

203

The South Indian Teacher

1957. March

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The South Indian Teacher

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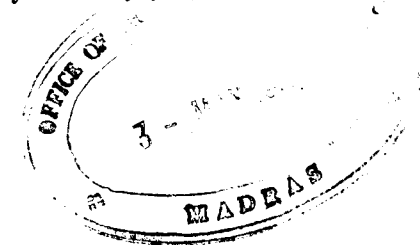
Vol. XXX

MARCH 1957

No. 3

॥ उद्धेदात्मनात्मानम् ॥—The Gita

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SCIENCE SEMINAR NUMBER



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RAJA ANNAMALAIPURAM, MADRAS-28.

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THE
47th MADRAS STATE EDUCATIONAL CONFERENCE

Danish Mission High School, Tiruvannamalai

15th — 17th May 1957.

Delegates are furnished the following information regarding the Conference.

1. Delegates are requested to inform the Secretary, Reception Committee, the time of their arrival on or before 10th May 1957. Volunteers will meet the delegates at the Railway Station.

2. All the meetings of the Conference will be held in the premises of the Danish Mission High School, Tiruvannamalai.

3. Arrangements are made for the lodging of the delegates in buildings quite close to the venue of the Conference. Lady delegates will be lodged separately.

4. Badges will be distributed to the delegates between 6 and 9 a. m. on the 15th May 1957.

5. Boarding will be provided at the following rates:—

Breakfast	6 annas	} Rs. 1—12—0 per day.
Noon Meal	8 annas	
Tiffin	6 annas	
Dinner	8 annas	

The Modern Cafe, Tiruvannamalai will be the caterers. Tickets can be had from the office of the Reception Committee. The Secretaries of the Teachers' Associations are requested to write to the Secretary, Reception Committee about the number of delegates attending the Conference and the number of delegates for whom food arrangements are to be made.

6. Excursions will be arranged to Gingee and Sathanoor Dam. Places of interest (Local)

1. Sri Arunachaleswara Temple.
2. Sri Ramana Ashram
3. Adi Annamalai Temple
4. Skandashram on the slope of the hill

Details regarding this can be had from the Enquiry Office.

Tiruvannamalai Railway Station is midway between Villupuram and Katpadi.

The following are the Train Timings:—

Via Villupuram :

4:55 A. M.

6:28 A. M.

12:25 P. M.

6:50 P. M.

Via Katpadi

9:45 A. M.

5:50 P. M.

8:15 P. M.

7. An Educational Exhibition will be held during the Conference. Exhibits, if any, can be sent to Sri V. Doraisami Iyer, B. A., L. T., Headmaster, Municipal High School, Tiruvannamalai before 5th May 57.

Tiruvannamalai, }
16-4-'57.

J. SOUNDARARAJAN,
Secretary, Reception Committee.

THE SOUTH INDIAN TEACHER

Vol. XXX

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THE S. I. T. U. SCIENCE SEMINAR

WELCOME ADDRESS

Sri T. P. Srinivasavaradan, President of the South India Teachers' Union and Director of the Seminar, welcomed Dr. A. Lakshmanaswamy Mudaliar, Vice-Chancellor of the Madras University. He then said that it was not the first time that the Union organised a Seminar. A similar Seminar on Social Studies was held in 1950 under the auspices of the Union and a number of refresher courses to improve the efficiency of teaching in secondary schools had been run by the Union in previous years.

Science has established its claim to a place in school curriculum in modern education. It will be a compulsory

subject in the proposed higher secondary school course, the objective being to enable the students to understand the physical and natural laws. With the new advances in science, the curriculum was also constantly undergoing a change and the teacher's competence must increase correspondingly. Hence a Seminar of this kind would be of great benefit to teachers and would improve the efficiency of science teaching in secondary schools. The Seminar, he said, was attended by about 40 science teachers including a dozen women from high schools in the districts of Madras, Chingleput, South Arcot and North Arcot, selected by the Director of Public Instruction, Madras.

INAUGURAL ADDRESS

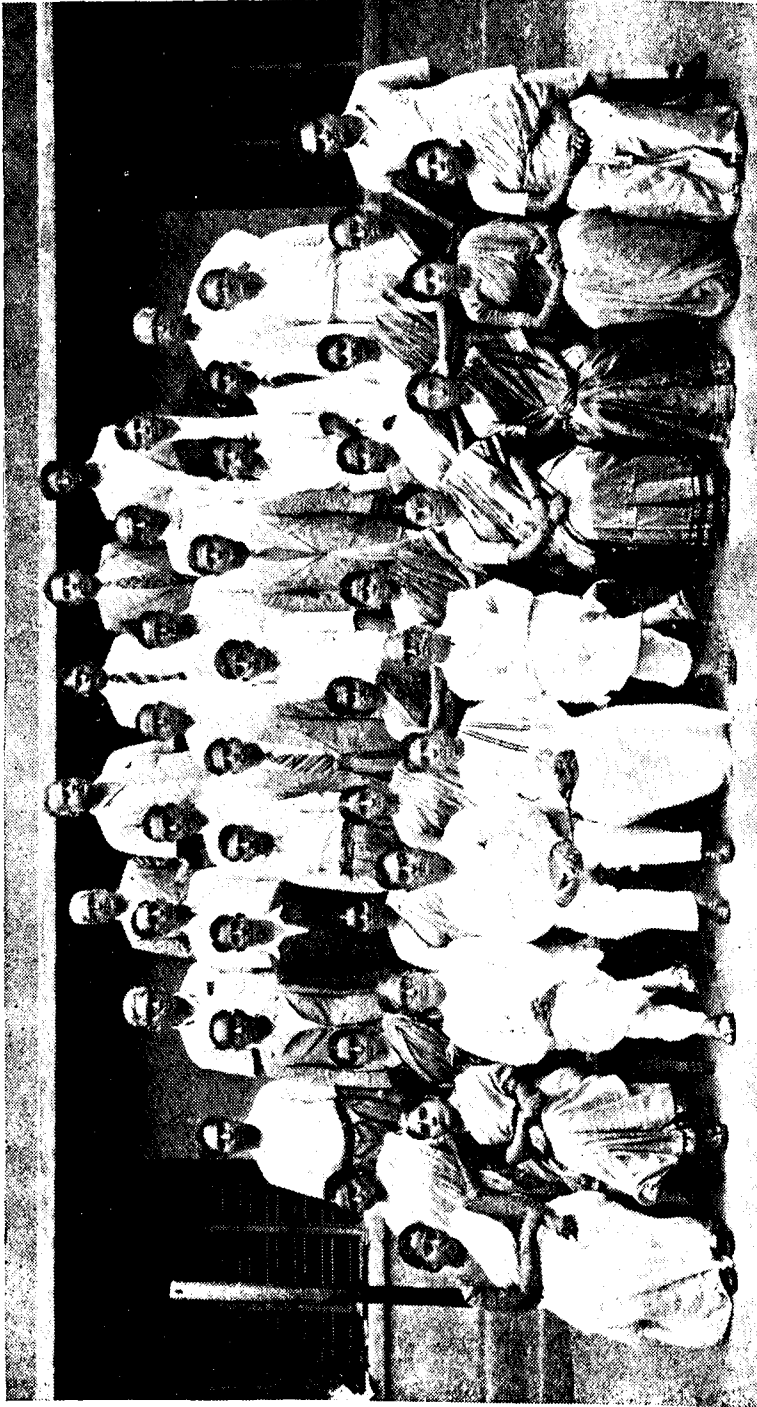
DR. A. L. MUDALIAR

Dr. Lakshmanaswami Mudaliar said that it had always been his endeavour to see that in this modern age science was a compulsory subject of study for all. No person could be said to be educated unless he had some knowledge of the fundamentals of science. It might have been true that in the last century it would have been possible for a person to obtain the highest degree of the University without having had any knowledge of the sciences worth mentioning. To-day, however, the great advances in science rendered it absolutely necessary that a fundamental knowledge of science should be the *sine qua non* of any person who was educated, and "I would say, the *sine qua*

non of every man who wished to lead a life which combined in itself something of the scientific aspects of existence.

NEED FOR DEMONSTRATION OF EXPERIMENTS

He had visited many schools and colleges throughout the country, Dr. Mudaliar said, and he had found that the teaching of science in them left much to be desired. In a college which he recently visited, he found that Chemistry was being taught by the Professor with a bare table in front of him. The essence of science-teaching was experimentation with which the teacher should be thoroughly familiar and he



Sitting: Mrs. C. Timothy, Mrs. Saraswathi Srinivasan, Mr. T. N. Sundaram, Asst. Director, Mr. U. B. Md. Sarvar, D.E.O., Madras, Mr. S. Natarajan, Director, Field Advisory Services, A.I.C.S.E., Mr. T. P. Srinivasavaradan, Director, Miss Tara Bai, Miss Sarada, Miss Grace Paul, Mrs. Gnanam Nayagam.

I Row standing: Mrs. G. Caleb, Mrs. C. V. Sumitra Devi, Miss T. N. Radha, Mrs. K. Sumukhi, Mrs. Sargurudoss, Mrs. Rajammal, Miss Leela Bai, Miss Rose Naidu, Mrs. Lucy Daniel, Mr. S. D. Krishnamurthi Rao.

II Row standing: Mr. C. Krishnaswami, Mr. V. Doraiswami, Mr. P. R. Ramaswami, Mr. Syed Ghouse, Mr. C. Kannappan, Mr. S. Natesan, Mr. Md. Abdul Rahim, Mr. N. K. Aravamudan, Mr. S. Gregory, Mr. D. V. Sanjeevi Naidu.

III Row standing: Mr. M. G. Ramachandran, Mr. D. Periathambi, Mr. A. V. Rangachari, Mr. P. G. Sundaram, Mr. G. V. Balaraman, Mr. T. S. Ranganatha Iyer, Mr. K. S. Viswanathan, Mr. V. Narayanaswami.

IV Top Row: Mr. S. Swaminathan, Mr. V. Janakiraman, Mr. Titus Ebenezer, Mr. T. S. Jayaraman, Mr. J. J. Smiles.

should be able to demonstrate the experiments to the students.

Dr. Mudaliar said that they were going to have a great change in school education very soon. The teaching of science would be an important aspect of secondary education, and in fact, it had to be upgraded to such an extent that it would be possible for the student who passed out, to get into a professional course of study by attending the pre-professional course of one year and it would also be necessary for a student to get admitted into a three-year degree course in a science subject. All these and other innovations had been suggested by the Legislature Committee in its report on the White Paper on education to improve the quality of higher secondary education so that they might be better prepared either to enter life or to enter a course of higher learning in the University, polytechnic or a professional college. That meant that a greater amount of responsibility would be placed on the shoulders of teachers. He said the existing teachers themselves required a little more of training, not in the principles of teaching, but in the subject itself.

In October this year a conference of Vice-Chancellors of South Indian Universities and the Directors of Public Instruction considered the question of improvement in the quality of existing high school teachers. The Secondary Education Commission's report had suggested an admixture of teachers who had taken higher qualifications like the Master's Degree. The University had permitted teachers to take up the Master's Degree in Humanities by private study, but for obvious reasons, it could not be done for science subjects. But to enable some of the senior teachers to acquire the higher qualification suggested, they had recommended that those teachers who had put in a service of five years might be given training for a year in an affiliated college of the University and they might be given a certificate which would entitle them to appear for the M.A. Degree in Science. Two things were possible by this. They might get a certificate which

would entitle them to teach the higher classes and they might straightway appear for the Master's Degree. He was glad that this suggestion was well received by the authorities of the State.

As regards Humanities, Dr. Mudaliar said, it had been suggested that teachers might study for a six-month period or for three months each year in two years and get the benefit of the training given in colleges so that they might appear for the higher examinations. He hoped that many teachers would take advantage of this.

Dr. Mudaliar said that one of the things which they would be considering at the seminar was a knowledge of modern science. It would be good, he said, if they were able to secure the services of some of the distinguished scientists to speak to them on the progress of modern science.

The University, Dr. Mudaliar said, was interested in conducting vacation courses of lectures and if they were interested the teachers could come together for a fortnight and hear with practical illustrations some of the lectures of distinguished professors in various subjects. The Madras University this year might conduct this course sometime during the summer vacation at select centres. He appealed to the managements of schools to depute a few of their teachers by rotation each year to undergo the course conducted by the University or such seminars.

DELEGATES

Thirty-five science teachers including fourteen women teachers, 18 from Madras, 5 from Chingleput, 9 from North Arcot and 3 from South Arcot districts—attended the Seminar. Their names and particulars are given below :—

MADRAS

1. Sri T. S. Ranganatha Iyer, B.A., L.T., Sri Ramakrishna Mission High School, Theagarayanagar, Madras-17.

2. Sri N. K. Aravamudan, B.Sc., B.T., Dr. G.M.T.T.V. High School, Ammenkoil Street, G. T. Madras-1.
18. Sri M. G. Ramachandra Iyer, Hindu High School, Triplicane, Madras-5.

NORTH ARCOT

3. Sri S. D. Krishnamurthi Rao, B.A., L.T., Hindu High School, Triplicane, Madras-5.
19. Sri Titus Ebenezer, B.A., L.T., Voorhees High School, Vellore, North Arcot.
4. Sri T. S. Jayaraman, San Thome High School, Mylapore, Madras-4.
20. Sri K. S. Viswanathan, B.A., B.T., R. K. High School, Tirupattur, North Arcot.
5. Sri D. V. Sanjeevi Naidu, B.A. L.T., Muthialpet High School, Tambu Chetty St., G.T. Madras-1.
21. Sri R. Syed Ghouse, B.Sc., B.T., Islamiah High School, Vaniyambadi, North Arcot.
6. Smt. Lucy Daniel, Egmore High School, Egmore, Madras-8.
22. Sri S. Natesan, B.A., L.T., Saint Andrew's High School, Arkonam, North Arcot.
7. Smt. G. R. Caleb, Anderson Girls' High School, G.T., Madras-1.
23. Sri Md. Abdul Rahim, B.Sc., L.T., Islamiah High School, Melvisharam, North Arcot.
8. Sri G. V. Balaraman, Progressive Union High School, Audiappa Naick St., G.T., Madras-1.
24. Sri S. Gregory, B.Sc., B.T., Hindu High School, Vaniyambadi, North Arcot.
9. Kumari Grace Paul, St. Ann's Girls' High School, Royapuram, Madras-13.
25. Sri John Jesudoss Smiles Vedanayagam, Concordia High School, Ambur, North Arcot.
10. Smt. C. V. Sumitra Devi, R. K. M. Sarada Vidyalaya Girls' High School, T'Nagar, Madras-17.
26. Sri Chinnaswami Kannappan, Board High School, Arni, North Arcot.
11. Smt. K. Sumukhi, Lady Sivaswami Iyer Girls' High School, Mylapore, Madras-4.
27. Kumari T. S. Tara Bai, B.A., L.T., Govt., Secondary and Training School, Gudiyattam, North Arcot.
12. Kumari T. N. Radha, National Girls' High School, Triplicane, Madras-5.

CHINGLEPUT

13. Smt. Rajammal Gnanasambandam, Kalyanam Girls' High School, Chintadripet, Madras-2.
28. Smt. C. Timothy, Board High School, Kovur, Chingleput.
14. Kumari S. Sarada, Presidency High School for Girls, Egmore, Madras-8.
29. Smt. Sargurudoss, Seva Sadan Boys' High School, Tambaram, Chingleput.
15. Kumari M. P. Leela Bai Sundararaj, Northwick Girls' High School, Royapuram, Madras-13.
30. Sri P. R. Ramaswami, Goudie High School, Trivellore, Chingleput.
16. Mrs. Gnanam Nayagam, Theagarayanagar High School, T'Nagar, Madras-17.
31. Sri P. G. Sundaram, Hindu High School, Madurantakam, Chingleput.
17. Sri C. Krishnaswami, P. S. High School, Mylapore, Madras-4.
32. Sri A. V. Rangachari, Singaram Pillai High School, Villivakkam, Chingleput.

SOUTH ARCOT

33. Sri D. Periathambi, B.Sc., L.T.,
R. C. T. High School, Annama-
lainagar, South Arcot.
34. Sri V. Doraiswamy, St. Joseph's
High School, Cuddalore, South
Arcot.
35. Miss A. Rose Naidu, St. Ann's
Girls' High School, Cuddalore,
South Arcot.

PROGRAMME OF WORK

Monday the 17th December 1956 :

11 a.m. to 12 noon.

Inaugural function.

Prayer.

Welcome address by Sri T. P.
Srinivasavaradan.

Reading of messages.

Inaugural Address by Dr. Sir A. L.
Mudaliar, Vice-Chancellor, Madras
University.

Vote of thanks by Sri T. N. Sun-
daram.

12 noon to 1 p.m.

Plenary session.

Introduction of delegates : Talk on
the purpose and scope of the Semi-
nar by the Director and Assistant
Director.

Presentation of the draft pro-
gramme.

2-30 to 4-30 p.m.

Formation of working groups to
consider the following subjects :—

1. Critical evaluation of the present
syllabus in General Science and
preparation of a draft Syllabus
in General Science for the new
standards V to XI.
2. Teaching methods and equipment.
3. The use of the library, films, the
exhibition, etc.
4. Practical activities.

5. Testing and recording.
Election of conveners and recorders
of the groups.
Discussion about the methods of
work.

Tuesday the 18th December 1956.

10 a.m. to 11 a.m.

Lecture on 'Group methods in tea-
ching Science' by Sri M. D. Deva-
dason, Lecturer in Science, Meston
Training College, Madras-14.

11 a.m. to 12-30 p.m.

Group Work.

2-30 p.m. to 4 p.m.

Group Work.

4 to 4-30 p.m.

Conference and questions.

Wednesday, the 19th December 1956.

10 a.m. to 11 a.m.

Lecture on "The importance of
training high school pupils in India
to consult reference books in Eng-
lish on Science Subjects" by Mr.
F. L. Billows, British Council,
Madras.

11 a.m. to 12-30 p.m.

Group work.

2-30 to 4 p.m.

Group work.

4 to 4-30 p.m.

Conference.

6 p.m.

Film show by United States Infor-
mation Service.

Thursday, the 20th December 1956.

10 a.m. to 11 a.m.

Lecture on 'Test improvements in
Science Teaching' by Sri M. D.
Devadason, Lecturer, Meston Train-
ing College, Madras.

11 a.m. to 12-30 p.m.

Group work.

2 to 4-30 p.m.

Visit to the U.S.S.R. Exhibition.

Friday, the 21st December 1956

10 a.m. to 12-30 p.m.

