture had distinctive properties.

Recommendations of the Committee of the Board.	Recommendations of the Board.
3 (i) p. 103. The Committee noted. 3 (ii) p. 103. The Committee noted that the D.S.I.R. had taken action departmentally to furnish the B.S.I.R., Hyderabad with detailed information on the work done on the preparation of lubricants from vegetable oils under the auspices of the C.S.I.R.	3 (i) p. 103. The Board noted. 3 (ii) p. 103. The Board noted.

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Item No.	Particulars.
	A mixture containing 20% alcohol had the maximum vapour pressure. The calorific value decreased with increasing proportion of alcohol. A readjustment of jet was also required. A suitable diaphragm had been evolved for the use of petrol alcohol mixtures. It was resolved to continue the work on this scheme. The President desired the Director, Central Laboratories to obtain fuller data in the subject from the reports of work done in the C. S. I. R. Laboratory during his next visit to Delhi. The Board agreed to include the following items in the research programme of the Fuel Committee :— (a) Briquetting of Coal (b) Washability of Hyderabad Coal. (iv) <i>Ceramic Research Committee</i> : The following research programme was approved :— (a) Systematic study of Hyderabad clays in collaboration with the Mines and Geology Survey Department. (b) Preparation of refractories from local raw-materials. (c) Manufacture of clinker lime bricks. (d) Determination of the suitability of Hyderabad clays for manufacture of electrical insulators (New item). Dr. Husain Zaheer stated that the source of the materials was always ascertained and most of the materials for investigation had been supplied by the Mines and Geological Survey Department. (v) <i>Pharmaceuticals and Drugs Committee</i> : The following programme of work was approved:— (a) Preparation of fructose from cane sugar. (b) Preparation of sesamin from sesame oil. (c) Synthesis of analgesics—pathidine and Metopon. (d) Investigation of Lathrus satives. (e) Assay of kurchi. (f) A study of the conversion of brucine to strychnine. (g) Manufacture of menthol from Indian turpentine (New item).

Recommendations of the Committee of the Board.	Recommendations of the Board.
3 (iii) p. 103-105. The Committee noted that the B.S.I.R. Hyderabad and the National Fuel Research Institute were exchanging notes to effect co-ordination of their researches on coal, as recommended by the B.S.I.R. in their last meeting. It was also recommended that the D.S.I.R. be authorised to send the reports of work done in the C.S.I.R. laboratories on petrol-alcohol mixtures as fuel, to the Hyderabad Board. 3. (iv) p. 105. The Committee noted and recommended that detailed reports of the work of the Hyderabad Ceramic Research Committee be obtained for information of the Central Glass and Ceramic Research Institute	3. (iii) p. 103-105. The Board noted. The Board accepted the recommendation of its Committee. 3. (iv) p. 105. The Board noted and accepted the recommendation of its Committee.

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Item No.	Particulars.
	Maj. Gen. C. L. Bhatia supported the proposal of the Committee to appoint a pharmacologist as Scientific Officer in the Central Laboratories for testing the physiological activity of new compounds. The Board recommended to the Governing Body to appoint a pharmacologist as Scientific Officer in the Central Laboratories. (vi) <i>Heavy Chemical Committee</i> : The following programme of work was approved :— - Utilisation of coal pyrites. - Development of potash industry in Hyderabad. - Investigation of the suitability of the glue prepared in the Laboratory for the match industry - Activation of the charcoal obtained by the distillation of groundnut husk. - Preparation of photographic gelatine. (vii) <i>Forest Products Utilisation Committee</i> : The following programme of work was approved:— - Investigation of (i) custard apple seed (ii) gum of <i>Bosellia serrata</i> (iii) gum of <i>Sterculia urens</i>. - To study the biology of Tassar silk worm and the control of its diseases with the object of reviving the silk industry. - Survey of medicinal plants. (viii) <i>Industrial Ferments Committee</i> : The following programme of research work was approved :— - Pilot plant experiments on the manufacture of food yeast. - Manufacture citric acid from sugar or molasses. - To increase the proportion of alcohol in the mash at the Bodhan Distillery. 4. Donation Utilisation Committee. It was resolved that two Scholarships of Rs. 100 p.m. each be awarded from the Donation Fund on certain conditions for research in Applied Science leading to Ph. D. degree. 5. Proposal for the survey of coal resources of Hyderabad State. The Director, Central Laboratories said that he had discussed this question with Dr. Whitaker and Dr. Lahiri when they visited Hyderabad about one year ago and the proposal was being submitted as suggested by them.

Recommendations of the Committee of the Board.	Recommendations of the Board.
(v) p. 105-107. The Committee noted. (vi) p. 107. The Committee noted that research on the preparation of gelatine for photographic purposes had already been carried out under the auspices of the C.S.I.R. It was recommended that the relevant information be supplied to the Hyderabad B.S.I.R. to enable them to avoid duplication of work. (vii) p. 107. The Committee noted (viii) p. 107. The Committee noted that certain amount of research work had already been done under the auspices of the C.S.I.R. on— - pilot plant experiments on food yeast. - citric acid from molasses. - increasing alcohol concentration in distillery washes. It was recommended that the D.S.I.R. be authorised to ascertain from the Hyderabad B.S.I.R., the details of their programme and furnish them with the reports of the work done under the C.S.I.R. 4. p. 107. The Committee noted.	(v) p. 105-107. The Board noted. (vi) p. 107. The Board noted and accepted the recommendation of its Committee. (vii) p. 107. The Board noted. (viii) p. 107. The Board noted and accepted the recommendation of its Committee. 4. p. 107. The Board noted.

PROCEEDINGS OF THE RESEARCH COMMITTEES

Item No.	Particulars.
	The Board approved the proposal in principle and resolved that the Secretary, Commerce and Industries may call a meeting of Director, Central Laboratories, The Director, Mines and Geological Department and the Manager Singarreni Collieries to discuss details and submit a scheme to the Government.
XXVIII	<i>Subject :</i> Proceedings of the Industrial Research Committee, Bombay. <i>Synopsis :</i> 1. A meeting of the Industrial Research Committee, Bombay was held on the 27th February, 1950. During a discussion on the Pilot Plant Committee, it was mentioned that the committee was appointed at the suggestion of the Council of Scientific & Industrial Research in 1941 and hitherto grants were given to applicants who proposed special problems for research and that the policy governing the grants was that the problems suggested were of industrial value. Dr. Mata Prasad and Dr. K.A. Hamied stated that there should be an autonomous organisation on the model of the Council of Scientific & Industrial Research. Dr. Hamied also stated that there should be a number of research laboratories. Dr. Mata Prasad stated that problems of all India importance may be tackled by the Council of Scientific and Industrial Research and there should be some problems of special interest to the State itself. Hyderabad had an organisation on the model of the Council of Scientific and Industrial Research. The organisation should allot grants to short and long term research programmes and not to isolated problems. Research schemes worked out by himself pertaining to gelatine, extraction of potassium chloride, bromine, etc. had reached a commercial stage. The organisation should be able to give research grants for specific schemes to research laboratories such as the Institute of Science, Bombay, Department of Chemical Technology, Matunga, Industrial Research Laboratories Matunga, etc. Prof. Joshi suggested that a survey would be necessary for finding out the technical requirements of industries of the State. Shri Kirloskar stated that reference to individual factories should be necessary for finding out the problems for research. Dr. Mandlekar stated that an approach to various Industrial Associations, two years ago, had yielded no useful result. Dr. Mata Prasad remarked that the schemes which were taken up should be continued and the results made available to the interested parties.

Recommendations of the Committee of the Board.	Recommendations of the Board.
5 p. 107-109. The Committee noted and recommended that the proposed survey of Hyderabad Coal resources should be properly integrated with the National Coal Survey undertaken by the National Fuel Research Institute.	5. p. 107-109. The Board noted and accepted the recommendation of its Committee.
Item XXVIII 1. p. 109. The Committee noted.	Item XXVIII 1. p. 109. The Board noted.

PROCEEDINGS OF THE RESEARCH COMMITTEES

Item No.	Particulars.
	2. (a) Research grants to the following schemes were approved. (i) The production of amylases for food, pharmaceutical and textile Industries. (ii) Preparation of surface active compounds from glycerine. (iii) Vegetable drugs, and (iv) Synthetics. (b) The Committee did not approve the following schemes for research grants :— (i) Utilization of mahuwa flower extract and of molasses for production of refined syrup. (ii) Glycerophosphates and phosphates. (iii) Colouring of motion picture films. (c) The Committee noted the progress of work under the following schemes :
Serial No.	Name of the Scheme. Remarks.
(i)	Ergot investigation scheme by Prof. S.L. Ajrekar, Fergusson College, Poona and Dr. P. S. Gharse. Maharashtra Education Society's College, Poona. The scheme was discontinued for want of necessary facilities at the Fergusson College, Poona. The same work has now been taken up by Dr. Gharse.
(ii)	Preparation of stable diazo salts for printing and dyeing purposes by Principal P. N. Joshi, V. J. T. Institute, Matunga, Bombay. The preparation of antediazotates of 6 simpler chloro and nitro bases has been studied in detail and the experimental conditions determined.
(iii)	Preparation of amylases for pharmaceutical food and textile industries by Dr. A. Sreenivasan, Department of Chemical Technology, Matunga, Bombay. (1) The preparation from <i>Aspergillus Oxyzae</i> have been found to be superior to malt and other amylases for use in various industries like textile, paper, leather, food, pharmacy, etc. The cost is found to be comparatively cheaper than those of imported products. The process is covered by Indian Patent No. 37843 of 1947. (2) The work on bacterial amylases requires further study to put it on industrial basis.
(iv)	Investigation of fish poison of hingora nuts by Prof. B. V. Bhide, Sir. P. Bhau College, Poona. (1) Fish poison of hingora seeds is a saponin and could be used as insecticide against bugs, etc. Its use as insecticide, however, needs investigation on large scale. (2) Diogenin which is obtained by hydrolysis of saponin, if available in sufficiently large quantities could be used as a starting point for the production of sex hormone progesterone. (3) The kernels of the seeds give about 45% non-drying oil suitable for soap making.