Lecture on "The Teaching of Bio-
logy in High Schools" by Miss A.
K. Joshua, Lecturer in Zoology,
Queen Mary's College, Madras.

2 to 4-30 p.m.

Presentation of group reports and
discussion.

Saturday, the 22nd December 1956.

10 a.m. to 11 a.m.

Lecture on "Audio-Visual methods
in Teaching" by Sri M. Jayaraman,
United States Information Service,
Madras.

11 a.m. to 12-30 p.m.

Conference—Presentation of group
reports and discussion.

2 to 3-15 p.m.

Talk by Dr. Mikelson.

3-15 to 5 p.m.

Lecture on "Atoms and Space Tra-
vel" by Dr. Thangaraj, Professor
of Physics, Madras Christian Col-
lege, Tambaram.

5-30 p.m.

Tea to Dr. Mikelson.

Monday, the 24th December 1956.

10 a.m. to 11 a.m.

Lecture on "Some criteria for
framing the General Science sylla-
bus of Secondary Schools" by Sri
V. S. Ramanujam, Lecturer, Tea-
chers' College, Saidapet, Madras.

11 a.m. to 12-30 p.m.

Group work.

2-30 to 4 p.m.

Group work.

4 to 4-30 p.m.

Conference.

Wednesday, the 26th December 1956.

10 a.m. to 12 noon.

Lecture on "Teaching through pro-
jects" by Miss E. J. James, St.
Christopher's Training College,
Vepery, Madras.

12 noon to 12-30 p.m.

Group work.

2-30 to 4 p.m.
Group work.

4 to 5-30 p.m.
Conference.

Thursday, the 27th December 1956.

10 a.m. to 5-30 p.m.

Excursion to Central Leather Insti-
tute, Alagappa College of Techno-
logy, King Institute, Guindy, and
Revathi Studios.

6 p.m.

Film show by United States Infor-
mation Service.

Friday, the 28th December 1956.

10 a.m. to 12-30 p.m.

Group work.

2-30 to 3-30 p.m.

Group work.

3-30 to 5 p.m.

Conference.

Saturday, the 29th December 1956.

10 a.m. to 12 noon.

Lecture on "Practical Activities"
by Dr. Miss L. A. Cornelius, Inspec-
tress of Girls' Schools, Madras.

12 noon to 12-30 p.m.

Group work.

2-30 to 4 p.m.

Group work.

4 to 5 p.m.

Conference.

Monday, the 31st December 1956.

10 a.m. to 12-30 p.m.

Group work.

2-30 to 4-30 p.m.

Group work.

4-30 to 5 p.m.

Conference.

5 to 6 p.m.

Visit to the 'Hindu' Office.

Wednesday, the 2nd January 1957.

10 a.m. to 4 p.m.

Excursion to Meenambakkam Aero-
drome, and Observatory and visit
to the 'Saw Mills' at Guindy.

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THE SOUTH INDIAN TEACHER

4 to 5-15 p.m.

Lecture on "Organising a Natural Science Museum in Schools" by Miss V. K. Kamalam, Biological Supply House, Royapettah, Madras.

6 p.m.

Film show by British Information Service.

Thursday, the 3rd January 1957.

10 to 10-30 a.m.

Conference.

10-30 a.m. to 12-15 p.m.

Group work.

1-15 to 6 p.m.

Visit to National Carborendum Co., Tiruvottiyur and Madras Harbour.

6 to 7 p.m.

Meeting of the Conveners of Groups.

Friday, the 4th January 1957.

10 a.m. to 11 a.m.

Conference.

11 a.m. to 12-30 p.m.

Group work.

1-30 to 5-30 p.m.

Visit to Integral Coach Factory.

6 to 7 p.m.

Meeting of Group Leaders.

Saturday, the 5th January 1957.

10 a.m. to 12-30 p.m.

Plenary session to consider the final reports of the various working groups and to formulate general recommendations. Sri S. Natarajan participated in the discussions.

2-30 to 5 p.m.

Valedictory function.

Prayer.

Introductory statement by the Director of the Seminar.

Reading of messages.

Recommendations.

Valedictory address by Sri S. Natarajan.

Speeches by delegates.

Vote of thanks by Sri T. N. Sundaram.

5-15 p.m.

Group Photo.

7 p.m.

Dinner.

VISITOR

Sri S. Natarajan, Director of Field Advisory Services, and Joint Secretary, All India Council for Secondary Education, New Delhi.

STEERING COMMITTEE

1. Sri T. P. Srinivasavaradan (Director).
2. Sri T. N. Sundaram, (Assistant Director).
3. Sri S. Swaminatha Aiyer.
4. Sri V. Narayanaswamy Iyer.
5. Sri V. Janakirama Iyer.

CONSULTANTS

1. Dr. Mikelson, All India Council for Secondary Education, New Delhi.
2. Sri M. D. Devadason, Lecturer in Science, Meston Training College, Royapettah, Madras.
3. Miss E. J. James, Lecturer in Science, St. Christopher's Training College, Vepery, Madras.

WORKING GROUPS

A detailed study of the various problems was made through five working groups constituted as follows:—

I. Syllabus :

1. Sri T. S. Ranganatha Iyer (Convener).
2. „ N. K. Aravamudan (Recorder).
3. „ T. S. Jayaraman.
4. „ A. V. Rangachari.
5. „ S. Natesan.
6. „ P. G. Sundaram.
7. Srimathi K. Sumukhi.
8. „ C. V. Sumitra Devi.

II. Methods and Equipment :

1. Sri K. S. Viswanathan (Convener).
2. „ G. V. Balaraman (Recorder).
3. „ C. Kannappan.
4. „ V. Doraiswamy.
5. „ D. Periathamby.
6. „ Titus Ebenezer.
7. Srimathi Lucy Daniel.

III. Library, Films, Exhibition, Etc. :

1. Sri John Jesudasson Smile Vedanayagam (Convener).
2. „ P. R. Ramaswamy (Recorder).
3. Miss A. Rose Naidu.
4. Mrs. Gnanam Nayagam.
5. Kumari T. S. Tara Bai.
6. Sri S. D. Krishnamurthi Rao.

IV. Practical Activities :

1. Srimathi Sargurudoss (Convener).
2. Kumari S. Sarada (Recorder).
3. Srimathi C. Timothy.
4. Kumari T. N. Radha.
5. Kumari Grace Paul.
6. Srimathi Rajambal Gnanasambandam.
7. Sri C. Krishnaswami.

V. Testing and Recording :

1. Sri D. V. Sanjeevi Naidu (Convener).
2. „ B. Syed Ghouse (Recorder).
3. „ M. G. Ramachandran.

4. Sri Muhammad Abdul Rahim.
5. „ S. Gregory.
6. Srimathi G. R. Caleb.
7. Kumari M. P. Leelabai Sundararaj.

Film Shows

Date.

1. 19-12-1956 6 to 7 p.m.

Film.

1. And to Fame Unknown.
 2. Story of Light.
 3. Popular Science, Vol. I.
- Shown by
United States Information Service.
Madras.

Date.

2. 27-12-1956 6 to 7 p.m.

Film.

1. Atom in the service of
 2. Gift of Green.
 3. Passage to the Pribilops
- Shown by
United States Information
Madras.

Date.

3. 2-1-1957 6 to 7 p.m.

Film.

1. How a motor car Engine
 2. Atoms at work.
 3. Your children's teeth.
- Shown by
British Information Service

SYNOPSIS OF LECTURES

CRITERIA FOR SELECTING CONTENT OF THE GENERAL SCIENCE SYLLABUS OF THE SECONDARY SCHOOLS.

V. S. RAMANUJAM

Lecturèr in Science, Teachers' College, Saidapet, Madras.

The present age is rightly called the "Age of Science", as the recent contributions of Science are innumerable and as these have determined the complexity of the fabric of the modern society which is ever changing on account of the impact of science. "Science is an inescapable factor in the life of the modern man". It has solved many human problems like food, transport, communication, etc., though at the same time it has created problems the solutions of which are a challenge to the human ingenuity. It has helped man to unravel a few of Nature's mysteries leading to the control and exploitation of some of the forces either for the good or for the bad of mankind. The findings of Science have been leading to the destruction of the traditional modes of thinking and to the creation of newer viewpoints resulting in man's giving up old customs and habits and his taking to new ways of life. So tremendous is the impact of science on society that none can escape it.

Our boys and girls are not living in a vacuum. They are living in the environment which is ever changing on account of the advances of science in the various fields. Our boys and girls are also future adults and citizens. So if they are to live effectively in the present and in the future, they must be educated to understand and interpret correctly their environment for which a general knowledge of science in its various aspects is absolutely necessary. Hence General Science has come to be introduced as a school subject to be studied by all the pupils.

In order that what they learn in General Science is useful to the pupils,

the content of the course must be related to their needs. After a careful study, a committee of the Educational Association of the U.S.A., arrived at seven cardinal needs of boys and girls the satisfaction of which should be possible by the proper choice of the subject matter. These are (1) Health, (2) a good command of the three R's, (3) worthy home membership, (4) citizenship, (5) vocation, (6) worthy use of leisure and (7) character building along ethical lines. Of these the second may not have a direct bearing on the choice of content of the General Science course. As the scope of secondary education is rather general and liberal, the fifth need, i.e., vocation, may not be satisfied directly by what is taught in General Science, though General Science teaching can contribute indirectly to meet this need to a certain extent. The 'citizenship' need may not be an immediate one for the high school pupils, but it belongs to their future.

The various aims and objectives of teaching science also determine the choice of the material for the syllabus. One of the chief objectives is the development in the pupils of "the scientific attitude of mind". A realisation of this objective depends more on the method of teaching than on the content. But the proper choice of the material will help the achievement of the objective. Another objective is the development of "emotionalised standards" for the pupil, like (a) an admiration for the self sacrificing devotion of eminent scientists who are prepared even to lay down their lives in serving humanity and the cause of truth, (b) an appreciation of how

ordinarily discoveries and inventions are being made after systematic study involving much time and human labour, these discoveries and inventions being veritable adventures in the field of science, (c) a realisation of the orderliness in Nature, a respect for the laws of nature and "a profound feeling of obligation to live in obedience to the laws of the game". As in the previous case the realisation of the objective is facilitated by the choice of suitable material.

The content of the General Science course must be within the comprehension of the pupils. It is relevant to note here that in arranging the material for the course, "the cyclic" or "the concentric" method and a psychological treatment are most suitable at least at the middle school stage, at the end of

which it might be normally expected that the pupil gains a basic knowledge of General Science. As he or she grows older, the pupil develops power of reasoning and the grouping of the subject matter under the traditional classification of Physics, Chemistry, etc., and a logical treatment helps his or her learning of the content easily.

Last but not least, in order that learning is effective, the content must be related to the interests and activities of the pupils.

In conclusion, it might be observed that it is possible for the framers of the General Science syllabus to keep in view the criteria communicated above and select such material as would satisfy, if not all, at least as many of them as possible.

TEACHING SCIENCE THROUGH PROJECTS

MISS E. J. JAMES,

Lecturer in Science, St. Christopher's Training College, Madras.

The Project Method is a fairly recent method of teaching. It was used as a method of instruction in the United States of America in 1900, but it was only in 1918 that it was defined by Kilpatrick as "a whole-hearted purposeful activity proceeding in a social environment."

We often hear the work 'project' in everyday life. Many projects and multi-purpose projects are undertaken by Government on a large scale: for example, in the building of a dam, to divert the course of a river, and to use the water for many constructive purposes. The Bhakra Nangal project is a very big project that is now in progress, and the Banihal project which took years of planning and work has now been successfully completed.

The term project has been used by educationists also, to define something attempted on a larger scale than mere classroom teaching. Project means to thrust or push forward, and in using the Project Method in the classroom,

the activity of the children is thrust forward from the mental level within the confines of the classroom into the out of doors, and occasionally even beyond the confines of the community.

A project has been rightly described as a unity of activity "carried to completion in a natural setting." It is important therefore, that a project should be well defined as to its scope in the allotted time. Whether it be for a Middle school class or for a High school class, the teacher has to plan the work clearly, and decide even before the commencement of the project, the extent to which it can be worked out. The same topic can be worked out as a project either for a small age group or for an older age group; but in both cases there should be clearly defined developmental stages leading up to a conclusion.

The children's interests should be the starting point in the selection of projects. This may be found out by informal talks with them, from the

questions they ask in class, or the answers obtained from a specially prepared questionnaire. Sometimes the topic selected may be something in the syllabus itself about which the children would like to know more, or it may grow out of interest from a topic dealt with in class. It is a good plan to spend some time over the selection of a project and think over all aspects of it to make sure it is a suitable one for that particular age group, and if it can be carried out by co-operative activity in a natural setting.

Only certain topics in the science syllabus which can be worked out in concrete to reach completion, can be dealt with by the Project method for school children. That is another reason why time should be spent in the selection of a project. In the case of some topics, previous preparation by the teacher and a great deal of preliminary reading may be necessary to collect suitable material and simplify it, and to set a limit to the project. Many topics in the present science syllabus have to be presented in logical order if they are to be properly understood by the children. A project might touch such a subject at any stage of its development. "Thus a progressive course could never be ensured if projects were continually allowed to interrupt it. But within such a planned course or curriculum, the project method may be used with excellent effect; or it may be carried out alongside class instruction of the normal kind. But it would be obviously difficult, if not impossible, to plan any kind of coherent school course if the project method were adopted on a large scale."

How is a project different from other methods of teaching?

Teaching by the project method involves activity. Learning by doing is stressed. All subjects are correlated round the central theme—that is, the subjects are brought into play in giving a complete understanding of the subject or topic chosen, wherever possible. As activity and correlation of subjects

according to their importance and adaptability are stressed, there is no scope for the rigid time-table in the ordinary school. It is necessary however, to draw up a time-table before the beginning of the Project week or weeks of teaching, but during the working out of the project, the time-table can be flexible with regard to the time length of the periods and the order of the lessons. This method promotes co-operative effort much more than is possible with other methods of teaching. This method can be used to teach the pupil how to use books and collect information. It stimulates the activity and ingenuity of the individual in that each pupil can make his own contribution towards any aspect of the topic in which he is interested. Children's interests as well as teacher's skill and guidance determine many of the activities.

If a single teacher or a group of teachers (as in the case of student-teachers) are directing the project, their interest should not flag. For every type of activity included in the project they must see that the time taken must be worth the values likely to result from the project. They must be with the children in the working out of the project from start to finish, making incidental changes wherever necessary. Where a group of student-teachers is working out a project with a particular class, the notes of lessons for each day should be written in a notebook set apart for the week's work. The note book would also contain the time-table for the week, the practical activities planned for each day, including any excursion that may be undertaken in connection with the learning of the project. At the end of the project week of teaching a report should be written on the week's activity. This need be only a concise report but it would be useful for reference for another year, especially if the same topic is to be dealt with by the project method. A copy of this report should be handed in to the school office. The report should also include the sources

for money and materials for the project, in what types of activity the materials were used, and the entire cost of the project.

One of the projects worked out in Bentinck Girls' High School, Vepery, by a group of ten B.T. students in December, 1955 was on Plastics. This was done in Form IV Tamil section. The class teacher was consulted as to whether it would be a suitable topic; and after talking it over with her pupils she agreed that it would be an interesting subject of study, since there were many plastic articles being used in homes and elsewhere these days. Since the topic was new to the students, they had to do much reading on the subject. A time-table for the week was drawn up, and the work was divided among the student-teachers. The afternoon periods were set apart for practical activities.

Besides reading and gathering information about modern plastics and where they originate, and how industry adapts plastics to its needs, charts were made as *teaching aids*, the week before the commencement of teaching. The charts included the following: Simple diagrammatic charts illustrating: Extrusion moulding; Compression moulding; Transfer moulding & Injection moulding. A diagrammatic chart showing how nylon is obtained from coal and some of the resins which are obtained as by-products.

Chart showing the manufacture of rayon.

In the science classes the two main classes of plastics—thermoplastic and thermosetting, were dealt with in some detail. The different methods of moulding were also explained with simple illustrations. In Social Studies classes, how industry adapts plastics to its needs was explained. Pupils were helped to understand the great advance of plastics especially during World War II, and the part plastics play in leisure-time activities. In the

Home Science class the various uses of plastics in the home were dealt with.

In the English class pupils learnt many new words such as, *resins, plastics, moulding, injection, compression, thermosetting, thermoplastic*. They learnt to use some of these words in sentences. Posters were made with interesting captions such as: Colourful company of plastics; unbreakable bottles break all records; Plastics—friend of the engineer; Plastic buttons for the world's clothes; Plastic pipes without bursts; The plastic age and you; Have you a plastic mind? Some posters were made in Tamil in the Tamil classes also.

Practical activities included the making of posters, Recognition cards with questions and answers, Folders, Frieze work, a scrap book containing cut-outs of pictures of plastic articles. Most of these pictures were brought by the pupils themselves. As group work, small booklets were made with attractive covers, each group of about 5 pupils being guided by a B.T. student. These booklets had the following titles:

- Nylon, the wonder fibre.
- Plastic sheet and film.
- Plastic in the home.
- Shellac.
- Plastics in industries.
- The father of modern plastics.
- Moulding.
- Casein.
- Coatings.

Plastics used as adhesives. (Some of the booklets were made in English, and the others in Tamil.)

A film on 'Lac from the lac insect' was shown, with a running commentary in Tamil.

A test was given on the last day, with questions based on what had been learnt during the week.

A review chart was also prepared by the teachers, entitled 'Do you know?' which included some of the outstand-

ing facts that the children had learnt about plastics during the week.

On the last day of the project week an exhibition was arranged, displaying the practical activities of the week of both teachers and pupils.

Safety in the Home was a Middle School project that was worked out in Bentinck High School in Form II. This can be made part of a larger project on the home, just as health can be done.

When a topic that is actually in the environment of the child and in which he is vitally interested is chosen, he will begin to see the relation between the school and social need. The special abilities of children are given scope for practical expression, and their individual difficulties are seen by the teacher who gives the required aid.

A writer has said: "There is no new thing under the sun, and to this saying the thing variously called by recent writers as a project, a centre of interest, or a unit of work, is no exception. In producing a play-making of scenery, costumes, study of social life, clearness of utterance and subtler process of literary appreciation, all to-

gether constitute a project, in which many a school "subject" is implicitly involved, but a dominating purpose adds gusto to the procedure."

"A class of five-year olds made a pillar box of corrugated cardboard covered with red paper. The children posted their letters to their little friends. Letters were collected and delivered at certain times in the week. Children were interested and made quick progress in reading and writing. Incidentally they learnt something of the history of the postal system."

Many such projects, whether worked out on a small scale or a large scale could emanate from children themselves. "What children are naturally interested in, and busy themselves about in their play, is not a "subject" abstracted from the actual environment, but a concrete situation, a real portion of the environment, a real bit of life as the children see it. The teacher's part consists mainly in helping the children by suggestion and guidance, in the selection of some centre of interest, some "project" that appeals to them, and then helping them to work out a scheme of which they themselves are the devisers."

ORGANISING A NATURAL SCIENCE MUSEUM IN A SCHOOL

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It is easy to organise a Natural Science Museum in a School, provided the teacher takes a little interest in observing nature. It is important, however, that he or she should have a fairly clear idea of the methods of preserving plant and animal specimens, artistic methods of their display and sources of getting them etc. Care of dry mounts like stuffed birds, pressed specimens etc., is also important in the upkeep of any good museum. The important points to be considered on this subject are as under :—

1. Preservation of plant specimens.

(a) Method of keeping green colour

of specimens by Copper acetate methods.

(b) Importance of preserving in suitable preservatives.

(c) Methods and precautions to be taken for dry specimens.

2. Preservation of animal specimens.

(a) Narcotisation of specimens.

(b) Injection of preservatives into the body to preserve the tissues.

(c) Proper setting of specimens.

3. Methods of stuffing birds etc.

4. Methods of making and mounting skeletons.

5. Sources of getting collections.

AUDIO VISUAL METHODS

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The use of visual aids for instructional purposes is a new idea in many countries. Even in the United States, as recently as ten years ago, only a third of the U.S. schools had access to motion picture equipment. Today, according to a recent U.S. Office of Education survey, nearly all the schools have their own equipment or have easy access to the equipment.

What really constitutes audio visual materials? Often, people have the wrong notion that a motion picture alone represents visual aids. Besides the motion picture, there are a wide variety of materials which are used in a classroom situation for the purpose of making ideas clear to the pupils. For example there are the following: Exhibits, filmstrips, radio and recordings, television, posters, charts, graphs, flannelgraphs etc.

The big problem facing a teacher is, how to integrate these various materials into the curriculum, and also, at what levels should these materials be used. So long as the material is the right type, it can be used at any level, whether it is an elementary school or a college. The main thing is to see that the materials help the students, and are effective substitutes or supplements to the classroom lecture and textbook. The aim of education is to give to the students materials that are as near the actual experience as possible. For example, it is difficult for a pupil in an Indian school to imagine what snow is like. To help him understand what snow is like, we have to devise ways and means of giving him a clear picture of snow — we may think of using a colour photograph, or show a

movie with snow scenes. Here we notice that these visual aids are being used as supplements to verbal description.

These "vicarious" ways of presenting reality to the students help them to move towards concreteness. Often, a good many ideas are just "floating" in the minds of pupils, completely unrelated to reality. Use of words without a proper understanding of what they mean, is an example of this.

Objections to use of visual aids are largely based on the traditional outlook of teachers and a reluctance on their part to accept anything new, and also a certain mistaken notion that these aids will replace the teacher. They do not realize that these aids are no more than mere aids and these in the hands of an incompetent teacher will be quite ineffective, and in this sense the aids are not substitutes for the teacher.

The proven contributions of visual aids in education may be summarized as :

"They supply a concrete basis for conceptual thinking and hence reduce meaningless word responses of students. They have a high degree of interest for students. They make learning more permanent. They offer a reality of experience which stimulates self-activity on the part of pupils. They develop a continuity of thought; this is especially true of motion pictures. They contribute to growth of meaning and hence to vocabulary development. They provide experiences not easily obtained through other materials and contribute to the efficiency, depth, and variety of learning."

GROUP I. — SYLLABUS

The group made a critical examination of the existing Madras syllabus in general science for the middle and high schools forms. It was of the view that the middle school syllabus is defective with overlapping of topics (perhaps on account of concentric distribution), while the high school syllabus particularly of V and VI Forms has been ambitiously conceived with the result that the lesson load was too heavy for a two year course.

In the reorganised pattern of the school education in the Madras State, there is to be a seven year integrated course followed by a four year higher secondary stage.

The aims and objectives of teaching of General Science during the first seven years should be :—

1. To arouse and maintain interest in Nature and in the physical and social environment.
2. To develop the habit of observation, exploration and classification and to stimulate a systematic way of thinking.
3. To develop the child's manipulative skill as well as the creative and inventive faculties.
4. To foster a proper understanding of the impact of science in our way of life and to acquaint children, wherever possible, or helpful, with a broad outline of the life and achievements of great scientists.
5. To help children acquire useful knowledge concerning nature and environment and to inculcate habits of healthful and purposeful living.

No attempt was made to frame a syllabus for standards I to IV. It was however made clear that the teaching of science should start right up from Standard I and that at this stage all learning should be through rambles, excursions, visits, projects, and allied activities. The approach in Standard I must be just to identify the familiar plants and animals in the neighbourhood, to know that they too are alive

and need water and food, moisture and warmth and that they grow and die, to help children keep themselves and their classroom clean, to wonder at the sun, the moon and the stars and to observe the sunrise and the sunset, the dark nights and the moonlit nights, the waxing moon and the waning moon, and the changing weather—the wind and the rain, the hot and cool days. It was recommended that in Standards III and IV nature rambles and garden work may be correlated to basic activity on the lines adopted in basic schools in their programme of nature study, and that general science as such may be begun from Standard V.

A syllabus has been prepared for each of the Standards V to VII. The subject content therein is more or less the same as what is found in the existing middle school syllabus (Forms I to III). Only the lesson topics have been realigned and graded progressively to fit in with the pattern of grouping, which is an attempt to integrate the different branches of science and which claim to be more in consonance with the environment and experiences of the pupils. In other words, the syllabus is life-cum-environment centred.

The content for each standard has been arranged under four broad areas of experience :—

1. About ourselves.
2. About our surroundings—plants, animals and the universe.
3. Nature of things.
4. Energy and work.

Whereas in the first four years of schooling the approach is through Nature rambles and garden activity, in Standards V to VII, classroom demonstration should assume growing importance, and project methods should receive adequate attention, so as to encourage pupil activity in groups, and both group and individual activity should be gradually harnessed towards running a Junior Science Club and building up a school museum.

Assuming that about 100 periods a year are available, the following appor-

tionment of time among the several types of activities is suggested :—

1. Classroom teaching, demonstration and discussion—50 to 60 periods.
2. Practical work, projects and allied activities—20 to 30 periods.
3. Excursions, field trips, visits, etc.—20 periods.

The syllabus for the higher standards too has been prepared on similar lines, only taking into account the growing maturity of the pupil and the consequent need for the shifting of emphasis on the different aims and objectives already set forth. It must be remembered that throughout the entire course of General Science study the stress is more on the understanding of the environment and man's increasing control of it than on the mere acquisition of knowledge of organised science as such and that the outcome sought by the teaching of science is the development of the scientific attitude and critical thinking on the part of pupil by acquainting him with the scientific method.

It is urged that in the higher secondary stage General Science should be a separate core subject studied by all pupils irrespective of the courses pursued by them and that it should not be clubbed with mathematics as recommended by the Secondary Education Commission. Also the various branches of science, such as Physics, Chemistry and Biology shall be studied as parts of the elective science group. No syllabus in the elective sciences could be drafted for want of time.

Standard VIII in the new scheme is expected to be exploratory in nature and as such the syllabus for this standard ought to be not only an extension in broad outline of the course content of the first seven years but also a preparatory for a more systematic study of General Science in Standards IX, X and XI.

The present syllabus for Forms V and VI which, as has already been ex-

pressed, is too heavy for a two-year course, has been recast with some lessons added on so as to conform to the principles already stated. It was felt that a knowledge of rudiments of geology was necessary and so certain fundamental topics in this branch of science have been included.

It was felt that at least four periods a week may be needed for the teaching of General Science and an equal number for each of the three electives. This apportionment of time for General and Elective Sciences on the basis of 100 periods a year may be on the following lines :—

1. Class-work and demonstration—60 periods.
2. Practical work by pupils, Field work, excursions, etc.—40 periods.

The science staff in schools in our State at present is composed predominantly of Physical Science trained graduates. Our new scheme of courses in General and Elective Sciences will obviously demand an accelerated infusion of Natural Science trained teachers. This leads us on to the pressing question of a vast number of science teachers in our secondary schools having to improve their qualifications to meet the demands of a syllabus enlarged in scope and content. In this connection it was suggested by the Vice-Chancellor of the Madras University in his inaugural address that science teachers who undergo a year's course of training in theory and practice in an affiliated college may be awarded a certificate that would allow them to take the M.A. degree examination in science besides qualifying them to teach the upper standards in a higher secondary school. This is an advantage that may not be availed of by many teachers. For such teachers as are in the middle of life with far from encouraging commitments on the domestic front to be away on study leave for a year on half average salary or no salary as it might turn out to be, is a hardship too real to be ignored. Again the problem of the dearth of

science teachers which faces us at the moment will confront us in a more pronounced form with the gradual up-grading of the existing secondary schools. With such a shortage of trained science teachers, to think of sending more for improving their qualifications for a year would not be quite practicable. It is therefore suggested that for the existing science teachers with ten or more years of experience a short-term intensive course for a period of three months commencing from 1st April and ending with 30th June be conducted every year and a certificate awarded on completion of the course that will qualify them for their work in the higher secondary schools. This is in addition to the suggestion of the Vice-Chancellor and does not seek to replace it. Future recruitment may however be confined to trained M.A.'s and M.Sc.'s and first and second class B.Sc. trained teachers.

We would also place on record our view that in fixing the work load of a science teacher due consideration should be shown to the volume of work involved in getting a demonstration ready, arranging for practical work, organising a project or conducting science club activities.

It is suggested that after three years of working the new scheme in its entirety, the syllabus be reviewed and modified in the light of experience gained in the actual working.

The syllabuses for the electives have not been considered in detail and it may be taken as a piece of follow-up work.

We would, before closing, like to remind ourselves of a very old but none the less valid notion that the will, the zest and the resourcefulness of the science teacher count far more than curriculum, methods, equipment and all that sort of thing. With such a thought vitalising us, we feel we will deliver the goods as science teachers despite all conceivable kinds of hardships.

SUMMARY OF RECOMMENDATIONS

1. In Standards III and IV nature ramble and garden work may be correlated to basic activity on the lines adopted in basic schools in their programme of nature study.
2. General Science may be studied from Standard V.
3. Standard VIII in the new scheme may be exploratory in nature, the syllabus for the same being an extension in broad outline of the course content of the first seven years and also a preparation for an integrated General Science course in Standards IX to XI.
4. In the higher secondary phase General Science must be a separate core subject, not being clubbed with mathematics as suggested by the Secondary Education Commission.
5. General Science must be studied by all pupils of the higher secondary school stage.
6. There should be an accelerated infusion of natural science trained graduates in the science staff of our schools.
7. There should be a short term refresher course for a period of three months commencing from 1st April and ending with 30th June every year for teachers with a service of ten years and more, qualifying them for their work in General and Elective Sciences in the higher secondary schools. In the case of teachers who desire to take a full course for nine months in a college such a course may be provided.
8. In the fixing of work-load of science teachers, due consideration should be shown to the volume of work in getting a demonstration ready, arranging for practical work, organising project or conducting science club activities.
9. After three years of working the new scheme in its entirety the syllabus may be reviewed and modified, if necessary, in the light of experience gained in the actual working.

GROUP II. TEACHING METHODS AND EQUIPMENT.

The enlarged syllabus in General Science with the added provision for the study of electives demands a considerable amount of practical and demonstration work. This necessarily presupposes a commensurate expansion in laboratory provision and equipment, as otherwise science teaching would degenerate into a mere theoretical subject.

So schools would do well to be provided with separate laboratories for general science, physics, chemistry and biology, having an overall floor space of at least 30 sq. ft. per pupil. A demonstration table with shelves, water tap, gas burner etc. must be provided. Provision should be made for a store room adjacent to the laboratory. Every laboratory should be equipped with at least the minimum apparatus necessary. Charts, models, films, filmstrips and slides must be available in the school itself. Audio-visual apparatus like film-strip projector and movie, epidiascope and tape recorder are also necessary.

An attendant with at least the S.S.L.C. qualification is necessary for each laboratory.

As practical work in general science forms an integral part of science teaching, a well-equipped laboratory is very necessary. The teacher must plan his work at the beginning of the year, dividing the subjects termwise. The teacher should first plan out the experiments to be performed by the teacher and also by the pupils. He must prepare instruction cards for each of the experiments to be done by the pupils. These cards should help the pupils to do the experiments without the help of the teacher. The pupils should record the observations. Even or rotation system may be adopted for performing experiments according to the nature of the experiment and availability of the sets of apparatus.

To make the pupils interested in the subject, the teacher should be able to

give a number of problems of daily interest. They must be made to solve these problems by experiments or observation. The laboratory and the library should be made freely available to the pupils. The models must be strong ones to be handled by the pupils. The parts must be easily visible. Science clubs may be organised. Short plays, projects, etc. may be conducted in connection with the subject matter.

The method of approach for each lesson should not be stereo-typed. It must vary according to the subject and lesson. Major experiments should be demonstrated by the teacher. The simple ones may be done individually or in small groups by the pupils. There must be a dark room for audio-visual education and the exhibition of films must be correlated to the subject and not conducted as a routine.

A radio set should be provided in each school to enable the pupils to listen to educational broadcasts on scientific topics. The All India Radio should make available to schools tape recording of such broadcasts. The science teacher may refer to these broadcasts in his teaching where necessary. There should be provision in the time-table for the pupils to listen to these broadcasts.

A teaching class may contain 40 pupils. But a practical class must contain only 20. The remaining 20 must be planning for a practical work, which they will have to do the next day. The teacher should be a silent observer and a guide where needed.

If General Science is to be a non-examination subject, it must concern the person of the pupil and the topics must be interesting. The teacher should be a person of great resource and the laboratory well-equipped. Practical activities such as drawing charts, making models, giving talks on science, must be encouraged. Purposeful excursions to places of scientific interest must be arranged now and then. There must be separate records maintained by the pupils showing their activities, records

of the teacher which contains a well-planned set of experiments for demonstration, for group work, etc. The teacher must have full freedom to suggest the requirements for the laboratory. The inspecting authorities should see that standards with regard to equipment, practical work and teaching are maintained.

Refresher courses must be given to science teachers at least once in five years, to adapt themselves to the new set up. A set of good reference books must be supplied to the teacher. He should be given training in organising a museum, to operate audio-visual apparatus, etc.

SUMMARY OF RECOMMENDATIONS

1. The syllabus should be one that is prepared by classroom teachers with the assistance of experts in different branches of science. It should be flexible allowing free scope for the initiative and enterprise of teachers.

2. The units of the syllabus should be tested by different groups of teachers adopting different methods in their schools and their experiences and outcomes should be discussed in a conference. Their findings should be published in a suitable journal.

3. Nobody can be dogmatic about a particular method for any lesson unit and all that can be said is that the method should be dynamic and flexible allowing for free play of the abilities and skill of pupils in the class.

4. There are schools without laboratories, and where there are laboratories, they are not adequately equipped. Immediate steps should be taken for securing well-equipped laboratories in schools.

5. The laboratory work and other practical activities should be systematic and well planned so as to receive even distribution over every year of the school course.

6. Individual and group activities by pupils should be encouraged. Too much help by teachers may kill the initiative and critical thinking on the part of the pupils and may not be conducive to the development of scientific attitude. So teachers should be cautious in this respect.

7. Pupils should be asked to maintain records of laboratory work, excursions, and visits which should be assessed from time to time.

8. Teachers should maintain a chart of individual experiments prepared by pupils, a datewise record of excursions and visits, a log book of daily teaching, records of periodical tests and marks awarded, and a register of films and filmstrips shown.

9. Inspection should be done by a panel of teachers which should include at least one expert in science. He should be given constructive suggestions for the guidance of the teacher in all aspects of science work and act as a liaison officer between one school and another communicating the experiences of schools and helping to maintain a uniform standard of internal assessment in all the schools.

10. The appointment of laboratory attendants in schools should be insisted upon, as otherwise the teacher's time and energy are wasted.

11. There should be periodical refresher courses for teachers so that they may keep themselves up to date in regard to not only latest discoveries and inventions but also methods of teaching and science programmes of schools in different States in this country and abroad.

12. Facilities should be available for a few science teachers at least to visit schools in other countries like Great Britain, and the United States, and on their return to communicate their experiences to groups of science teachers.

GROUP III. LIBRARY, FILMS, EXHIBITIONS, ETC.

LIBRARY

1. Pupils are to be encouraged to read library books in Science in addition to the prescribed text-books, especially in the higher secondary stage.

2. The school library should have interesting science books giving information and illustrated with diagrams and charts.

3. Books for a science library can be divided into several categories, each serving a particular purpose. The titles given hereunder indicate the type of books appropriate to each category.

- (a) Reference books, e.g., an encyclopaedia, a dictionary of science.
- (b) Books on history of science.
- (c) Biographies of leading scientists.
- (d) Background books, e.g., electricity in the home, human machine.
- (e) Inspirational books, e.g., the wonder book of engines.
- (f) Science magazines.
- (g) Laboratory manuals.
- (h) Text-books.

4. Books should be available for reference or for borrowing, without undue difficulty or delay, so that even a slight interest may be satisfied before it disappears.

5. If a school has a room set apart as a library and reading room with a responsible person in charge, then the science library can be established as a section of the general library. Failing this, it is best for a science library to be in charge of the science teacher, and for the books to be kept in a science room or laboratory.

6. The reference books in science should form a separate section in the science library. These reference books should not ordinarily be given for home use.

7. Active measures should be taken to encourage love for reading and ability to use reference books. Pupils should be required to write a brief review of the books read by them. Good

reviews prepared by pupils should be read in the class or should find a place in the science bulletin or science magazine, etc.

8. A small committee of students may be formed to assist the science teacher in the library work, if necessary.

9. At present there is a real dearth of suitable supplementary books either of the popular type or of an inspirational nature in the regional language. There are many books in English. A concerted attempt should, therefore be made to encourage the production of such books in the regional languages, including books on biographies of famous scientists and their work. To solve this problem a committee must be appointed to translate into the regional language very good science books published in foreign countries. The committee should consist of science teachers serving in high schools. The State (Provincial or Central) should finance this project.

10. Every science teacher has to make a selection of books for the library. Books containing coloured diagrams and photographs of rare living things and apparatus are preferable to books with black and white figures. Sufficient number of such costly books cannot be secured by many schools for the science library. The Government should give special grants for equipping the library with such costly books.