Recommendations of the Committee of the Board.	Recommendations of the Board.

PROCEEDINGS OF THE RESEARCH COMMITTEES

Item No.	Particulars.		
	Serial No.	Name of the Scheme.	Remarks.
	(v)	Chemical analysis of grasses of grass lands of Raita by Dr. F. R. Bharucha, Institute of Science, Bombay.	Chemical analysis determining (1) moisture, (2) nitrogen, (3) crude protein, (4) phosphorus, (5) total mineral matter and (6) carotene from grasses of grass lands of Raita (near Kalyan) was carried out under different seasonal conditions. The scheme was discontinued after a year as it could be better carried out under the auspices of the Indian Council of Agricultural Research and The Director of Agriculture.
	(vi)	Preparations of pectins from indigenous raw materials by Dr. H.R. Nanji and Dr. A. Sreenivasan, Dept. of Chemical Technology, Matunga, Bombay.	(1) The polysaccharide from tamarind seed, originally described as tamarind seed pectin, has been shown to differ fundamentally from fruit pectins in general and has been tentatively designed as polyose of hexopentosan. (2) In spite of the evident disadvantage of tamarind seed jelly the gel-studies have indicated the possibilities of improvement in the texture and consistency of the preparation and offer further scope for its utilisation. (3) Small scale laboratory trials have been promising in getting enzyme product from moulds (pectase from tomato fruit and drumstick leaves) comparable to the foreign products like 'Pechniol' and 'Filtragol'. (4) Further work is necessary in carrying out trials on a commercial basis.
	(vii)	Preparation of glycerol derivatives by Dr. J. G. Kane, Dept. of Chemical Technology, Matunga, Bombay.	(1) Methods of preparing mono, di and epichlorohydrins from glycerine have been studied in detail. (2) The oxidation of glycerine under different conditions did not lead to the formation of any prospective expected products.
	(viii)	Vitamin 'C' concentrates from cheap indigenous raw materials by Dr. A. Sreenivasan, Dept. of Chemical Technology, Matunga, Bombay.	Possibilities of getting Vitamin 'C' concentrates using (1) drumstick leaves (2) amlas (3) guava and (4) legumes are being investigated.
	(ix)	X-ray examination of fibres by Director, Technological Laboratory Indian Central Cotton Committee, Matunga, Bombay.	...
XXIX	<i>Subject :</i> Proceedings of the B.S.I.R. Orissa. <i>Synopsis :</i> A meeting of the Board of Scientific and Industrial Research, Orissa was held on the 4th May, 1950.		

Recommendations of the Committee of the Board.	Recommendations of the Board.
2. p. 111-113. The Committee noted that effective co-ordination with a view to avoiding duplication was being kept up by exchange of notes between the D.S.I.R. and the Provincial Industrial Research Committee, Bombay, on the schemes of research undertaken by the Bombay Committee.	2. p. 111-113. The Board noted.

PROCEEDINGS OF THE RESEARCH COMMITTEES

Item No.	Particulars.
	1. Progress reports of research schemes : (i) Research into fire proofing of straw and other building materials. Information collected from the Board of Scientific and Industrial Research, Government of India and an interim report on the progress of research now being done in the Ravenshaw College by Dr. Prasad were presented to the Board. (ii) Manufacture of artificial cement. Director of Industries was of opinion that Government should not be interested in the project. (iii) Scheme for biochemical study of rice by Sri Shyamananda Pattnaik. The scheme was postponed as Government decided to depute Mr. Pattnaik for training in soil conservation in the U.S.A. (iv) Research in edible oils. The progress report on this work was awaited. (v) Filarial research centre in Orissa. A research unit for conducting field trials for ascertaining the efficacy of Hetrassonl in the treatment of filariasis has been set up in the Medical College, Orissa since September, 1949. (vi) Industrial and medicinal use of turmeric. Report was awaited. (vii) Stephano-filariasis among cattle in Orissa. Progress report was awaited. (viii) Industrial use of forest products. (a) Myrobalan and leaves of a tree at Bari having curative effects on fever. Dr. S.S. Guha Sarkar and Dr. Bansidhar Samantarary, Ravenshaw College had submitted a scheme for financial assistance. (b) Bharmar-mari. Samples not yet received from Chief Conservator of Forests, Raja Saheb, Nayagarh and Administrator Keonjhar. Kumar Saheb of Jeypore had been requested to supply some samples of Bhramar-mari. (c) Gudmari. The samples had been obtained and made over to the Director of Health for necessary investigation of its curative properties specially in diabetes.

Recommendations of the Committee of the Board.	Recommendations of the Board.

PROCEEDINGS OF THE RESEARCH COMMITTEES

Item No.	Particulars.
	(d) Bishalya Karani. Director of Health had submitted a report regarding botanical names etc., of the different varieties of the plant. Further report from Dr. J.C. Gupta of the Standardisation Laboratory, Calcutta on its medicinal properties was awaited. (ix) Manufacture of cholera and small pox vaccines. It was suggested that encouragement may be given to private enterprise to take up this work and the manufacture of drugs and pharmaceuticals. Government would be prepared to give if necessary, financial assistance under State Aid to Industries Act. 2. New schemes. (i) Scheme for manufacture of agar-agar on a commercial scale by the Director of Industries, Orissa. The scheme along with the report received from the Board of Scientific and Industrial Research, Government of India was discussed. It was decided that necessary funds should be sanctioned early for the purchase of the equipment by Director of Industries. If it be absolutely necessary to appoint a chemical assistant on the scheme he should be sent for some time to the Laboratory of the Board of Scientific and Industrial Research at Delhi who had so kindly offered to help in this matter and to train the worker to master the technique worked out there. (ii) Scheme for research on properties of waves ultimately derived from matter by Dr. B.N. Misra. The Board after prolonged discussion decided that Dr. Misra should be requested to submit a report about the work done and the result achieved so far. This report should be referred to some eminent scientists by the Board and their guidance and advice should be sought in the matter. The question of further assistance for the continuance of the work will be taken up on receipt of necessary advice. The names of Dr. Bhabha, Dr. Saha or Dr. C.V. Raman were suggested for the purpose. (iii) Industrial research on forest products—scheme submitted by Dr. S. S. Guha Sarkar. Dr. Guha Sarkar wanted to investigate the tannin contents of haritaki, amlaki, bahara, barks of sunari and arjuna and the kath liquor. The Assistant Director of Industries (Leather) pointed out that intensive investigations have already been carried out on these forest products as regards their tannin content by the Leather Research Institutes in Bengal and elsewhere and the data were already available. It was not therefore necessary to spend time and energy in redoing the work.

Recommendations of the Committee of the Board.	Recommendations of the Board.
Item XXIX 1. p. 115-117. The Committee noted. 2 (i) p. 117. The Committee noted that arrangements were made to get a worker from the Orissa Board in the National Chemical Laboratory. ii) p. 117. The Committee noted.	Item XXIX 1 p. 115-117. The Board noted. 2. (i) p. 117. The Board noted. 2. (ii) p. 117. The Board noted.

PROCEEDINGS OF THE RESEARCH COMMITTEES

Item No.	Particulars.
	A survey ought to be taken up to find out the tannin contents of this bark at different seasons of the year and of the extent of its growth in the Orissa forests so as to estimate the total quantity that would be available per year. This bark might take the place of the wattle bark, formerly imported from South Africa and now very much in short supply. Mr. Palit was requested to send full details about the bark and the results of tanning carried out. As regards the scheme of Dr. Guha Sarkar it was resolved that a sub-committee should be constituted with Dr. Prasad, Dr. Samantray, Dr. Guha Sarkar and the Director of Industries to work out the details of the scheme. (iv) Scheme for investigation of the nature of dimono-valent and di-divalent salts in aqueous solutions by Dr. B. Prasad. As these investigations were purely of a theoretical nature and were not likely to have any immediate practical application, the Board recommended that the matter should be referred to the Education Department to make the necessary funds available to Dr. Prasad. The Board felt that the scheme deserved encouragement and should be sympathetically considered by the Education Department. The assistance of the Board of Scientific and Industrial Research, Government of India may also be sought in this matter. (v) Scheme for botanical survey of Orissa. The Forest Department were also intimately connected with investigations of this nature. It was therefore resolved that a sub-committee consisting of the Chief Conservator of Forests, the Professor of Botany, the Director of Agriculture, Dr. Prasad, Dr. Guha Sarkar and the Director of Industries should go into this question and work out a detailed scheme for consideration. This Committee should also be requested to go into the question of using karadi bark for tanning purposes and the extent of its availability in Orissa forests to estimate the annual yield. 3. Miscellaneous. The Chairman suggested that the desirability of converting the Board into an autonomous body by registering it as a Society should be considered as soon as possible when it would be possible for it to approach individual industrialists, the Utkal University and other patrons of science and learning and the Board of Scientific and Industrial Research, Government of India to help it with funds.
XXX	Any other business.