RADIO

To make the radio broadcasts more useful as aids to the teaching of science the following recommendations are made:

1. Students should be given opportunity to hear radio broadcasts of science lessons. Provision should be made in the time-table for pupils to hear educational broadcasts.

2. Experienced teachers and eminent research workers may be asked to give the lessons in simple language.

3. Tape recordings of broadcasts should be made available to schools on request by All India Radio.

4. The All India Radio should include a larger number of talks on scientific topics useful for students. Science teachers in schools should also be consulted in the preparation of the broadcasts.

5. To drive home what has been learnt, oral questioning and writing of summaries of broadcasts may be very useful.

EXHIBITIONS

1. The science teachers may take efforts to hold science exhibitions annually or whenever possible if the managements of schools permit them to do so and provide necessary facilities and funds.

2. Science exhibition should contain models, instruments, collections, diagrams and charts prepared by the co-operative efforts of teachers and students.

3. Selected pupils should be in charge of the various exhibits and they should be able to explain to the visitors the importance and use of the exhibits and demonstrate them.

4. Some exhibits which arouse the curiosity of the visitors to know more about things of scientific interest should find a place, e.g., 'A candle burning in a jar of water'.

5. Exhibits may include herbarium specimens, aquarium, and products of the activities of children made in the project method of teaching. Members of the science club may also be asked to help the teachers.

SLIDES, FILMS AND FILMSTRIPS

In order that effective use may be made of the appropriate films and filmstrips (and slides), the following suggestions are made :

(i) Every school should have a film-strip projector and a cine projector. It is advisable, if possible, to have a 16 m.m. sound projector.

(ii) Films for shows may be obtained from the Central Film Library, Office of the Director of Public Instruction, Madras, or British Information Services,

Madras. Films of general interest may be obtained from Film Division, Government of India, Mount Road, Madras, United States Information Service, Madras, etc.

(iii) The old type of projection lantern is sometimes very convenient for projecting a picture drawn on a suitable slide. Aldis Film Projector is a convenient device for film strip projection. These two instruments are very useful for classroom teaching. The teacher can draw the attention of the pupils to the particulars he desires to impress on their minds well while showing the pictures.

(iv) Cine projectors (silent or sound) are quite easy to use, but it is advisable for a school to have one member of the staff, preferably a science teacher, to operate it and be responsible for its upkeep.

(v) Projection screens ; special screens are available for small sizes of projected image up to 3 ft. x 4 ft. This type is rolled in a long narrow box. Larger pictures require other arrangements. They can be projected on to a plain classroom wall which has been distempered with a light coloured wash or with white wash.

(vi) Films and Filmstrips : Films depicting the lives of great scientists like Newton, Faraday, Curie and others are useful to rouse the interest of the pupils to learn easily the principles of science. Films on recent developments in science like Atoms, discovery of vitamins, treatment of rickets, may be useful to them even though such topics fall outside syllabus.

(vii) Sound films are to be shown whenever possible if the school has a sound projector. Coloured films are appreciated by children especially in connection with lessons in biology and chemistry. Silent and ordinary films are of immense use to a science teacher to explain difficult lessons like "Internal combustion engines", "Digestion of food", "Extraction of Iron". Pupils see clearly the different stages in the processes and understand them easily. The teacher may give a brief explanation

when he feels that certain points in the films cannot be comprehended by the children well.

(viii) Selection of films for conducting film shows : Films required for film shows for the various classes in the school should be selected and a scheme should be made for conducting the shows. A table containing the following particulars will be very useful :

(1) Month. (2) Date. (3) Title of the Film/Filmstrip and source. (4) Standard for which required. (5) Time of the show. (6) Remarks.

This table will help the science teacher to correspond with the Central Film Library or other authorities sufficiently early to get the films in time and conduct the film shows.

(ix) The teacher, before commencing the show, should give a brief introduction to the topic or lesson of the film to be shown. After the film show he should put questions to the pupils to find out if the pupils have understood the lesson. This follow up work is very essential. Recapitulation of the subject matter of the film show goes a long way in helping pupils to retain the important points in the lesson.

(x) Epidioscope : This apparatus projects an image of any flat opaque object, such as the illustration in a book, a diagram, a pressed specimen and so on.

(xi) Micro-projector : This instrument enables a microscope slide to be projected either on to a vertical screen, so that a whole class can see it together or horizontally on to a bench. Illumination is provided in the same way as for a filmstrip projector.

The above apparatus is very useful and efforts should be made to buy them for the schools.

(xii) The film show is of greater use if introduced into a lesson naturally and informally and in such a manner that the class does not regard it as a 'stunt'.

Teachers may prepare suitable slides necessary for teaching a lesson with the help of pupils.

BULLETIN BOARDS

1. There should be a science bulletin board outside/inside the science room.

2. Cuttings of scientific interest from newspapers and magazines should be exhibited on the bulletin board.

3. Notices drawing the attention of pupils to important and interesting science news items should be exhibited.

4. Reviews of lessons prepared by students after reading supplementary books may also be exhibited on the bulletin board.

5. Activities of science club may be notified on the board.

6. Latest additions to the science library or apparatus and models may be published.

TEXT BOOKS AND LABORATORY MANUALS

1. The text book is to be used by a pupil to supplement the teacher's lessons, to prevent the student from wasting much time in note-taking and to ensure that he has acquired a definite amount of information brought to his notice.

2. Pupils of Standards IX, X and XI should be encouraged to read in full or some portions of the text books written by authors other than the authors of prescribed text books in the schools.

3. In selecting a text book the following points should be borne in mind :

There should be a text book for theory and laboratory manual for practical.

(a) There should be proper selection and organisation of the subject matter.

(b) The subject matter should follow the psychological sequence.

(c) The book should contain apt, simple and exact diagrams, sketches,

pictures, etc. The parts of a diagram should be named.

(d) The language should be lucid, simple and in precise scientific language.

(e) Books intended for higher secondary stage should give the English scientific terminology within brackets.

(f) Each chapter should begin with a brief introduction and end with a summary of the chapter. The chapters should not be long.

(g) Each chapter should contain questions at the end to be answered by pupils at home as exercises.

(h) Books do not contain a detailed index, especially in the regional language. Index giving the necessary particulars in the text should be provided.

(i) The headings and sub-headings should be in bold type. Definitions and important principles or laws should be in italics.

(j) The books should be printed on good paper and the lay-out and get-up should be neat and attractive.

(k) The books intended for higher secondary stage need not give elaborate details of experiments or arrangements of apparatus. These should find a place in the laboratory manual only.

(l) The books should contain coloured diagrams and charts for lessons like blood circulation, breathing, spectrum, etc.

(m) There should be a glossary of scientific terms with their English equivalents.

(n) There should be brief biographies and photographs of the scientists whose discovery is explained in the chapter.

The biographical note may be at the beginning or at the end of the chapter as an appendix.

4. The laboratory manual should satisfy the following conditions:

(a) It should be a companion volume to the prescribed theory book. It should

give full and complete instruction and guidance regarding the procedures to be followed and precautions to be taken in practical work. It should contain clear diagrams showing the arrangement of the apparatus required for the experiments.

(b) The method and manner of recording observations, readings and tabulating them should be clearly indicated.

(c) It should give complete guidance to the pupils to write the laboratory record note.

(d) It should contain a detailed table of contents and an index.

(e) The books should be prepared by teachers who have taught the subject in schools.

5. At present the Laboratory Manuals are not available in the regional language. Encouragement should be given to authors by the government and publishers to write good laboratory manuals.

SUMMARY OF RECOMMENDATIONS

1. There is a dearth of reading books on topics of scientific interest in the regional language and steps should be taken to supply this need.

2. An association of science teachers formed on a State level may take up the work of bringing out reading books in science in the regional language with adequate financial help from the State Government and the All India Council for Secondary Education.

3. This association may publish Teachers' Guide Books in science with reference to the syllabus in General Science for the different standards.

4. There is a great need for integrating audio-visual education with the General Science course in schools. The film shows should form part of the lesson activity and better use should be made of school broadcasts through previous preparation and follow-up work.

5. Every school science club should try to bring out at least one annual science magazine, manuscript or printed. Such magazines would provide the nucleus for a school science magazine or journal to be published by the State Association of Science Clubs.

6. Every school should see that models, charts, simple appliances, etc., made under 'Practical Activities' in the course of the year are put on show at an annual exhibition organised as part of the school day or parents' day celebration. Such an exhibition will give the public an idea of the work done in school and will lead to a better understanding and appreciation of our schools.

GROUP IV — PRACTICAL ACTIVITIES

The modern theory in education stresses that learning by doing is the best method. And no subject lends itself to 'doing' and thereby learning, as science. Yet it must be confessed that science teacher's work in our schools has been either more towards pupils' learning some facts than towards their 'doing' certain things or rather engaging themselves in purposeful activities thought out and planned by themselves under the guidance of the teacher. So there is a need for radical change in our entire outlook and approach to the teaching of science in our schools. In brief we should strive to enrich the content, galvanise the methods and give a more practical bias. Besides great discoveries in science have more often than not been the outcome of a series of trials and errors demanding at every stage hard thinking and improved technique. So the teacher should not be worried over pupils making mistakes as long as they could be made to discover their mistakes and set them right. In fact scientific principles and their applications are thereby made more meaningful. Thus practical work opens up possibilities for training in critical thinking and cultivates a scientific attitude in pupils. It helps to develop resourcefulness and co-operation.

The science teacher is concerned with the fundamental problem as to what kind of practical work the students are to do, what activities they should engage themselves in, and what experiences should be provided for them.

At the elementary stage, i.e., standards I to VII the curriculum in general science is so limited that it does not give full scope for a variety of practical activities. Still it affords opportunities for such simple activities as maintaining a garden, nature study and nature walks. But at the higher secondary stage, there is a wide scope for practical activities since the curriculum is fairly comprehensive. At this stage a teacher with initiative and resourcefulness in co-operation with his or her pupils can foster creative thinking, scientific attitude and inventive skill.

Practical activities: In planning and choosing practical activities for pupils of different standards the teacher must bear in mind the suitability of such activities for that particular age group. Factors like time, interest of pupils, facilities for equipment and materials should also be taken into consideration.

Different types of practical activities:

(a) Preparation of charts, diagrams, sketches and models. These activities could be so planned out by the teacher in co-operation with the pupils to supplement the teaching aids especially at the higher secondary stage. Clear instructions as to what should be emphasised in the charts and diagrams should be given before hand by the teacher to the pupils. As regards preparing models, here again teacher's guidance is very essential in selecting the objects for modelling and also in the actual process of preparing them and labelling their parts. In this particular type of activity scientific accuracy in proportions and labelling should be emphasised. This work should be evenly distributed throughout the year and as far as possible opportunity should be given to every pupil to participate in some item of this type of activity.

(b) Pupils should be encouraged to collect materials of scientific nature. The Teacher should only guide and direct them in the search for materials. The materials thus collected should be properly labelled and they may be kept in a museum intact and used as teaching aids whenever they are required. If pictures are collected in the elementary grade stage, they could be classified under different headings to form valuable scrap-books.

(c) Handmade apparatus : Some appliances that are used in the laboratory could be improvised by allowing the students to make them. Here the initiative should come first from the teacher and materials needed for them should be supplied by the school. The making of such handmade apparatus not only allows us to produce apparatus at a nominal cost but it also has a great educational value to the children. For example, tin cans, discarded things such as pumps, bolts, radios, etc., could be made use of in providing valuable experiences.

(d) Organising a museum, an aquarium and a vivarium and maintaining them infuses great scientific interest among pupils at all stages in the school. It will as well create a scientific atmosphere. Besides, it is needless to say that children love to see things in their natural environment and their innate curiosity is greatly satisfied by observing them. Children should be provided with show cases, troughs, jars, pans, etc., for organising this sort of activity. Things collected should be correctly classified and displayed to the maximum advantage. Every year new additions should be made and old ones should be renewed.

(e) Nature study garden : This kind of activity should be emphasised throughout the child's school career ; more so in the elementary stage where scope for other practical activities is so limited. A pond in addition to garden will be very helpful to grow water plants and rear water insects. Wherever there is no space for a good spacious garden, facilities should be pro-

vided for the pupils to keep pot gardens, strip-garden or terrace-garden, verandah garden.

(f) Excursions and visits to places of scientific interest. An excursion to a place of scientific interest should be arranged at least once a year. Visits as many as possible to local places of scientific interest should be made. The teacher should ensure the maximum scientific benefit out of these excursions by planning them well in advance, by giving questionnaires and by doing follow-up work. Nature rambles forms a part of this type of activity.

Adequate funds should be made available for these excursions and visits by the school.

(g) Organising an annual exhibition: Every school should strive to organise an annual exhibition with the help of the co-operative efforts of the teachers and the students. Organising an exhibition will give the pupils the necessary stimulus for their practical activities.

Science Club : There should be a science club in every school. The schools may have either one club for the whole school or a junior club for the lower standards and a senior club for the higher standards.

As far as possible the membership of the science club should be voluntary and not compulsory. Students who are really interested in the activities of the club, may become members. This will ensure a steady stream of activities and their enthusiasm in terms of their achievements will in course of time prove infectious, thus bringing in more members.

If the school is a very big one and if the membership of the club is too unwieldy for practical running of the club, such a group may be divided into a convenient number of smaller groups classified according to their varying aptitudes and interests. And these small groups may meet on different days under the supervision of other science teachers or sponsors.

Aims : The following are some of the aims of the science club :

- (1) To create a scientific attitude in pupils.
- (2) To help the pupils pursue science as a hobby.
- (3) To encourage pupils to take an active and intelligent interest in the environment and every day experiences.
- (4) To promote individual and group initiative.
- (5) To contact other science clubs at a regional level, leading to a wider affiliation on State, National and International levels.

Organisation :

1. The science teacher should be the sponsor of the club.
2. The Headmaster should be the patron.
3. Membership should be open to those pupils interested in science.
4. An elected executive committee should be formed among the pupils—a chairman, a secretary, an assistant secretary, a treasurer, a librarian, a store-keeper and a publicity officer.
5. The club should be located in the school.
6. In the early stages free membership should be encouraged. Later on a nominal membership fee may be collected.
7. The resources of the school should be made available to the science club.

The duties of the office-bearers :

Patron : He should give facilities to the club for its active participation in all its activities.

Sponsor : He should only supervise, guide and lead. He should maintain a lively interest in the club.

Student-chairman : He should preside over the meetings.

Secretary : He should maintain the minutes of the meetings and attend to the correspondence.

Assistant Secretary : He should act in the absence of the Secretary.

Treasurer : He should collect subscriptions and maintain accounts.

Librarian : If the club has a library, he should be in charge of it.

Storekeeper : He should maintain a stockbook of the equipments belonging to the club.

Publicity officer : To give publicity to the activities of the club, its magazine and exhibition.

Some of the activities suggested :

1. Hold discussions and meetings among themselves or with outside speakers participating.
2. Arrange excursions and visits to places of scientific interest.
3. Conduct science exhibitions.
4. Prepare specimens, models, charts, diagrams and scrap-books.
5. Prepare handmade apparatus.
6. Have simple dramatics.
7. Render social service and attend to public health.
8. Conduct daily health inspection in school.
9. Prepare slides and blue-prints
10. Photography.
11. Celebrate science days—days of great scientists.

The science club could widen its contact to a State level which will later on find its affiliation at a national and lastly at the international level. This scheme will give ample opportunity for the members of the science club to have interchange of ideas, wider contacts and exchange visits between the different countries of the world.

In this connection this Seminar welcomes the steps taken recently at Gwalior to form an All India Association of Science Clubs and is glad to know that the All India Council for Secondary Education has set apart funds to help worth-while projects that may be undertaken by science clubs in schools.

As practical activities not only form an integral part of learning but also result in some specific achievements on the part of pupils, they should be assessed and evaluated. It is highly desirable that in the yearly evaluation of the progress of a pupil in science, about 30% should be set apart for provincial activities.

SUMMARY OF RECOMMENDATIONS

1. The pupils' interest in the study of science should be fostered through a planned programme of practical activities which should form an integral part of science teaching or rather science learning at all levels.

2. The practical activities should be varied to meet the age, capacity and manipulative skill of pupils of different standards in schools.

3. The organisation of a science club in every school shall be an effective means of encouraging the participation of pupils in practical activities.

4. Practical activities of pupils should be assessed and evaluated and the marks awarded should be taken into account in deciding the annual promotion. It is suggested that a maximum of 30% be allotted for practical activities.

5. The Seminar welcomes the steps taken recently at Gwalior to form an All India Association of science clubs and is glad to know that the All India Council for Secondary Education has set apart funds for to help worthwhile projects that may be undertaken by science clubs in schools.

GROUP V—TESTING AND RECORDING

AIMS

Testing and recording should be done on a scientific basis. To achieve this end, both oral and written examinations should be conducted. In such an evaluation of pupils' achievements, their practical work and aesthetic appreciation must be tested. We should find out their experiences which are mean-

ingful and useful to them. Testing is only to guide the students but not to weed them out.

Tests are of two kinds, viz., the essay type examinations and the objective tests. Some of the objective tests are (1) the intelligent tests to test the abilities of the students, (2) the attainment tests to measure their depth of knowledge of scientific data, (3) diagnostic tests to diagnose their difficulties, (4) special aptitude tests to test their skills and (5) prognostic tests to test their abilities to study new subjects. In all these objective tests our aim is to test the subject matter rather than memory work. The final aim of our testing should be to observe and guide the pupils individually and classify them according to individual and social needs. Having these ideas in mind, the Seminar considered various views on this subject and finally made the following suggestions:—

1. Science is to be made a non-external examination subject. Let us gird up our loins and find out how best we could sustain interest, bring that scientific attitude or the scientific bend into the minds of our pupils so that they may sharpen their intellect and do creative work with well-thought-out plans and live a well-disciplined comfortable and useful life of existence.

2. The group agrees that the device of testing and recording is a powerful instrument in the hands of a teacher, if it is handled by him in a scientific manner.

3. In view of the changes made in the curriculum of secondary schools, the group is in general agreement that the pupils will take the external examinations in electives and a certificate in General Science at the end of the higher secondary school course. But to minimise the indifference that the pupils are likely to show to General Science, the group suggests that there shall be assessment of the pupils' progress in their day to day practical activities in the subject.