Recommendations of the Committee of the Board.	Recommendations of the Board.
2 (iii) p. 117-119. The Committee was of the opinion that a survey of tannin containing barks in Orissa would be useful and recommended that details of the proposed survey be obtained for information of the Leather Research Committee of the CSIR.	2. (iii) p. 117-119. The Board accepted the recommendation of its Committee.
(iv) p. 119 The Committee recommended that the scheme of Dr. B. Prasad be referred to the Chemical Research Committee, if and when received.	(iv) p. 119. The Board accepted the recommendation of its Committee.
(v) p. 119. The Committee noted.	(v) p. 119. The Board noted
3. p. 119. The Committee noted.	3 p. 119. The Board noted.

PROCEEDINGS OF THE RESEARCH COMMITTEES

Item No.	Particulars.
	<i>Subject : Proceedings of the Radio Research Committee.</i> <i>Synopsis :</i> 1. A meeting of the Radio Research Committee was held on 5th September 1950 in New Delhi. The Committee placed on record its appreciation of the distinguished services rendered by Prof. M. N. Saha, the retiring Chairman of the Committee. Proceedings of the meeting held on December 30, 1949 were read and confirmed. In this connection, the Chairman gave the following information :— (a) RADAR TRAINING SCHEME. The scheme had been approved by the Ministry of Defence and arrangements had been made for training in Radar at Jallahalli and for training in microwave equipment at Agra. The first batch of trainees had already been selected. (b) RESEARCH SCHEMES RECOMMENDED. (i) Studies on atmospherics by Dr. S. R. Khastgir, Banaras. Funds for this scheme had been made available to the investigator. (ii) Investigations on radio valves by Dr. S. K. Mitra, Calcutta. Funds had been placed at the disposal of the investigator. (iii) Development of magnetic dust cores by Mr. B. D. Toshniwal, Bombay. The C.S.I.R. had asked for information regarding the research facilities available to Mr. Toshniwal. The matter was being pursued. (Note :—Information has since been received from Mr. Toshniwal that he is unable to accept this grant since he has made commitment with other work—Chairman R.R.C.) (iv) Fading of short wave radio signals by Dr. S. S. Banerji, Banaras. Funds for this scheme had been made available to the investigator. (v) Correlation of night-sky-light intensity with region F₂ ionisation by Dr. S. N. Ghosh, Calcutta. The scheme had been approved by the C.S.I.R. subject to the availability of funds from the Ministry of Finance. (vi) Survey of radio noise by Dr. M. B. Sarwate, New Delhi. The Inter-departmental Conference on Radio Noise Survey which was to consider this scheme had not yet been convened and Dr. Sarwate was requested to convene the conference at an early date.

Recommendations of the Committee of the Board.	Recommendations of the Board.
Item XXX. 1. p. 121. The Committee recommended that Prof. M. N. Saha be thanked for his distinguished services as Chairman of the Radio Research Committee. 1. (a) p. 121. The Committee noted with satisfaction that a batch of ten research workers had been selected, four for training in Radar at Jallahalli and six for training in Microwaves at Agra. It was also noted that a stipend of Rs. 100/- per scholar had been granted by the C.S.I.R. 1 (b) (i), (ii), (iii), (iv) and (v). p. 121. The Committee noted. 1 (b) (vi) p. 121. The Committee recommended that Dr. M. B. Sarwate be requested to convene the Inter-departmental Conference on Radio Noise Survey at an early date.	Item XXX 1. p. 121. The Board accepted the recommendation of its Committee. 1 (a) p. 121. The Board noted. 1. (b) (i), (ii), (iii), (iv) and (v). p. 121. The Board noted. 1. (b) (vi) p. 121. The Board accepted the recommendation of its Committee.