4. The group thinks that self evaluation of a teacher should play a very important part in testing. Self-evaluation should help the teacher to evaluate his own methods. It helps him to find out the efficacy or the effect of the methods employed by him to teach a particular lesson, to produce the desirable results and to change his methods according to environmental conditions and needs. It enables him to know for himself whether he is able to stimulate the interest of pupils in order to produce creative work. He has to take stock of the knowledge or skill the pupils possess before commencing a particular topic. To achieve this end the teacher may profitably employ the preview and the diagnostic tests for checking results of his own teaching methods. He will maintain a record wherein he will note down the name of unit, the method employed by him and the results achieved.

5. To test the pupils' attainments, the group feels that the same types of testing which are in vogue now in schools may be continued and these tests may be classified into two types, viz., the essay test and the objective type tests. The science teacher shall also test the pupils in their practical work in the laboratory, field work, excursions and visits. He will initiate the students in the various science club activities, viz., collection of specimens, drawing of charts, making clay and cardboard models, maintaining an aquarium, garden and pond keeping, making albums, setting up experiments for demonstration purposes, bringing out science magazines, preparation of graphs and posters. The pupils must maintain science notes, prepare answers for questions and maintain a separate note book for drawing diagrams and naming parts. They may be made to dramatize the biographical memoirs of eminent scientists. The pupils must maintain a note book for follow-up work in audio-visual education. They must maintain nature diaries or nature calendars. Facilities must be given to the pupils to prepare samples of balanced diet and preserved foods.

Good number of science books must be kept in the science room for reference and the pupils must be made to study them and they may be encouraged to do project studies in groups.

The Group is of opinion that such an overall assessment as this, has its own legitimate place in testing as it will reveal to us a true and complete picture of the personality of the pupil.

6. Pupils must be made to maintain the following records:—(1) An up to date practical notebook; (2) A record of excursion and visits to places of interest with dates, places visited and observations made; (3) Record of other activities such as, gardening, and pond-keeping (both individual and group activities should be properly indexed); (4) The pupils should maintain a record of other activities in the science club; (5) They may maintain note-books in which they may record all the precautions and minor details of observations made as and when they actually do the experiments either in the laboratory or for demonstration purposes; (6) An album in which photos, pictures and parts of flowers are preserved; (7) A record containing the photographs of scientists with their biographical memoirs and suggestions for dramatisation; (8) A library note book to note down points of scientific interests as and when they study the library books; (9) The science textbook which has undoubtedly its own usefulness in science teaching.

7. The teacher has to maintain the following records:—(i) A record of the individual experiments performed by the pupils; (ii) A datewise record of excursions and visits in the teacher's diary; (iii) The teacher's logbook of day to day teaching work; (iv) A record to show the tests given by him periodically and the marks awarded to pupils in these tests; (v) A record of individual and group activities; (vi) A record to show the names of films or the filmstrips shown to the pupils. This record should be kept with the projector; (vii) The cumulative

records of the pupils showing the assessment in all the co-curricular activities of the pupils.

8. The Group recommends that the science teacher in charge of a particular group, shall rate the pupils' progress on a five-point scale (very good, good, very fair, fair, bad) when he evaluates the practical activities of the pupils.

9. The Group is faced with another question as to how far a science teacher can find time to perform so many duties as contemplated herein, in addition to his responsibility to cover the syllabus laid down. In order to overcome this difficulty, the Committee suggests that the classes should be small and the teacher should not be burdened with too much of teaching work.

10. The committee is of opinion that the current practice of providing choice in answering questions in science must be stopped and the entire school record of the whole year should decide promotion or graduation.

11. The committee views with disgust the publication of notes and made-easy in the market and requests the Government to disallow such publications which completely hamper scientific approach to subjects of science.

12. The suggestion in the Madras legislature report that there shall be a common test at the end of Standard VII is viewed with disfavour by this committee as there are several evils attending on the practice of holding examinations on district basis.

13. In the place of the present S.S.L. certificate issued to the pupils, the committee suggests maintenance of cumulative records.

14. The questions at the examinations should necessarily be of the Essay Type and the objective Types the samples of which have been furnished by the committee for all the standards V to XI. In the framing of samples of tests the committee have taken into consideration the capacities of the different standards.

15. If General Science is made non-external examination subject, the progress of the pupils may be assessed and evaluated in the practical activities as suggested in this report.

16. The tests should be held as often as possible at least once a month, the duration of the test being 45 minutes. The nature of the test should be of bit questions and of completion type. The teacher should maintain a marks register containing the dates of tests and marks obtained by the pupils. There should be two comprehension tests of two hours duration, one hour for essay type and one hour for objective type, the allotment of marks being 50 : 50. The assessment of practical and other activities of the pupils and records have been suggested in this report. The committee is not in favour of holding practical examinations in schools at the end of every year.

17. The Group in general agreed that there should be external examinations in the electives.

18. The committee feels that the proportion of marks allotted for periodical tests and terminal tests must be in the ratio of 40 : 60.

19. The Group is of opinion that the minimum for a pass should be 35 per cent and that there should be a separate minimum for theoretical and practical work in the ratio of 50 : 50.

SUMMARY OF RECOMMENDATIONS

1. General science should be made a non-external examination subject. There should be no external examination in General Science at any stage and the progress of pupils may be evaluated on the strength of internal assessment.

2. Internal testing should include practical work in the laboratory and the science club activities.

3. This committee recommends that rating the pupils' progress be done on a five-point scale.

4. The classes are to be small and the teacher should not be burdened with too much work to enable him to devote

more attention to the practical activities of pupils.

5. The committee views with disfavour the practice of giving choice in tests.

6. School records, practical work, and theory internal examinations are to be assessed in the ratio of 20 : 40 : 40.

7. Instead of S.S.L. Certificate cumulative records may be introduced in order to assess the all round progress of the pupils.

8. Samples of tests to be circulated so that a certain amount of uniformity and reliability may be secured in the assessment.

9. Duration of tests to be for 45 minutes and these tests may be held as often as possible.

10. Comprehension tests of two hours duration to be held once a quarter — one hour essay type and one hour objective type — Marks 50 : 50.

11. There must be an external examination in Electives.

12. Periodical tests and terminal tests to be assessed in the ratio of 40 : 60.

13. This committee suggests that the minimum for a pass should be 35 per cent and not below this mark under any circumstances.

CONCLUDING SESSION

Sri T. P. Srinivasavaradan gave a brief account of the work of the Seminar and expressed the hope that the Government, when framing the syllabus of the higher secondary school course, would consider the recommendations of the Seminar.

Sri T. N. Sundaram read the messages received for the occasion from Mr. R. A. Gopalaswamy, Secretary to Government of Madras, Education Department, and Mr. N. D. Sundaravadivelu, Director of Public Instruction, wishing the function success.

The recommendations of the various working groups of the Seminar were then placed before the Conference.

Sri S. Natarajan, Director, Field Advisory Services, All India Council for Secondary Education, New Delhi, delivered the valedictory address.

He said that science occupied an important position in their system of education. It was natural that this Seminar should have recommended that General Science should be studied throughout the higher secondary school course by all students whatever might be the subjects chosen under the electives. For living is a common problem to all children and it is the responsibility of the school to train them for the good life which understands their responsibilities and obligations to society and which can foster an attitude of cooperation and self-reliance in the pupils. It was equally natural, he said, that the teachers must have full freedom in framing the syllabus without any imposition from outside. The success of any educational system largely depended upon the teachers putting forward constructive suggestions in the light of their experiences. The teachers should inculcate in the minds of the pupils a genuine desire to learn science which was essential for the progress of the country. This would not be possible as long as there was the cramping influence of the external examination in our secondary school programme of studies. For the public examination at the end of the school course has almost set the pattern of our work in our schools and it has created a situation in which the larger objectives of education have given place to the narrow objectives of success in the examination which tests no more than the ability of the pupils to remember certain facts. He therefore commended the decision of the Seminar that General Science shall be a non-external examination subject and that it should be internally assessed. In this recommendation of the Seminar, he said, lies a great charter of freedom for teachers. It throws the responsibility on the teachers for providing a suitable scheme of studies and working it out to the best advantage of the

pupil. It further gives them the responsibility of measuring the pupils' attainments at the end of the course.

He, therefore, exhorted the teachers to develop a high degree of professional sense and integrity and scientific techniques of appraisal of student ability and hoped that the joy of working a scheme prepared by themselves and in the interest of their pupils would bring about not only improved techniques but also high standards of science teaching in secondary schools.

Mrs. Gnanam Nayagam, Mrs. Timothy, Sri K. S. Viswanathan, Sri Rangachari and Sri C. Kannappan made brief speeches recounting their experiences during the three weeks of the Seminar and thanked the Director of the Seminar on behalf of all the delegates.

All the delegates who attended the Seminar decided to form themselves into a Science Teachers' Association and to undertake follow-up work by way of testing the curriculum in certain schools and pooling up their experiences.

DRAFT SYLLABUS IN GENERAL SCIENCE FOR NEW STANDARD V

I. ABOUT OURSELVES :

1. *Food. The food we eat*—Wholesome and nutritious—food articles used as food every day—animal and vegetable—Milk and milk products.—Need for cooking food—What happens to the food we take in—Elementary idea of digestion and removal of undigested matter.

2. *Air we breathe*—Need for pure air—Inspiration and expiration—Expansion and contraction of the chest cavity—Importance of open air life—Evil of crowded place—Breathing through the nose.

Sri T. N. Sundaram proposed the vote of thanks to all those who contributed to the success of the Seminar. Special mention was made of the following :—

1. The All India Council for Secondary Education.
2. The Director of Public Instruction, Madras.
3. Sri S. Natarajan, Director, Field Advisory Services, All India Council for Secondary Education.
4. The managements of schools for deputing teachers.
5. Consultants and Lecturers and Members of the Steering Committee.
6. United States Information Service, British Information Service, the British Council, and the Heads of various institutions visited by the delegates of the Seminar.
7. Management of the Hindu High School, Triplicane.
8. The Press.

3. *Water we drink*—Pure—importance of using boiled water.

4. *Clothes we wear*—Cotton, silk, woollen, with reference to season and climate.

5. *Exercise*—Rest and sleep—Importance of sunlight.

6. *Cleanliness of the body*—Bathing—care of eye, teeth, ears, nose, nails, hair—keeping the dress clean.

7. *Cleanliness of the Home*—Sweeping, dusting and cleaning—white-washing, painting—use of phenyle.

8. *Cleanliness of the surroundings*—Keeping clean streets and roads—drains

and sewage—filth and dirt breed disease—Removal and disposal of waste.

II. OUR SURROUNDINGS :

1. (a) *Animals*—wild and tame animals—Classification of animals into herbivores, carnivores and rodents—Examples for each—

Kinds of teeth—Incisors, canines and molars—and the use of each kind.

(b) *Animals*—servicable to man—Birds in the locality—crow, parrot, vulture, woodpecker and sparrow and what they feed on.

2. *Plants*—Those that give fruits, seeds and flowers—how man depends upon plants for food and clothing.

Soil—the home of plants—Tilling the soil—manures and fertilizers—Observing a few common leaves, flowers, seeds and fruits.

III. MODES OF TRAVEL :

How we travel on land,—sea and air—Safety first—Rules of the road.

How animals move—walking, running, jumping, creeping, swimming, flying. How plants climb and creep.

IV. FIRE AND USES :

How fire was produced through the ages—by friction and flint stone.

Uses of fire to man—for comfort and civilisation.

DRAFT SYLLABUS IN GENERAL SCIENCE FOR NEW STANDARD VI

I. ABOUT OURSELVES :

(a) *Why we take food*—classification of food as body builders and energy producers.

(b) *How we breathe*—Lungs—air passage to lungs—(nose, throat—wind-pipe—air sacs of the lungs)—Expansion and contraction of the chest—Air-sacs surrounded by blood vessels—Exchange of gases—Importance of breathing through nose—Evils of breathing through the mouth—Breathing exercises—deep breathing.

(c) *Our body framework*—the skeleton—uses of the bones of the skeleton—for support, protection and for movement—Joints—movable and immovable—advantage of a jointed skeleton—Muscles as agents for moving the bones—Muscles as cover for the skeleton.

(d) *Skin*—Covering for the body—its protective and excretory functions—Care of the skin—Skin diseases—Itch and ringworm.

(e) *Our sense organs*—Eye—ear—nose—tongue—and skin—as gateways of knowledge.—Their connection through nerves with brain (detailed study not contemplated).

(f) *Comfortable and healthy living*—Shelter—Home of the primitive man—Home of the modern man.—Building materials—stones, bricks and tiles.—Lime, mortar, cement and concrete.—Types of wood—varieties and uses. Types of stones—Bricks and tiles—how made.—Lime, cement and concrete—reinforced concrete—how made. Use of glass and asbestos sheet.—Lighting and ventilation in home—Cleaning the home—Whitewashing, painting and disinfection—Part played by sunlight—Chemical agents—Keeping the surroundings clean.

Social hygiene—Removal and disposal of sewage water and refuse—Diseases. Individual and state responsibility.

II. OUR SURROUNDINGS — LIFE AROUND US :

1. *Plants* : (a) Plants—living things—use of food to plants for growth and work—Parts of a typical plant—Roots, stem and leaves—their main functions—Soil, the home of plants—constituents of soil—sand, clay, humus—Kinds of soil—sandy, clayey and loamy, and their relative merits for growth of plants.

(b) Factors affecting the growth of plants—soil, water, climate and sunlight.

(c) Use of plants—Economic and other values of plants.

2. *Animals*: (a) Classification of animals into vertebrates and invertebrates—examples for each. Animals as sources of food and clothing.

(b) Food habits of local animals and the arrangement of teeth—cow (cud chewing animal), horse, dog, cat, squirrel, elephant.

(c) Food habits of local birds and how the beaks are adapted—Sparrow, crow, parrot, woodpecker, kite, kingfisher, duck.

(d) Social life in animals—bees and ants.

3. *The Universe*: Our universe—vast—the sun, the moon, the planets and the stars, the milky way.

III. NATURE OF THINGS:

1. Matter — three states — solids, liquids and gases—properties of each state—examples.

2. Air—composition (qualitative)—Oxygen, nitrogen, carbondioxide and water vapour—part played by each—Air necessary for burning—Rusting of iron—a kind of slow combustion.

3. Water—sources of water—pure water—tasteless and colourless—Impurities in water—Filtration, decantation and distillation as methods of purifying water—Dissolving property of water—How water is useful.

4. Metals in our daily use—Iron and its varieties—silver, gold, tin, lead, copper, aluminium and zinc—their characteristic properties and uses.

5. Common salt—how manufactured—uses.

IV. ENERGY AND WORK:

1. Pressure in liquids—water finds its level—water level and spirit level—uses—water falls—water wheels.

2. Simple machines in daily life—Lever—orders—fixed pulley—Mechanical advantage.

3. Light—sun the chief source of light — stars — burning gases and vapours.

4. Lighting the home—Oil, candle, gas and vapour (mantle) lamps.

5. Light travels in straight lines—Reflection in plane mirrors.

6. Magnet—Its properties—Needle magnet—Mariner's compass (elementary treatment).

DRAFT SYLLABUS IN GENERAL SCIENCE FOR NEW STANDARD VII

I. ABOUT OURSELVES:

1. The food we take—composition of foodstuffs—Carbohydrates, proteins, fats, mineral salts, water, vitamins—their relative importance.

2. Food values of common food articles (Rice, wheat, meat, vegetables, egg, ghee, oil, butter)—Milk an ideal food—Milk products.

Mixed diet and balanced diet.

Common beverages—Tea, coffee, cocoa, lime juice, cocoanut and palmyra juice.

Intoxicating drinks—their evil effects on the system.

3. Digestive system in man—alimentary canal and the chief glands connected with it. Digestion in mouth, stomach and intestines—(Enzymes not contemplated).

Absorption and assimilation (elementary idea).

4. Breathing—Mechanism of breathing—Movement of ribs and diaphragm—Differences in air breathed in and breathed out—Evil effects of bad air and the need for ventilation.

5. Bony system—Arrangement of bones in the human skeleton—Kinds of movable joints and the nature of movement they permit.

6. Muscles—their functions—Voluntary and involuntary muscles—examples—exercise—fatigue.

7. Blood circulation—Functions of blood circulation—Composition of blood as consisting of corpuscles (red and white) and plasma—Heart—a blood pumping station—Chambers of the heart and the valves in the heart—Blood vessels—arteries, veins and capillaries—General circulation and pulmonary circulation.

8. Excretion—Need for removal of waste products—Part played by kidneys, skin and lungs (elementary treatment only).

9. The nervous system—Its importance—Brain, spinal cord and nerves (motor and sensory)—Functions of each—Voluntary and involuntary action.

II. OUR SURROUNDINGS:

A. *Plants*:

1. Growth of plants from seeds—Study of the bean seed and its parts—Germination of seeds—Conditions necessary—Stages of germination—Enemies of plants—Grasshopper, snail, caterpillar.

2. How plants obtain raw materials for preparing their food from soil and air—substances got from each and how.

Starch—chief food of plants—how prepared (elementary treatment).

Plant—World's feeder.

Storage of food in roots, stem, fruits and seeds.

3. Parts of a typical flower—use of each part—Pollination and fertilisation—How bees and insects help plants—Kinds of fruits—fleshy and dry.

Dispersal of fruits and seeds.

B. *Animals*:

1. The egg and the food it contains.

2. Parental care in animals.

3. Life history of the butterfly, mosquito and frog.

C. *The Universe*:

The solar system—the earth a planet—its rotation and revolution—the seasons.

The moon—the phases of the moon, waxing and waning.

The Stars—how they are different from planets.

Identifying a few prominent stars and star groups (Pole star, Great Bear, Orion, Pleiades).

III. NATURE OF THINGS:

1. Fundamental units of length, mass and time. (British system and metric system).

2. Pressure of air—Measurement Barometer—construction and uses.

Syringe—application of the principle in ink-filler, medicine dropper, self-filling fountain-pen.

The lift pump and syphon—their uses.

3. Preparation and properties of Oxygen and Carbondioxide—Fire extinguishers.

4. Division of matter into elements, compounds and mixtures.

5. General properties of common acids—Hydrochloric acid, Nitric acid and Sulphuric acid and Acetic acid.

Properties of alkalies—Caustic soda, caustic potash, lime, liquor ammonia—Washing soda—Baking soda

6. Making soap and paper.

IV. ENERGY AND WORK:

1. Why objects fall—force of gravity—Centre of gravity—States of equilibrium.

2. Effects of heat—Expansion of solids, liquids and gases when heated.

Temperature—thermometers—Centigrade and Fahrenheit—Doctor's thermometer.

3. Methods of transmission of heat—Conduction. Convection. Radiation—Thermos flask. Water and air currents.

4. Light — Refraction of light—Examples in daily life—dispersion of light in a prism.

Sunlight made of seven colours—How rainbow is caused.