PROCEEDINGS OF THE RESEARCH COMMITTEES

Item No.	Particulars.												
	(vii) Mr. J. M. Sil informed the Committee that the India Meteorological Department had placed an order for one Swiss type of atmospheric d.f. equipment which was due to arrive this year. (viii) The Chairman also read a letter from Dr. D. S. Kothari, convenor of the Committee formed for planning a Central Radio Laboratory about the work of the Committee. 2. Consideration of the progress of work done under the schemes in operation. Reports on the following research schemes that are in operation, for the half year ending with February 1950 had already been circulated to the members. The reports for the half year ending with August 1950 would be circulated to the members of the Committee when received. (i) Theoretical investigations on upper atmosphere by Prof. M. N. Saha, Calcutta. (ii) Ionospheric investigations by Prof. S. K. Mitra, Calcutta. (iii) Investigations on radio valves by Prof. S. K. Mitra, Calcutta. (iv) Polarization of down coming waves by Dr. S. R. Khastgir, Banaras. (v) A new technique of investigating the ionosphere by Mr. B. M. Banerjee, Calcutta. As regards the scheme by Mr. B. M. Banerjee, it was noted that this was renewed upto 31st August 1950 and the question of further renewal was to have been decided on the basis of a report from Dr. Sarwate and Mr. Baliga. The D.S.I.R. suggested that Mr. B. M. Banerjee may be invited to meet him personally at Delhi within this month in this connection and the scheme may in the meanwhile be extended for a month. This was agreed to by the Committee. 3. Consideration of the new schemes submitted to the Committee. The Chairman placed the following new schemes received for the consideration of the Committee :— (a) Absorption of microwaves in the 3 cm. region by Mr. Krishnaji, Allahabad. The Committee recommended the scheme with the following grant :— <table><tr><td>Contingencies</td><td>...</td><td>Rs. 500</td></tr><tr><td>Staff :</td><td></td><td></td></tr><tr><td>(One Research Assistant on Rs. 160 p.m.) ..</td><td>Rs. 1,920</td><td>plus allowances.</td></tr><tr><td>Total</td><td>...</td><td>Rs. 2,420 plus allowances.</td></tr></table> As regards equipment, the Chairman was authorized to reduce it as far as possible in consultation with the investigator. (b) Investigation of the properties of single crystals of semi-conductors with reference to their transistor action by Dr. K. Banerjee, Calcutta.	Contingencies	...	Rs. 500	Staff :			(One Research Assistant on Rs. 160 p.m.) ..	Rs. 1,920	plus allowances.	Total	...	Rs. 2,420 plus allowances.
Contingencies	...	Rs. 500											
Staff :													
(One Research Assistant on Rs. 160 p.m.) ..	Rs. 1,920	plus allowances.											
Total	...	Rs. 2,420 plus allowances.											

Recommendations of the Committee of the Board.	Recommendations of the Board.
1 (b) (vii) & (viii) p. 123. The Committee noted. 2. p. 123. The Committee noted that the D.S.I.R. had taken action departmentally to sanction the continuance of the scheme of Mr. B.M. Banerjee for a month and to invite him to Delhi for discussion. 3. (a) p. 123. The Committee recommended that the Research Scheme on absorption of Microwaves in the 3 cm. region by Mr. Krishnaji be approved. In view of the policy of the Council to place equipment grant first with investigators to enable them to arrange for equipment before staff appointments were made, it was recommended that the D.S.I.R. be authorised to ascertain from Mr. Krishnaji the details of the equipment needed and examine in consultation with the Chairman of the Research Committee and sanction the necessary grant.	1. (b) (vii) and (viii) p 123. The Board noted. 2. p. 123. The Board noted. 3. (a). p. 123. The Board accepted the recommendations of its Committee.