5. Simple Voltaic cell—to produce current.

Leclanche cell and dry cell—their relative merits.

6. Electricity in the service of man—

Heating effects as in electric stove—Lighting as in electric bulbs—Magnetic effect as in electric bell and crane.

7. Dynamo as generator of electricity—Motor. (Elementary treatment).

DRAFT SYLLABUS IN GENERAL SCIENCE FOR NEW STANDARD VIII

I. ABOUT OURSELVES :

(a) Our body viewed as a machine—Collection of organs—functions of each.—Organs built of tissues—cells—protoplasm.

(b) Respiration—a vital process in all living things—Review of the respiratory system in man.—Muscles involved in respiratory movements—Energy released through oxidation in tissues.

(c) First Aid — Fainting — artificial respiration.—Dog-bite, snake-bite, electric shock.

II. OUR SURROUNDINGS :

Living and non-living characteristics—Interdependence of plants and animals.

A. Plants :

(a) Respiration in plants—The importance of the air—spaces—stomata of the leaf in this process—Respiration in all parts of the plant.

(b) Formation of soil—weathering action of wind, rain, heat, etc. and erosion. (Steps to prevent erosion of land.)

(c) Constituents of soil—early soil—late soil and tired soil—Organic matter present—Kinds of soil suitable for plant growth—Soil as the source of water and mineral salts for plants. Micro-organisms (Bacteria) in the soil. Nitrogen cycle in nature. Manures and fertilizers. Rotation of crops.

(d) Absorption by the roots of nutrient water from the soil and its passage through the plant body (Elementary treatment). Transpiration—why it is necessary—Use of transpiration.

(e) Movement in plants due to gravity, light and moisture—Sleep movements.

(f) Adaptation of plants to environments—desert and water plants.

(g) Vegetative reproduction —cutting, layering and grafting.

B. Animals :

1. Adaptation of animals for protection—colour, mimicry, poison apparatus, horns and spines.

2. Coverings of animals and their uses—Classification into warm-blooded and cold-blooded animals.

3. Insects useful and harmful. Birds useful and harmful.

4. Life history of silk moth—Silk farming.

5. Bacteria—cause of diseases—how they enter the body—Beneficial bacteria and their use.

C. The Universe :

1. The sun and other planets.—How planets move in space round the sun —Sun—a great source of energy—Sun's energy locked up in plants—living and dead (coal).

2. The Moon—Moon's pull on the water on earth—tides.

III. NATURE OF THINGS :

1. The story of earth—Solidification of the outer crust—shrinkage—Earthquakes and volcanoes—Earth's force of attraction—Centre of gravity—Finding the Centre of Gravity of an irregular lamina—Conditions of stability.

2. Measuring vessels—Graduated jar, burette, pipette, overflow—how used to find the volume of irregular and small bodies.

3. Common balance—How to find the weight of an object.

4. Relation between mass and volume—Finding the density of solids and liquids.

5. Spring balance—Hooke's law—Use of spring balance.

6. Pressure of air—measurement of atmospheric pressure—Mercury barometer—Aneroid barometer.—Barograph—Weather forecasting. Altimeter (Construction not contemplated).

6 (a). Relation between Pressure and Volume of air—Boyle's law.

7. Appliances based on air pressure —Pumps—exhaust and compression—Force pump and its application in fire engine.

The siphon and its application in flush tanks and wash basins.

8. Effect of heating substances—such as, Magnesium, copper, sulphur and carbon in air—Formation of oxides—Oxidation—Prevention of rusting—Change of weight when substances burn or rust in air.

9. Hard and soft waters—Softening of water. Effect of using hard water in kettles and boilers.

10. Solution—saturated and unsaturated.—Crystallisation—properties of crystals—Growth of crystals. Solubility.

11. Action of sodium and potassium in water.

12. Preparation of hydrogen—its properties and uses.

13. Composition of water—Electrolysis.

14. Evaporation of water—Condensation of water vapour in air resulting in cloud, mist, fog and dew.

15. Cooling effect due to evaporation—Volatile liquids (ether, liquor ammonia). Manufacture of ice—Freezing mixture.

16. Classification of elements—metals and non-metals—their distinguishing features.

17. Physical and chemical changes—(Types of chemical changes not expected).

18. Limestone — chalk, marble and sea-shell. Action of heat and dilute hydrochloric acid on these substances.

IV. ENERGY AND WORK :

1. Energy of wind—wind mills—how they work.

2. Single movable pulley—Block and tackle.

3. Friction—how caused—use—how to reduce friction.

4. Light — formation of shadows —Eclipses, solar and lunar.

5. Sound — how produced — transmitted—echoes.

DRAFT SYLLABUS IN GENERAL SCIENCE FOR NEW STANDARDS IX, X AND XI

I. ABOUT OURSELVES :

(a) Review of food stuffs and food values—Vitamins and their importance—digestion in detail with reference to the enzymes, and their action on different food stuffs—Alimentary system in man.—Supply of food to the tissues—Structure and care of teeth—Food preservation and adulteration of food.

(b) Circulation—study in detail of the heart and its parts, blood corpuscles and their functions;—plasma. Importance of circulation—pulse.

Lymph—lymph vessels and lymphatic circulation.

(c) Respiration—study in detail—of the lungs—its structure—Exchange of gases in the lungs—how affected.

(d) Excretion—organs of excretion and the products excreted by each—kidneys, lungs and skin.

(e) Movement—study of the human skeleton in greater detail and the classification of joints—Parts of a ball and socket joint. Muscles—voluntary and involuntary—Examples: calf, biceps, sphinctral and cardiac.

(f) Sensing: The nervous system in man. The brain and its parts. Spinal cord and nerves (afferent and efferent)—function of each part.—Fatigue—voluntary action and reflex action—The five sense organs, their parts and their functioning through the nervous system. (A detailed study of the sense organs is not expected).

Sympathetic Nervous system (only an elementary treatment).

(g) Ductless glands—thyroid, pituitary and adrenal. The influence of the secretions on the human system.

II. OUR SURROUNDINGS :

A. Animals :

(a) Feeding habits of animals—the earthworm, leech, butterfly, snail, fish,

frog and snake and how the mouth parts are adapted.

(b) Movement—adaptation of animals for movement in the lizard, snail, snake, birds, earthworm, frog and bat.

(c) Breathing in animals, fish, frog, crab.

B. Plants :

(a) Plant cell and its parts—Protoplasm—Properties—Uni and multi cellular organisms.

(b) The leaf: Structure and functions. Respiration, transpiration and photosynthesis.

Respiration in plants: Simple experiments.

Transpiration — (recapitulation.) Photosynthesis—study in greater details — Photosynthesis and respiration compared.

Storage of starch, protein and fat and action of enzymes.

(c) Seeds: Parts—bean and castor seeds—Germination—stages.

(d) The Flower—Parts and their work in detail—Pollination and fertilization—dispersal of seeds.

(e) Flowerless plants: External features of the fern, moss alga and fungus.—Nutrition of the mould. Alternation of generation in fern and moss (Elementary treatment).

(f) Darwin's explanation of the origin of new forms.

C. Universe :

1. Formation of the first oceans—water cycle—weathering—soil.

2. Types of rocks—*Igneous rocks*—solidified from original liquid (magma)—like granite, basalt.

Sedimentary rocks—sediments accumulated in water basins—Consoli-

dated like sand stones—slate—limestone fossils.

Metamorphic rocks—formed from both above types during large earth movements due to heat and pressure—like marble, gneiss and schists.

3. An outline of the evolution of life through the geological periods as evidenced by the fossils in the sedimentary rocks.

4. (Fire and burning — Lavoisier's work—Combustion).

5. Structure of matter, molecules, atoms and atomic energy.

6. Measurement of time. The simple pendulum—Galileo—Relation between period and length.

III. NATURE OF THINGS :

1. Pressure in liquids: Transmissibility of liquid pressure. Pascal's law and application. Hydraulic Press.

2. Balancing columns: U-tube and Hare's apparatus (Measurement of Relative Densities of liquids).

3. Buoyancy: The principle of Archimedes—verification. Density and Relative Density. Application of the principle of Archimedes to determine Relative Densities of solids and liquids.

4. Why do bodies float? Law of flotation—Simple, variable immersion hydrometer.

5. Airplane: How supported and made to fly.

6. Separation of ingredients of mixture and the processes involved therein.—Solution, decantation, filtration, distillation, sublimation, crystallisation, fractional distillation and fractional crystallisation.

7. Chemical changes: Conditions, effects and types.

8. The common acids: Hydrochloric, Nitric and sulphuric acids—Preparation in the laboratory—Properties and uses —(Industrial preparation not contemplated).

9. The alkalies: Caustic and mild—Preparation in the laboratory—properties and uses.

10. Salts: How formed—Neutralisation—Use of indicators.

11. Chlorine: Preparation, properties and uses.

12. Bleaching powder and bleaching liquor—properties and uses.

13. Uses of Sodium chloride—Chlorates of sodium and potassium.

14. Iodine: Properties and uses.

15. Sulphur: Occurrence—extraction and purification—Uses.

16. Sulphur dioxide: Laboratory method of preparation—Properties and uses.—Sulphites and hyposulphates—Uses of sulphates of ammonium, copper, magnesium, alum (potash)—Uses.

17. Phosphorus: Varieties — white and red. Difference in properties—Uses in safety matches.—Uses of phosphates, calcium super-phosphate, and hypo-phosphites.

18. Sodium and potassium nitrates: Preparation, properties and uses.

19. Fixation of atmospheric nitrogen —Preparation and properties of ammonia—Use of ammonium nitrate.

20. *Metals*: Chief ores of metals—Iron, Aluminium, Copper, Gold, Zinc, Lead, Tin, Mercury, Thorium, Uranium, Radium, Manganese, Magnesium. (Where found in India).

Extraction of Iron, Aluminium, Gold and Mercury.

21. *Kinds of steel and their uses*: Common alloys of copper, aluminium and steel. Their principal components and uses—Type metal.

22. *Alcohol*: Preparation—Uses as Power, as solvent and for medicine.

23. *Coal*: Its products—dyes, perfumes.—Petroleum and its products.

24. *Rayons and Plastics*—Their use in daily life.

IV. ENERGY AND WORK :

1. *Machines* : The inclined plane—The screws—Movable pulley—Block and tackle—Wheel and Axle—Weighing machines.

2. *Heat* : Effects of heat on bodies—Practical application of the expansion of solids, liquids and gases.—The compensated pendulum.

3. *Temperature and thermometry* : The Centigrade and Fahrenheit—thermometers—The clinical Six's thermometers.—Quantity of heat and calorific capacity for heat—specific heat (only concept).

4. *Change of State* : Melting and boiling. Determination of melting and boiling points. Evaporation—Latent (Elementary ideas)—Freezing Mixture.

5. *Transmission of heat* : Methods of—Recapitulation—different conductivities—of metals—Davey's safety lamp—Thermos Flask (Recapitulation)—Application in everyday life.

6. *Steam Engine*—Main parts and working—Internal combustion engine—Parts—the four-stroke engine—working of.

7. *Fuels* :

(a) Solid—wood and coal.

(b) Liquid—Petroleum, Power alcohol.

(c) Gaseous—Coal gas, producer gas, water gas.

8. *Light* : Laws of — Reflection in plane mirrors—Periscope and Kaleidoscope—Reflection in concave and convex mirrors (No quantitative relationship) Uses of concave and convex mirrors—Measurement of the focal length of a concave mirror—Refraction through rectangular glass slab, water and prisms.—Deviation and dispersion of light.—Elementary idea of critical angle and total internal reflection. Formation of rainbow.

9. *Lenses* : Convex and concave—focal length—of convex lens—determination—formation of images by a convex lens—Use of lenses.—Simple magnifying glass—spectacle lens.—defects of the eye.—Camera—projector—telescopes (astronomical and terrestrial)—Binocular—compound microscope.

10. *Magnetism and Electricity* : Cells—primary cell and batteries—connection of cells in series and parallel.

11. Effects of electric current—(a) Magnetic effect ; Making of temporary and permanent magnet ; The electromagnet and uses ;—Telegraphy ;—Galvanoscope.

(b) Heating effect ; Electrical heaters and fuses.

(c) Chemical effect—Electrolysis—Electro-plating, Electro typing, Making of gramophone records. Extraction of aluminium, purification of gold, etc.

(d) Lighting effect : Filament and vapour lamps. Fluorescent lamps and arcs.

12. Electrical units—Volt, Ohm, Ampere—their relation.

Electric power—Watt and K.W.H.—Candle power.

13. Electrical Induction—The induction coil—Work of Faraday—A.C. and D.C. Dynamo—and Motor. Production and distribution of electricity in large scale. Elementary treatment—Transformers. The telephone—and the microphone. Bell's—Elementary treatment of broadcasting.

14. Energy — Potential, kinetic — Transformation of energy—Conservation of energy.

15. Sound—Sound-vibrations—Music and noise—Resonance—Musical instruments—Stringed, wind and percussion.

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OXFORD UNIVERSITY PRESS

LETTER BOX

HIGHER STUDIES IN HINDI

Sir,

With a view to give stimulus to higher studies in Hindi, it has been decided to depute 30 students from Madras State to Hindi Parangat Vidyalaya, Agra to undergo the course of study of 'Parangat' (B.A.) and 'Sikshana Kala Praveen' (B.T.). This course is recognised by the Ministry of Education, Government of India. Selected students will be given a monthly stipend of Rs. 40/- for one year from 1-4-1957. Minimum qualification for admission is a pass in 'Hindi Visharad' and S.S.L.C. or Matriculation. After completing the course successfully, the students are eligible for admission in B.Lit. Degree course in Agra University.

Application should be sent to the Director, All India Hindi Parishad, Vijayanagar Colony, Agra, through the Secretary, Hindi Prachar Sabha, Tiruchirapalli.

S. R. SASTRI, M.A.,
Secretary, Dakshina Bharat Hindi
Prachar Sabha, Tamil Region.

Sir,

The latest enhancement of pay to Secondary Grade teachers in Elementary schools has not only failed to benefit the experienced hands but also lowers them in the eyes of others. An experienced teacher with 25 or 30 years of meritorious service will draw Rs. 53/- and a new entrant who is lucky to get into the 6th standard as teacher, will draw Rs. 50/- from 1956, November. Can any one rest contented with this difference of Rs. 3/- for his 30 years of sincere service?

There is another injustice in fixing the pay of these teachers. The inspecting offices have been directed to assess the new scale of Rs. 50/ to those handling standards 6th to 8th and Rs. 45/- to others. There are a few schools where experienced Secondary Grade teachers are handling lower standards while new entrants take up higher standards as they had not been

financially affected in any way. Now that the new rule benefits the new one without respecting the service of the other, naturally, the position of the heads of such schools will be difficult.

In order to obviate the injustice and ensure harmonious working in schools, the Government would do well to give the difference of Rs. 10/- to those who handle higher-standards along with their scale of Grant. The new scale of pay should be granted to as many teachers as there are sections in the Higher standards in the school according to their seniority. This will, in course of time entail the managements to fix the teachers in the standards according to their seniority in the school.

N. VENKATACHALAM

Kulasekharapatnam.
4-2-'57.

Sir,

My attention has been drawn to the statement referring to the Cambridge Examinations conducted by this Syndicate on pages 393 and 394 of the interesting special number of your Journal dated July and August 1956 (Vol. XXIX Nos. 7 & 8) :- "This examining authority has recently decided to withdraw the examination from India, thus creating a void which has at once to be filled up." This statement is incorrect, since the Syndicate has not taken such a decision, and I think you may be glad to be able to correct it in your next issue. It is intended that the present School Certificate shall be replaced by an Indian School Certificate, in conducting the examination for which the Syndicate will work with the advice, guidance and assistance of a Council in India representing the different types of schools which take the examination and the education authorities interested in these schools.

J. L. BRERETON,
General Secretary,
University of Cambridge
Local Examination Syndicate.
5-2-'57.

THE SOUTH INDIA TEACHERS' UNION

EXECUTIVE BOARD

A meeting of the Executive Board of the South India Teachers' Union was held at 2 p.m. on Saturday the 16th March 1957 in the premises of the Union at Raja Annamalaipuram, Madras. Sri T. P. Srinivasavaradan, President of the Union, presided.

The following members were present :—

Messrs. S. Natarajan (Ex-President), C. Ranganatha Aiyengar (Journal Secretary), L. Mariapragasam (Treasurer), E. Venkatesalu (Coimbatore), A. V. Ranga Rao (Tiruchirapalli), D. Sebastian (Ramanathapuram), T. P. Gopalakrishna (North Arcot), D. Narasimhachari (North Arcot), P. R. Swaminathan (South Arcot), S. Ramiah (Tanjore), S. Subba Rao (Salem), A. S. B. Philip (Tirunelveli), A. T. Doraiswamy Iyengar (Chingleput), K. M. Ramaswamy Gounder (Coimbatore), M. N. Mahadevan (Tiruchirapalli), Srimathi Saraswathi Srinivasan (Vice-President) and Sri V. Arunajatai (Secretary).

Letters expressing inability to attend the meeting were received from :—

1. Sri P. Govinda Rao (Vice-President).
2. Sri H. Visweswaran (Tirunelveli).
3. Sri K. M. Sundaram (Tanjore).

The minutes of the last meeting were taken as read and recorded.

The President made the following statement :—

1. Representation was made to the authorities that till educational reorganisation proposals were finalised, the position of Sanskrit Pandits should not be affected and the order fixing the minimum strength should be held in abeyance and the present state should be allowed to continue.

2. The Government Order on special additional pay and increased dearness allowance at first created some confusion. The subsequent G.O. clarified it by stating that the special pay related to teachers in lower elementary and higher elementary schools and dearness allowance to teachers in middle schools, high schools, colleges, etc.

3. There was a growing recognition on the part of the government that teachers should be placed on a par with the Non-Gazetted Officers so far as dearness allowance was concerned.

4. Sri T. S. Avinashilingam Chettiar has consented to preside over the Annual State Educational Conference and the dates would be fixed in consultation with him.

5. The Science Seminar conducted by the S.I.T.U., was attended by 35 teachers belonging to four districts. The report of the Science Seminar would be published in the next issue of the South Indian Teacher.

The Executive Board offered its felicitations to Mrs. Saraswathi Srinivasan, a Vice-President of the Union, on her being selected under the Fulbright Scholarships Scheme to visit America on study tour.

The Executive Board offered its felicitations to Dr. R. M. Alagappa Chettiar and Dr. S. R. Ranganathan on the distinctions recently conferred on them by the President of the Indian Union. The Executive Board expressed thanks to the authorities for giving financial aid to the Union for the purpose of conducting the Science Seminar.