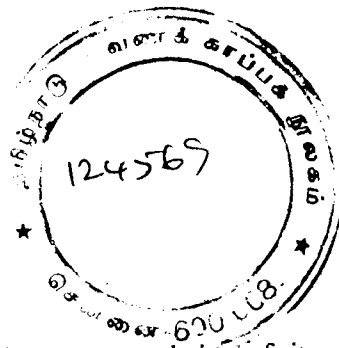
PROCEEDINGS OF THE RESEARCH COMMITTEES

Item No.	Particulars.																														
	All the earlier work on semi-conductors done in the laboratory of the Indian Association for the Cultivation of Science and referred to in Dr. Banerjee's letter related to the measurement of electrical conductivities and of magnetic susceptibilities of crystals like graphite, molybdenite, tungstenite, bismuth and antimony, whereas the present scheme refers to "Transistor action of semi-conductors" about which no details were given by him. The Chairman was requested to get from Dr. Banerjee details regarding the investigations on transistor action which he proposed to undertake. If, however, Dr. Banerjee wished to continue the measurements on electrical conductivities and magnetic susceptibilities, the Committee recommended the following grant :— <table> <tr> <td>Equipment</td><td>Nil</td></tr> <tr> <td>Contingencies</td><td>...</td></tr> <tr> <td>Staff :</td><td>Rs. 500</td></tr> <tr> <td>(One Research Assistant on Rs. 160 p.m.)...</td><td>Rs. 1,920 plus allowances.</td></tr> <tr> <td>Total</td><td>... Rs. 2,420 plus allowances.</td></tr> </table> (c) Investigations on RC-coupled FM Oscillator by Dr. H. Rakshit, Calcutta. The Committee recommended the scheme with the following grant :— <table> <tr> <td>Contingencies</td><td>...</td></tr> <tr> <td>Staff :</td><td>Rs. 1,000</td></tr> <tr> <td>(One Research Assistant on Rs. 160 p.m.)...</td><td>Rs. 1,920 plus allowances.</td></tr> <tr> <td>Total</td><td>... Rs. 2,920 plus allowances.</td></tr> </table> As regards equipment the Committee authorized the Chairman to reduce it as far as possible in consultation with the investigator. (d) Investigations on radio wave emission by the sun by Dr. H. Rakshit, Calcutta. In view of the fact that a scheme of the nature suggested by Dr. Rakshit would have to be continued for a long time, the Committee recommended that the consideration of the scheme be postponed till the report of the Sub-Committee appointed for formulating plans for a Central Radio Laboratory was finalised. (e) Recording and analysis of the reflections of electromagnetic waves from the ionosphere by Dr. K. R. Ramanathan, Ahmedabad. The Committee recommended the scheme with the following grant :— <table> <tr> <td>Equipment</td><td>Nil</td></tr> <tr> <td>Contingencies</td><td>...</td></tr> <tr> <td>Staff :</td><td>Rs. 1,500</td></tr> <tr> <td>(2 Research Assistants (i) Rs. 250-25-500</td><td>...</td></tr> <tr> <td>(ii) Rs. 160-10-330)</td><td>Rs. 4,520 plus allowances.</td></tr> <tr> <td>Total</td><td>... Rs. 6,420 plus allowances.</td></tr> </table>	Equipment	Nil	Contingencies	...	Staff :	Rs. 500	(One Research Assistant on Rs. 160 p.m.)...	Rs. 1,920 plus allowances.	Total	... Rs. 2,420 plus allowances.	Contingencies	...	Staff :	Rs. 1,000	(One Research Assistant on Rs. 160 p.m.)...	Rs. 1,920 plus allowances.	Total	... Rs. 2,920 plus allowances.	Equipment	Nil	Contingencies	...	Staff :	Rs. 1,500	(2 Research Assistants (i) Rs. 250-25-500	...	(ii) Rs. 160-10-330)	Rs. 4,520 plus allowances.	Total	... Rs. 6,420 plus allowances.
Equipment	Nil																														
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Total	... Rs. 6,420 plus allowances.																														

Recommendations of the Committee of the Board.	Recommendations of the Board.
3. (b) p. 123-125. The Committee noted that the earlier work done in the Indian Association for the Cultivation of Sciences on semi-conductors did not relate to their transistor action. The Committee endorsed the recommendation of the Research Committee that Dr. K. Banerjee be requested to submit the details of the proposed investigation for examination by the Chairman of the Research Committee. It was also recommended that the D.S.I.R. be authorised to take necessary action departmentally on receipt of the Chairman's recommendation. 3 (c) p. 125. The Committee recommended that the Research scheme on investigations on R. C. coupled F. M. oscillator by Dr. Rakshit be approved. As regards the grant, the Committee recommended that the D.S.I.R. be authorised to ascertain from Dr. Rakshit the details of the minimum equipment needed and in consultation with the Chairman examine the details and sanction necessary grant for the scheme. 3. (d) p. 125. The Committee endorsed the recommendation of the Research Committee. 3 (e) p. 125-127. The Committee recommended that the scheme on the reflections of electromagnetic waves from the ionosphere by Dr. K.R. Ramanathan be approved and the	3. (b) p. 123-125. The Board noted and accepted the recommendations of its Committee. 3. (c) p. 125. The Board accepted the recommendations of its Committee. 3. (d) 125. The Board endorsed the recommendation of the Research Committee.

PROCEEDINGS OF THE RESEARCH COMMITTEES.