The representatives from the various districts reported that still some local bodies and aided managements had not given the additional dearness allowance of Rs. 5 granted by the government. It

was represented that the term "half the expenses on dearness allowance would be paid as grant to institutions working at a deficit" required clarification. The president said that the educational authorities had given him the clarification that schools which had their approved expenditure (items 1 to 6 of the financial statement of the Grant-in-aid Code) above the fee income calculated at standard rates for eight instalments were all deficit schools. All schools at present in Madras State are deficit schools. The Board resolved to request such of the local bodies and aided managements as have not yet given the additional dearness allowance of Rs. 5 to teachers, to give it without any delay. The Board further resolved to request the government to pass immediate orders for the payment of the further additional dearness allowance of Rs. 7 from 1st March 1957.

The Board resolved that the 47th Madras State Educational Conference to be held at Tiruvannamalai should as usual be divided into four main sections, namely, 1. Primary and Basic Education, 2. Secondary and Technical Education, 3. University Education and 4. Organisation, Administration and Teacher-Education section, and in addition there should be conferences of Elementary School Teachers, Headmasters and Class-room teachers. It was suggested that a symposium on "Educational Standards" should also be organised.

The Executive Board decided to request Dr. S. R. Ranganathan to deliver the Sabhesan Memorial Lecture at the time of the State Educational Conference.

Committees were constituted to prepare the programme of the sectional conferences as follows:—

(i) Primary and Basic Education section: Mrs. Saraswathi Srinivasan (Convener) with Sri K. Arunachalam of Periyanaickenpalayam and the lecturers in Basic Education of the Meston Training College, St. Christopher's Training College and the Lady Willingdon Training College as members.

(ii) Secondary and Technical Education section: Sri E. Venkatesalu of Coimbatore (Convener) with Sri S. Venkataramanan (Peelamedu), Sri T. P. Gopalakrishna (Polur), Sri P. R. Swaminathan (Annamalainagar), and Sri L. Mariapragasam (Madras) as members.

(iii) University Education section: Prof. E. N. Subramaniam (Convener) with Prof. R. Krishnamurthi (Madras), Sri P. Doraikannu Mudaliar (Karai-kudi), and P. R. Krishnamurthy (Coimbatore) as members.

(iv) Organisation and Teacher-Education section: Sri V. Antoniswamy (Convener), Sri T. V. Arumugam, Sri T. N. Sundaram and Sri M. N. Vadivelu Mudaliar as members.

(v) Elementary School Teachers' Conference: Sri D. Sebastian of Karai-kudi (Convener), with Sri A. V. Ranga Rao and Sri G. Jayanathan and Sri N. Venkatachalam Iyengar as members.

(vi) Headmasters' Conference: Sri C. M. Fazalur Rahman of Pernambat (Convener) with Sri T. N. Sundaram and Sri M. Raja Iyer and Sri S. Subbaraman as members.

(vii) Class-room Teachers' Conference: Mr. A. S. B. Philip of Tinnevely (Convener), with Sri S. Subba Rao, Sri T. S. Rajagopala Iyengar and Sri V. B. Murthy as members.

It was decided that the Working Committee in consultation with the Reception Committee should fix up the Chairman for each section.

The Executive Board decided to recommend to the General Body the following amendment to Rule 5 of the Union.

Add—

"And the Administrator of the S.I.T.U. Benevolent Fund shall be an ex-officio member of the Executive Board and the Working Committee."

The Executive Board took the decision to conduct between September and

December 1957 Seminars on the Teaching of Tamil, Mathematics and Social Studies and for this purpose to divide the districts into three zones as follows:—

First Zone—Madras, Chingleput, South Arcot and Tanjore for Seminar in the Teaching of Tamil Language.

Second Zone—North Arcot, Tiruchirapalli, Salem, Coimbatore and the Nilgiris for Seminar on Mathematics.

Third Zone—Madurai, Ramanathapuram, Tirunelveli and Kanyakumari for Seminar on Social Studies.

The Executive Board decided that the S.I.T.U. should take steps to organise these Seminars and should address the authorities concerned for the purpose.

The Executive Board resolved to form a provisional Reception Committee for the conduct of the 32nd All India Educational Conference consisting of the Members of the Executive Board of the Union and the Presidents and the Secretaries of the District Teachers' Guilds with the Secretary of the S.I.T.U. as the Convener for the purpose of making arrangements for holding the All India Educational Conference in December 1957.

The Board further resolved to seek the aid of the Central and State Governments for the conduct of the Conference and for organising an Educational Exhibition along with the Conference.

The Executive Board passed the following resolutions:—

"The Executive Board of the South India Teachers' Union authorises the Secretary, Sri V. Arunajatai or the President, Sri T. P. Srinivasavaradan, as the case may be, to encash the National Savings and other certificates and

government bonds and the fixed deposit even before their dates of maturity.

It also authorises the Secretary to raise a loan on the mortgage of the S.I.T.U. Building for the purpose of providing amenities to the new premises."

Sri S. Natarajan appealed to all the members of the Executive Board to use their influence and time to collect funds for the building, now that the teachers were getting an increased dearness allowance. He also suggested the purchase of the land in front of the proposed building from the Life Insurance Corporation, with a view to expansion in the future.

It was resolved to take steps to form the Kanyakumari District Teachers' Guild and get it affiliated to the Union.

The Board resolved to take steps for the formation of a Federation of Teachers' Organisations in South India.

The Secretary was authorised to open correspondence for the meeting of Secretaries or representatives of teachers' organisations of the neighbouring States, at Tiruvannamalai at the time of the State Educational Conference.

The Board sanctioned an amount not exceeding Rs. 100/- for the portrait of Sri E. H. Parameswaran to be unveiled at the Tiruvannamalai Conference.

Earlier the Board expressed its deep sense of sorrow at the sudden demise of Sri P. S. Kumaraswami Raja who was the Chief Minister of Madras for some years and of Sri B. G. Kher who was connected with the A.I.F.E.A. The members stood for two minutes in silence as a mark of respect to their memory.

With a vote of thanks proposed by the Secretary the meeting terminated.

17-3-1957.

V. ARUNAJATAI,
Secretary.

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NEWS AND NOTES

MELVISHARAM

The School Day celebration of the Islamiah High School, Melvisharam was celebrated on Monday the 18th February, 1957 at 2-30 p.m. under the presidency of Sri S. V. Chittibabu, M.A., B.T., Principal, Government Teachers' Training College, Katpadi. There was a variety entertainment by the pupils. Reports on the activities of the Literary and Athletic Associations were then presented. Prizes were distributed for proficiency in studies and games.

MUSLIM HIGH SCHOOL, ABIRAMAM

Almost all the school numbering about 425 pupils and 23 Teachers (except the girls) went on an outing to the Newly Developed Town of Peraiyur nearly eight miles from Abiramam by walk. The party started at 6 a.m. (on 14-2-1957) from the school grounds in Houses under the Leadership of the Teachers in charge of them. They marched through the streets of Abiramam and reached Anaiyur on their way at 7-15 a.m. where the party had its breakfast. The people of the locality cheered the pupils for such an outing in such a large number.

The party then proceeded to Peraiyur and reached the Campsite at 9-30 a.m. Every arrangement was being made for the opening of the camp (by the advance party) at 10 a.m. Sri Srinivasa Nadar, President, Panchayat Board, presided over the function. Mr. Anna Ganapathiraman, Headmaster of the Basic Training School, Peraiyur declared the camp open and Mr. Moses, M.B., B.S., of the local Government Hospital hoisted the National Flag. There was a large gathering of visitors, the elite of the village, the pupil teachers of the Training School and the pupils of the High

Schools and Elementary Schools. On behalf of the village, the president of the Panchayat Board extended a warm welcome to the campers.

The evening session commenced at 2 p.m. in the Higher Elementary School compound. The pupils entertained the large audience (i) with their one act play—Election Stunt, (ii) Jean Val Jean—in Hindi, (iii) A dance by a 10 year old girl, (iv) The difference between Town and Village life (a play) and (v) Folk Dance (Oyil).

HINDI TEACHERS' REFRESHER COURSE AT OOTY.

Sri S. R. Sastri, M.A., Secretary, Dakshina Bharat Hindi Prachar Sabha, Tamil Region, writes:—

It has been decided to conduct a Hindi Teachers' Refresher Course at Ootacamund, Nilgiris, during ensuing summer—May, 1957.

Only qualified Hindi Teachers working in recognised High Schools in the Madras State and Hindi Pracharaks working in the Hindi Premi Mandals are eligible for admission. In the course, lectures will be delivered on the subjects of Pedagogy—such as principles of education, method of teaching language in the modern scientific psychological basis, comparative study of Hindi and South Indian languages and literature. Practical and demonstration Hindi class also will be conducted.

Prospectus and application form to join the course may be had by applying to the Hindi Prachar Sabha, Tiruchirappalli.

S. R. SASTRI,
Secretary.

OUR BOOKSHELF

EDUCATION IN PRACTICE : by S. Bala krishna Joshi. (Little Flower Co. Price Rs. 3-12-0).

This excellently got up book of 230 pages is the outcome of years of experience of Sri S. Balakrishna Joshi as teacher and headmaster in one of the City institutions—the Hindu Theological High School—which has already attained a name in the educational world of India.

The beautiful and flowing language of the author adds charm to the book.

The twenty-six subjects dealt with are the talks, lectures, addresses or articles which Sri Joshi had given or contributed on several occasions. Very few people preserve their talks or addresses in the written form. Mr. Joshi has therefore laid the educational world under a deep debt of gratitude to him for making his rich experience and valuable thoughts available to the profession and the public.

The twenty-six subjects are again classified under four main unified heads, viz., Education, Teacher, Activities and Random Reflections. The chapters 'Religious Training in schools', 'Teacher-Parent Cooperation', 'Citizenship Training' and 'Education—a synthesis', are particularly commended.

The book will make a very valuable and useful addition to every library (school or public) and will serve as a good stimulant to a bored teacher.

1. THE EMPIRES OF THE SUN : 2. THROUGH ANCIENT LANDS : by Forbes MacGregor. (Thomas Nelson & Sons, Edinburgh. Price 2 sh. each.)

These two books are numbers 7 and 8 in the series Fresh Field Geography Readers the first six of which we have reviewed in the earlier issues of this journal.

On the same lines are written these two books for the primary schools. Book 7 deals in an informal way with the geography of the tropical regions, viz., Africa and West Indies. Book 8 covers in the same way, India, China and South America.

GROUP THOSE INFANTS : by Grace Fleming. (Thomas Nelson and Sons, Edinburgh. Price 2 sh. 6 d.)

This book written by an experienced teacher in infant method is intended to help teachers in organising an approach to group methods. In the early chapter consideration is given to the social, physical and intellectual development of children attending school for the first time and this is followed by a helpful explanation on methods of selection for group teaching, including detailed suggestions for the materials required for use in the teaching of the three R's covering the first two years in the infant school. The book is delightfully illustrated with annotated diagrams.

THE SCHOOL TEACHERS : by Asher Tropp. (William Heinemann, Ltd., London. Price 21 sh. net.)

This neatly got up and illustrated book of 286 pages gives a historical account of the teaching profession—the largest professional group in England and Wales. It is also a study of the ways in which they have been recruited and trained, their conditions of employment, their position in the social structure and their professional associations, how the teachers have struggled to elevate their professional status and won freedom from excessive state control and gained a position of self-government and independence. Their increasing influence and importance as a professional group are reflected in the many educational ideas incorporated in the legislation. Thus the National Union of Teachers has become "the

mightiest lever of education reform". The book will be valuable to all those seeking guidance on educational policy and practice.

SRI SANKARACHARYA SWAMIGAL : (in Tamil) by S. Balakrishna Joshi.

This booklet is a free publication by T. B. Mehta & Sons, Madras-3 of the Tamil translation of the English address delivered by Sri S. Balakrishna Joshi on the occasion of the 61st birthday celebrations of the Swamiji in May 1954. Copies were distributed free during the recent Golden Jubilee celebrations of the accession of the Swamiji to the peetam.

RECENT DEVELOPMENTS IN EDUCATION: by Dr. S. M. Hunashal. (Ramashraya Book Depot, Dharwar, Mysore. Price Rs. 3.)

The book of 176 pages divided into 27 chapters deals with a discussion of the latest trends in educational methods and theory. The author's observations on many of these problems are based upon nationalisation of education, technical content, progressive education and the necessity to preserve the best in the Indian heritage of the ancient system of education. It is a useful book for school libraries.

GENERAL KNOWLEDGE (SAMANYA GNANAM IN HINDI), Books I and II : by Jagadishachandra Jain. K. & J. Cooper, Bombay. Price 6 as each).

These are very good books for children in their first year of learning Hindi.

OUR STORIES (HAMARI KAHANIYAM IN HINDI), Book I : by Jagadishchandra Jain. (K. & J Cooper, Bombay. Price 10 As.)

These stories selected from Jataka stories of Budhistic literature are useful and interesting to children. The book contains 23 stories with illustrations.

List of publications received and acknowledged with thanks :

1. World Alamanac and Book of Facts, 1956.—71st year of issue—a complete reference library in one volume. (U. S. I. S.)
2. Teacher-Education, Vol. I No. 2. (All India Council for Secondary Education).
3. Books for Asian Children—New UNESCO compilation—Review of UNESCO publications, No. 351.
4. U.S.S.R. in 1960.
5. Training of Engineers in U.S.S.R
6. On overcoming the cult of the individual and its consequences (Tass).
7. Commonwealth—Today, No. 48.

C.R.

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G. O.'S. AND REPRESENTATIONS

Rules Supplement dated 20-3-1957
DEPARTMENT OF HEALTH, EDUCATION
AND LOCAL ADMINISTRATION
(Education)

Amendments to rules relating to
Provident Fund for teachers in
non-pensionable service.

(G. O. Ms. No. 357, Education,
25th February 1957)

S. R. O. No. C-28 of 1957.

The following amendments to the
rules relating to the Provident Fund for
teachers in non-pensionable service
is published :—

Amendments

In the said rules —

(i) in sub-rule (i) of rule 6, after
the words “or attains the age of sixty
years”, the following shall be inserted,
namely :—

“or, when in service after attaining
the age of fifty-five years, expresses a
desire for closing the account” ;

(ii) in rule 10—

(a) in the opening paragraph,
after the words “or on his attaining the
age of sixty years”, the following shall
be inserted, namely :—

“or, when he continues in service
after attaining the age of fifty-five
years, at any time when he expresses a
desire for closing his account” ;

(b) in clause (a) after the
words “and applies for closure of his
account” the following shall be insert-
ed namely :—

“or, who when continuing in
service after attaining the age of fifty-
five years expresses his desire in writ-
ing for the closure of his account” be-
fore the end of the tenth year from the
date of admission to the scheme”.

V. RAMASWAMI,

Deputy Secretary to Government.

7

PROCEEDINGS OF THE DIRECTOR OF PUBLIC INSTRUCTION

SRI N. D. SUNDARAVADIVELU, M.A., L.T.,
RC. No. 84 D4/57 dated 16-3-'57.

Sub : Dearness allowances — Addi-
tional Dearness Allowance — Payment
to certain categories of teaching and
non-teaching staff in aided secondary
Schools—Admissibility for purposes of
aid.

Read : Director's Proceedings RC
No. 376 P & DI/56 dated 1-2-1957.

In para 2 of G.O. Ms. No. 2276 Educa-
tion, dated 29-12-'56 it is ordered that
managements of aided educational
institutions under the control of the
Director of Public Instruction including
Middle Schools, High Schools, Colleges
etc., are permitted to pay with effect
from 1-11-'56 D.A. at the revised rates
sanctioned in G.O. No. 1734 Finance
dated 3-11-'56 to all members of the
teaching and non-teaching staff who
are not eligible for the special addi-
tional pay sanctioned in G. O. No. 1985
Education dated 31-10-'56. The expen-
diture incurred will be taken into ac-
count in assessing the teaching grants
payable to the institution which worked
at a deficit.

A question has now been raised
whether there is any difference in
treatment between the Dearness Allo-
wance that is now paid and the addi-
tional Dearness Allowance that is now
proposed, in the matter of assessment
of grants. The Managements of Schools
may be informed that there is no de-
viation in the existing procedure for
assessment of Dearness Allowance
grant and that the entire Dearness
Allowance including the increased
Dearness Allowance as per G.O. No.
1734 Finance dated 3-11-'56 will be
taken into account and half the expen-

diture will be sanctioned as Dearness Allowance grant as usual.

S. MD. USMAN,

For Director of Public Instruction,
True Copy/Forwarded/By Order

Sd.

SUPERINTENDENT

Letter No. U/2678, dated the 24th March 1957, from Sri T. P. Srinivasavaradan, President, the South India Teachers' Union, to Sri R. A. Gopalaswamy, I.C.S., Secretary to the Government of Madras, Health, Education and Local Administration Department, Fort St. George, Madras-9.

Sir,

SUB.: Dearness allowance — further increase from 1st March 1957 — to be given effect to teachers also — orders requested.

A press note published on the 24th February 1957 announced the government's decision to pay to all its employees drawing up to Rs. 300/- per month, a sum of Rs. 12/- per month as dearness allowance more than what they had been paid prior to 1st November 1956. It was further announced that that decision would take effect from 1st March 1957 and would apply also to all employees of local bodies as well as teachers under local board and or private aided management in that salary group.

From 1st November 1956 teachers have been drawing additional dearness allowance ranging from Rs. 5 to Rs. 7. The further increase decided upon will benefit them ranging from Rs. 5 to Rs. 7, so that their total additional dearness allowance may be Rs. 12 per month more than what they were paid prior to 1st November 1956.

The Union thanks the Government for sanctioning the additional dearness allowance. Unless the private managements and the local bodies receive communication from the Government

through the Director of Public Instruction, they will not grant this additional dearness allowance. The Director will issue proceedings only on receipt of an order from the Government.

May I request you to be good enough to see that early orders are passed so that the teachers under local bodies and private aided managements may draw this further increase in the dearness allowance as early as possible.

Thanking you,

Yours faithfully,

(Sd.) T. P. Srinivasavaradan.
President.

GOVERNMENT OF MADRAS

Abstract

Education—Educational institutions—Aided and local body—Teaching and non-teaching staff—Rates of dearness allowance—Revised.

HEALTH, EDUCATION AND LOCAL ADMINISTRATION DEPARTMENT

G.O. Press No. 571, Education, dated the 2nd April 1957.

Read:—

G.O. No. 1985, Education, dated 31-10-1956.

G.O. No. 2276, Education, dated 29-12-1956.

G.O. No. 185, L.A., dated 2-2-1957.

G.O. No. 381, Finance, dated 13th March 1957.

ORDER

The Government direct that the rates of dearness allowance payable to teachers in elementary schools including basic schools under all managements (aided, local body and Corporation of Madras) who were allowed the benefit of the special additional pay sanctioned in G.O. No. 1985, Education, dated 31st October 1956, be revised as below, with

effect from 1st March 1957 (i.e., pay for March 1957, payable in April 1957)—

rates which they were drawing prior to the transfer of that area to this State.

(By Order of the Governor)

R. A. GOPALASWAMY,
Secretary to Government.

ANNEXURE

Particulars of rates of dearness allowance admissible from 1st March 1957.

Pay Group	Rate per mensem
	Rs.
Pay not exceeding Rs. 20 ..	23
Pay exceeding Rs. 20 but below Rs. 40 ..	25
Pay of Rs. 40 ..	28
Pay exceeding Rs. 40 but not exceeding Rs. 60 ..	29
Pay exceeding Rs. 60 but not exceeding Rs. 100 ..	31

The rate of dearness allowance should be calculated with reference to the pay in each case excluding the special additional pay sanctioned in G.O. No. 1985, Education, dated 31-10-1956. The additional expenditure involved will be met by the Government. The expenditure will be debited to the relevant sub-heads under "37. Education".

2. In respect of the aided educational institutions other than elementary schools and basic schools under the control and supervision of the Director of Public Instruction including special schools, middle schools, high schools, Anglo-Indian schools, colleges, etc., the managements are permitted to pay, with effect from 1st March 1957 to all members of the teaching and non-teaching staff who were not allowed the benefit of the special additional pay sanctioned in G.O. No. 1985, Education, dated 31-10-1956, dearness allowance at the rates sanctioned for Madras Government Servants as specified in the annexure to G.O. No. 381, Finance, dated 13-3-1957, which is appended to this order. The additional expenditure incurred will be taken into account in assessing the teaching grants payable to the institutions on the basis of one-half of the expenditure actually incurred on payment of the allowance.

3. The staff employed in the educational institutions in the Kanyakumari district will until further orders continue to draw dearness allowance at the

Pay Group	Rate per mensem
	Rs.
1. Government servants on pay not exceeding Rs. 20 ..	30
2. Government servants on pay exceeding Rs. 20 but below Rs. 40 ..	31
3. Government servants on pay of Rs. 40 ..	33
4. Government servants on pay exceeding Rs. 40 but not exceeding Rs. 60 ..	34
5. Government servants on pay exceeding Rs. 60 but not exceeding Rs. 100 ..	36
6. Government servants on pay exceeding Rs. 100 but not exceeding Rs. 200 ..	17½% of pay plus an additional sum of Rs. 20.
7. Government servants on pay exceeding Rs. 200 but below Rs. 270 ..	17½% of pay plus an additional sum of Rs. 18.

NOTE:—Others drawing over Rs. 200 but below Rs. 205 will be allowed to draw dearness allowance at the rate applicable to Group 6 if they find it more advantageous.

8. Government servants on pay of Rs. 270 per mensem and above but not exceeding Rs. 300 per mensem ..	63
9. Government servants on pay exceeding Rs. 300 per mensem but not exceeding Rs. 340 per mensem, Non-gazetted ..	65
Gazetted ..	17½% of pay.

NOTE :—Gazetted officers drawing over Rs. 300 but below Rs. 305 will be allowed to draw dearness allowance at the rate applicable to group 8 if they find it more advantageous.

Unmarried government servants on a pay of Rs. 250 per mensem and over and all government servants on pay exceeding Rs. 340 per mensem will draw dearness allowance at the rates hitherto in force, viz.,

Married Government Servants.

1. Government servants on pay exceeding Rs. 340 but not exceeding Rs. 400 :—

(a) Non-gazetted.— $17\frac{1}{2}\%$ of pay plus an additional sum of Rs. 5 per mensem.

(b) Gazetted.— $17\frac{1}{2}\%$ of pay provided that members of the I.A.S. and the I.P.S. shall be paid Rs. 70.

2. Government servants on pay exceeding Rs. 400 but not exceeding Rs. 500.—Rs. 70.

3. Government servants on pay exceeding Rs. 500 but not exceeding Rs. 750.—Rs. 85.

4. Government servants on pay exceeding Rs. 750 but not exceeding Rs. 1,000.—Rs. 100.

5. Government servants on pay exceeding Rs. 1,000.—The amount by which the pay falls short of Rs. 1,100.

Unmarried Government Servants.

- (a) Government servants on pay of Rs. 250 and over but not exceeding Rs. 1,000.—Ten per cent of pay subject to a maximum of Rs. 75 provided that the I.A.S. and the I.P.S. shall be paid a minimum of Rs. 40.

- (b) Government servants on pay exceeding Rs. 1,000, but not exceeding Rs. 1,075.—The amount by which the pay falls short of Rs. 1,075.

The above G.O. Press No. 571, Education was communicated to all aided educational institutions by the D.P.I. in his Pro. Rc. 1878 B-7/56), dated 9-4-1957.

Representation made on 4th April 1957 by Sri T. P. Srinivasavaradan, B.A., L.T., M.L.C., President, The South India Teachers' Union, to the Secretary to the Government of Madras, Health, Education and Local Administration Department, Fort St. George, Madras-9.

Sir,
SUB: Schools — Secondary — Aided 1957-58 — Compensation on account of fee concession to poor children — payment — orders issued — Request for revision of the orders.

Ref.—G.O. Ms. No. 549, Education, dated 28th March 1957.

In the above Government Order it is stated that the managements of aided secondary schools will be paid compensation for the income lost by them on account of the concession sanctioned in G.O. No. 926, Education, dated 19th May 1955 during the school year 1957-58 on the basis of the rates of fees levied by them during 1955-56.

Since June 1955, many things have taken place. In G.O. Ms. No. 2276, Education, dated 29th December 1956, the Government permitted the managements of aided educational institutions to pay with effect from 1st November 1956 additional dearness allowance at the revised rates, ranging from Rs. 5 to Rs. 7 a month, sanctioned in G.O. No. 1734, Finance, dated 3rd November 1956 to all members of the teaching and non-teaching staff. The order further stated that the expenditure incurred will be taken into account in assessing the teaching grants and the grant will be limited to one-half of the expenditure. Again the Government issued a press note in February 1957 granting a further increase of Rs. 7 in the dearness allowance from 1st March 1957. This interim relief has been extended to teachers also.

The following comparative statement gives the dearness allowance before 1st November 1956, from 1st November 1956 to 28th February 1957 and from 1st March 1957 :—

	D. A. before 1-11-1956 Rs.	D. A. from 1-11-1956 to 28-2-1957 Rs.	D. A. from 1-3-1957 Rs.
1. Employees on pay not exceeding Rs. 20/-	18	25	30
2. Employees on pay exceeding Rs. 20/- but below Rs. 40/-	19	25	31
3. Employees on pay of Rs. 40/-	21	26	33
4. Employees on pay exceeding Rs. 40/- but not exceeding Rs. 60/-	22	27	34
5. Employees on pay exceeding Rs. 60/- but not exceeding Rs. 100/-	24	29	36
6. Employees on pay exceeding Rs. 100/- but not exceeding Rs. 200/-	$17\frac{1}{2}\%$ of pay plus an additional sum of Rs. 8/- per mensem	$17\frac{1}{2}\%$ of pay plus Rs. 13/- per mensem	$17\frac{1}{2}\%$ of pay plus Rs. 20/- per mensem
7. Employees on pay exceeding Rs. 200/- but not exceeding Rs. 300/-	$17\frac{1}{2}\%$ of pay plus an additional sum of Rs. 6/- per mensem	$17\frac{1}{2}\%$ of pay plus Rs. 11/- per mensem	
8. Employees on pay exceeding Rs. 200/- but below Rs. 270/-	do	do	$17\frac{1}{2}\%$ of pay plus Rs. 18/- per mensem
9. Employees on pay of Rs. 270/- but not exceeding Rs. 300/-	do	do	Rs. 65/-
10. Employees on pay of Rs. 300/- but not exceeding Rs. 400/-	$17\frac{1}{2}\%$ of pay	$17\frac{1}{2}\%$ of pay plus Rs. 5/- per month	$17\frac{1}{2}\%$ of pay plus Rs. 5/- per month

It will be seen from the above comparative statement that the dearness allowance that is to be paid from 1st March 1957 exceeds that paid before 1st November 1956 by Rs. 12. If this additional dearness allowance of Rs. 12 is paid to each member of the teaching and non-teaching staff, and if the Government grant is limited to half the expenditure, then the other half to be borne by the managements. This additional increase in the dearness allowance represents roughly an increase ranging from $66\frac{2}{3}\%$ to 50% of the dearness allowance incurred before 1st November 1956 in the case of those getting Rs. 100 and below per month and about 30% to 25% in the case of those getting above Rs. 100.

Since the Government grant is limited to one half of the expenditure on this additional dearness allowance, the managements can meet the other half only by raising the school fees in general or by a special levy to meet the increased commitment on the additional dearness allowance. In view of this additional expenditure, not contemplated in 1955-56, the Government should revise their order which states that the compensation for the loss of fee income would be fixed on the rates of fees levied in 1955-56.

There are three courses open to the Government. One is that they should bear the entire cost of the additional dearness allowance of Rs. 12. The

second is to pay compensation at the rates to be levied by the managements in 1957-58 so that the extra fee income may be just sufficient for the managements to meet their share of expenditure. The third is to permit the managements to levy a special fee on all pupils including fee concession holders just to cover their part of the expenditure.

The managements would find it difficult to pay this additional dearness allowance with the income derived from the rates of fees levied in 1955-56. Since it is the desire of the Government that the teachers also should get this additional dearness allowance of Rs. 12, one of the above courses may be adopted.

It may be pointed out that teachers in government institutions and those in local bodies will get the benefit of this additional dearness allowance of Rs. 12. All teachers in elementary schools will get this additional sum of Rs. 12 since the Government have taken the full liability. The only group of teachers to which this half grant applies are those employed in aided secondary, middle and Anglo-Indian schools. Their number together with the non-teaching staff may not exceed 8,000. With the exception of about 8,000 teachers in aided secondary, middle and training schools, all the rest numbering about 1,20,000 employed in schools under government management, local bodies and aided managements of elementary schools will immediately get the benefit of Rs. 12.

As suggested above, in case the Government are not prepared to pay the full expenditure on this additional dearness allowance of Rs. 12, they should agree to pay compensation according to the revised rates in 1957-58 which the managements may have to adopt to meet their share of expenditure on the additional dearness allowance or permit the managements to levy a special fee, just to cover their part of the expenditure on this additional dearness allowance.

It is requested that early orders may be passed so that the teachers may get the benefit as early as possible and the managements may announce sufficiently early to the pupils the increase in the fees.

Thanking you,

Yours faithfully,

(Sd.) T. P. Srinivasavaradan,
President.

GOVERNMENT OF MADRAS

Abstract

Schools — Secondary — Aided —
1957-58—Compensation on account of
fee concession to poor children — Pay-
ment — Orders issued.

HEALTH, EDUCATION AND LOCAL ADMINISTRATION DEPARTMENT.

G.O. Ms. No. 549, Education, dated
the 28th March 1957.

Read :—

G.O. No. 926, Edn., dated 19th May
1955.

G.O. No. 1904, Edn., dated 28th
November 1955.

G.O. No. 495, Edn., dated 17th May
1956.

From the Secretary, Madras State
Aided Secondary School Mana-
gements Association, Madras-
5, dated 16th March 1957.

Order

The Government direct that the managements of aided secondary schools be paid compensation for the fee income lost by them on account of the concession sanctioned in G.O. No. 926, Education, dated 19-5-1955, during the school year 1957-58, on the basis of the rates of fees levied by them during 1955-56. If the fees levied during 1957-58, are lower in any particular case, then the actual rates of fees levied will be taken as the basis for compensation.

The compensation grant will be paid in instalments and in the manner approved in G.O. No. 1904, Education, dated 28-11-1955.

(By Order of the Governor)

R. A. GOPALASWAMI,
Secretary to Government.

To the Director of Public Instruction,
Madras-6.

To the Accountant General through
Finance Department.

To Sri A. Kalyanaraman, Accountant-
General, Madras.

Copy to the President, South India
Teachers' Union, Madras-28.

Copy to the Secretary, The Madras
Aided Secondary School Manage-
ment Association, Madras-5.

(True copy)

Forwarded.

(By Order)

(Sd.) K. Balagopalulu
Superintendent.

THE S. I. T. U. BUILDING FUND

The following contributions have been received and acknowledged with
thanks :—

	Rs.	A.
Previous total brought forward	..	1,890 9
The Principal, Beschi College, Shenbaganur, Madura Dt.	..	50 0
The Masters' Associations, S.K.P.D. Schools, G.T., Madras	..	60 0
Sri T. P. Srinivasavaradan, Headmaster, Hindu High School, Triplicane, Madras	..	26 0
The President, Teachers' Association, R.C.T. High School, Annamalainagar, South Arcot district	..	25 0
Sri S. Natarajan, Ex-President, S.I.T.U., New Delhi	..	10 0
Sri T. P. Srinivasavaradan, President, S.I.T.U., Madras	..	5 0
Smt. Saraswathi Srinivasan, Vice-President, S.I.T.U., Madras	..	5 0
Sri C. M. Fazalur Rahman, Headmaster, Islamiah High School, Pernambat, N.A.	..	5 0
Sri T. S. Rajagopala Iyengar, Hindu High School, Triplicane, Madras	..	5 0
The Secretary, Teachers' Association, Islamiah High School, Pernambat, N.A.	..	44 0
The Secretary, Madras Catholic Educational Council, Catholic Centre, Madras	..	250 0
The Secretary, Teachers' Association, Board High School, Thally, Salem	..	6 0
The President, Teachers' Association, Zamindar's High School, Turaiyur, Trichy	..	15 0
The Secretary, Teachers' Association, C.A.M. High School, Kondanoor, Ramnad	..	7 0
The President, Teachers' Association, Board High School, Polur, North Arcot	..	15 0
Mr. G. J. Jayanathan, Neela South Street, Nagapattinam, Tanjore	..	5 0
Total	..	2,423 9

THE XLVII MADRAS STATE EDUCATIONAL CONFERENCE

Draft Resolutions.

I. This Conference resolves to request the Government to extend the Pension Scheme to all categories of teachers irrespective of the agencies they serve, taking into consideration their total services.

II. Resolved to request the Government to provide loans to teachers for constructing houses from the L.D. Scheme.

III. Resolved to request the Government to provide loans to teachers pension sanctioned in Government order for those who have already retired from service.

IV. Resolved to request that the free educational concessions may be extended to the children of teachers of all categories in secondary schools.

V. Resolved to request the Government to raise the age of retirement of teachers to sixty in respect of all teachers serving under private managements, local bodies and government.

VI. Resolved that the Government should take immediate steps to bring into force the scales of pay of teachers as suggested by the South India Teachers' Union.

VII. At present there are numerous government orders regarding the fixation of scales of pay of Pandits. This creates great confusion to managements, teachers and officers. This conference resolves that the Government should issue a circular consolidating all the G.O's regarding the same.

VIII. This conference requests Government to grant railway concession without undue delay to teachers attending educational conferences and meetings and also to teachers undertaking educational tours.

IX. This Conference requests that House Rent Allowance be granted to teachers living in towns.

X. This Conference requests that free medical aid be given to all teachers in aided schools.

XI. In schools under aided managements, for assessment of grant, government scales of pay are allowed in the case of certain categories of teachers, and local body scales in the case of other categories of teachers, such as, Craft Instructors and Physical Directors. This disparity leads to discontent. This conference urges the Government to remove this disparity and allow government scales of pay for purposes of grant.

THE SOUTH INDIA TEACHERS' UNION

ANNUAL GENERAL BODY MEETING NOTICE

The annual General Body meeting of the South India Teachers' Union will be held at 8 a.m. on Friday, the 17th May 1957 in the Conference Hall at Tiruvannamalai. Members are cordially invited to attend.

Agenda.

1. To consider and adopt the Annual Report for the year 1956-57.
2. Election of Office-bearers for the year 1957-58.
3. Amendments to the Rules of the Union:

Under Rule 5, on page 7, line 3, after the words 'Ex-Presidents of the S.I.T. Union' the following words shall be inserted:—
"and the Administrator of the S.I.T.U. Benevolent Fund".

4. Any other business that may be brought forward by the Executive Board.

V. ARUNAJATAI,
Secretary.

T. E. SANTHANAM,
Joint Secretary.

1st April 1957.

☞ "There are numbers of books of essays and letters on the market which are badly written and full of mistakes of spelling, grammar and idiom. If reliable models are not used or recommended by the teacher, the pupils are likely to resort to such books, to their own damage and hurt."

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Principal, Islamia College, Peshawar

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EXTRACTS FROM THE PREFACE

The object of this little book is to supply students with a number of model essays and letters on a variety of subjects. Example is better than precept; and the best way to teach a pupil the art of essay-writing and letter-writing, is to show him by examples how it is done. No amount of theory can take the place of practice; and the inculcation of rules of composition will have little effect upon the pupil's mind, unless he is shown by reliable models how these rules can be carried out. The careful study of a few model essays will give him more insight into the art of essay-writing than any number of lessons on the theory.

Many teachers, however, object to this method, because they are afraid that their pupils will be tempted to learn the model letters and essays by heart, in the hope that they will get the same subjects in their examination papers. No doubt there is this danger, but it is one that can be guarded against by a wise teacher.

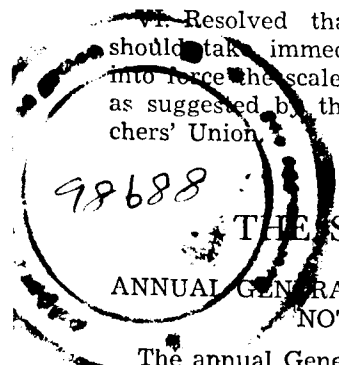
Even if students do resort to cramming, they are not likely in this case to do themselves much real harm. Language is learnt by imitation; and a good way of learning how to arrange words and sentences is by learning passages of good English by heart.

Lastly, it is not a question of models or no models, but of good models or bad models. There are numbers of books of essays and letters on the market which are badly written and full of mistakes of spelling, grammar and idiom. If reliable models are not used or recommended by the teacher, the pupils are likely to resort to such books, to their own damage and hurt. No example at all is better than a bad example; but a good example is better than either.

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