Item No.	Particulars.
	The Committee further recommended that as the order for the equipment had already been placed, it was not necessary to give any grant under the head of equipment at this stage. 4. Reconstitution of Sub-Committees. The Committee considered the question of extending the terms of the Atmospheric Sub-Committee and Ultra Short and Microwave Panel Sub-Committee and recommended that it was not necessary to have these Sub-Committees on a permanent basis, but that <i>ad-hoc</i> Sub-Committee might be appointed to deal with particular problems of special interest from time to time. 5. Consideration of the report on ionospheric research activities in the Indian Union and suggestions for their co-ordination. The Chairman referred to the report prepared by the Secretary on Ionospheric Research Activities in the Indian Union (already circulated) and invited suggestions from the members as to how these activities may be co-ordinated. The Committee recommended that a Sub-Committee to go into this question be formed with the following members :— A member representing the Chief Engineer of A.I.R. A member representing India Meteorological Department. Dr. M.B. Sarwate. A member representing the Defence Science Organization. Mr. S. Deb (Secretary). It was recommended that the sub-committee should hold a meeting as early as possible. 6. Other business. (i) The Chairman referred to the suggestion from the Scientific Adviser to the M.G.O. for undertaking researches on 'the indigenous manufacture of carbon for telephonic sets'. In this connection, the Chairman pointed out that some work on the line had already been done under a scheme of C.S.I.R. by Prof. S. K. Mitra. The Committee therefore recommended that the technical reports and other relevant papers relating to the scheme be sent to the Scientific Adviser M.G.O. for his information. (ii) Mr. Baliga suggested that a consolidated report of the work done so far under the Radio Research Committee be prepared and circulated to the members. Mr. Krishnamurthi informed the Committee that steps had already been taken to have such reports from all the Research Committees working under the C.S.I.R. (iii) Mr. Baliga suggested that reprints of all the papers published under the schemes of the Committee should be made available to the members. This was agreed to.

Recommendations of the Committee of the Board.	Recommendations of the Board.												
following grant be made (upto 28th February, 1951 in the first instance). <table> <tr> <td>Equipment</td><td>Nil</td></tr> <tr> <td>Contingencies</td><td>Rs. 500</td></tr> <tr> <td>Staff :</td><td></td></tr> <tr> <td>(One Research Asstt. on Rs. 250 p.m. in the scale Rs. 250-25-500.</td><td></td></tr> <tr> <td>One Research Asstt. on Rs. 160 p.m. in the scale of Rs. 160-10-330).</td><td>Rs. 2,875 including allowances.</td></tr> <tr> <td>Total</td><td>Rs. 3,375</td></tr> </table> 4. p. 127. The Committee endorsed the recommendation of the Research Committee. 5. p. 127. The Committee recommended that the constitution of the Sub-Committee to study the question of co-ordination of ionospheric research in India be approved and the following members be nominated on the Sub-Committee : 1. Representative of the A.I.R. 2. Representative of Meteorological Department. 3. Dr. M.B. Sarwate. 4. Representative of Defence Science Organisation. 5. Prof. S. K. Mitra. It was recommended that the Sub-Committee be requested to prepare their report at an early date. 6 (i) p. 127. The Committee noted that the reports relevant to the preparation of carbon for telephonic sets from Prof. Mitra had since been made available to the Scientific Adviser to the M.G.O. 6 (ii) p. 127. The Committee noted. 6 (iii) p. 127. The Committee endorsed the suggestion made by Mr. Baliga. In this connection, the Committee noted that over five hundred research papers had so far been published from the various research schemes. In order that the results obtained in the research schemes be given proper publicity, it was recommended that the reprints of all papers which will henceforth be published be obtained in larger numbers by the C.S.I.R. and circulated to research institutions, universities and research workers.	Equipment	Nil	Contingencies	Rs. 500	Staff :		(One Research Asstt. on Rs. 250 p.m. in the scale Rs. 250-25-500.		One Research Asstt. on Rs. 160 p.m. in the scale of Rs. 160-10-330).	Rs. 2,875 including allowances.	Total	Rs. 3,375	 3. (e) p. 125-127. The Board accepted the recommendation of its Committee. 4. p. 127. The Board endorsed the recommendation of the Research Committee. 5. p. 127. The Board accepted the recommendation of the Research Committee and further recommended that Chairman of the Research Committee should as far as possible be Chairman of a sub-committee. 6 (i) p. 127. The Board noted. 6. (ii) p. 127. The Board noted. 6. (iii) p. 127. The Board accepted the recommendation of its Research Committee. General Recommendation. After a discussion on 'Noise' the Board recommended that Dr. K. S. Krishnan, Director, National Physical Laboratory be requested to prepare a report on 'Noise' for circulation to members of the Board. He may for this purpose obtain the reports on the subject from the D.S.I.R., U.K.
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