

BUREAU OF EDUCATION, INDIA

**Report of the Scientific Terminology
Committee of the Central Advisory
Board of Education in India, 1940, to-
gether with the decisions of the Board
thereon.**



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PREFACE.

At the sixth meeting of the Central Advisory Board of Education held at Madras in January 1941, the Right Hon'ble Sir Akbar Hydari presented the report of the Scientific Terminology Committee, of which he was the Chairman. The Board adopted the recommendations of the Committee subject to the following modifications :—

- (a) No. II (ii) in the Main Conclusions and Recommendations should be deleted. The great majority of the members present were of opinion that the adoption of this recommendation would introduce an unnecessary complication since the legitimate aspirations of modern Indian languages in this respect could be satisfied under (iii) which, as the Chairman pointed out, did not preclude the adoption of new words formed and evolved in accordance with the traditions and genius of a people as distinct from neologisms invented, as it were for their own sake. Rajkumari Amrit Kaur recorded her dissent from the decision of the Board.
- (b) The two main groups into which Indian languages may be divided should be Sanskritic and Perso-Arabic instead of Hindustani and Dravidian as suggested by the Committee.
- (c) The words 'Mathematical propositions and questions' occurring in recommendation No. V. and in para. 12 (a) in the report to be changed to 'Mathematical processes and formulæ'.

ANNEXURE I.

AGENDA FOR THE SCIENTIFIC TERMINOLOGY COMMITTEE OF THE CENTRAL
ADVISORY BOARD OF EDUCATION IN INDIA.

1. To consider whether a common scientific terminology should be fixed for India as a whole, and if so, whether the main and common part of such a terminology should be borrowed extensively from the English terminology.

2. To consider whether every Indian language should have three main divisions in its scientific terminology consisting of—

- (a) the main English terminology which will practically be the common terminology for all-India;
- (b) the terminology peculiar to the language; and
- (c) Sanskrit or Perso-Arabic terminology, adopted or coined, according as the language is Sanskritic or Dravidian, or Urdu, Pushto or Sindhi.

3. To consider whether standard terminologies should be fixed for the various scientific subjects such as Mathematics, Anatomy, Physiology, etc.

4. To consider whether the Central Advisory Board of Education should set up a permanent Board of Reference whose views would ultimately be accepted by all educational authorities and organisations.

5. To consider any other matter that may be raised at the meeting.

ANNEXURE II.

(a) MEMORANDUM PLACED BEFORE THE CENTRAL ADVISORY BOARD OF EDUCATION IN INDIA AT ITS MEETING HELD IN MAY 1940, ON THE SUBJECT OF ADOPTION OF A UNIFORM SCIENTIFIC TERMINOLOGY FOR INDIA.

The question of adopting a uniform scientific terminology for regional languages has been engaging the attention of the Government of Bombay for sometime past. They accordingly asked Mr. B. N. Seal, I.E.S., their Deputy Director of Public Instruction, to prepare a note on the subject. That Government have now forwarded a copy of the note prepared by that officer, and desire that the question should be taken up by the Central Advisory Board of Education in order that a common scientific terminology acceptable to the whole of India may be evolved. The Government of Bombay are prepared to take up this work in so far as Marathi, Gujarati and Kannada are concerned.

2. A copy of the letter from the Government of Bombay together with a copy of the note prepared by Mr. Seal, in which the proposed scheme is fully explained, is appended for the information of the Board. For the sake of convenience the main features of the scheme are given below:—

- I. That a common scientific terminology should be fixed for India as a whole;
- II. That the question of an all-India scientific terminology should, in the first instance, be referred to an authoritative all-India body;
- III. That the main and common part of the scientific terminologies to be devised for the principal Indian languages should be borrowed extensively from the English terminology;
- IV. That every Indian language should have the following three main divisions in its scientific terminology, *viz.*—
 - (a) the main English terminology, which will practically be the common terminology for all-India,
 - (b) the terminology peculiar to the Indian language—a very small section,
 - (c) Sanskrit or Perso-Arabic terminology—comparatively small in number—adopted or coined, according as the language is Sanskritic or Dravidian or Urdu, Pushto or Sindhi;
- V. That standard terminologies should be fixed for the various scientific and humanistic subjects such as Mathematics, Anatomy, Physiology, Economics, Scientific Philosophy, Modern Logic, etc.;
- VI. That as soon as the tables of scientific terminology are settled, text books should be got written in the principal Indian languages for all grades of education and that all other terminology should be discouraged;
- VII. That it should be commended to the Provincial Governments that they should set up small representative committees of experts in their areas to take up the work of fixing and standardising the terminology under IV (b) above; and
- VIII. That the Central Advisory Board of Education should set up a permanent Board of Reference whose views must ultimately be accepted by all educational authorities and organisations.

3. The question of imparting education in India in all its grades through the medium of the Indian languages has assumed a great importance, and it is, therefore, considered desirable that the question raised by the Government of Bombay should receive the consideration of the Central Advisory Board of Education. The matter is accordingly placed before the Board for their consideration.

COPY OF LETTER No. 8671/F., DATED THE 23RD NOVEMBER, 1989, FROM THE GOVERNMENT OF BOMBAY.

SUBJECT:—*Adoption of uniform Scientific Terminology for regional languages.*

I am directed to state that the question of adopting a uniform scientific terminology for regional languages has been engaging the attention of this Government for sometime past. Mr. B. N. Seal, I.E.S., was asked to prepare a note on this question, a copy of which is appended. The Government of Bombay agrees with Mr. Seal that if a common Scientific Terminology acceptable to the whole of India is to be evolved, then the work should be undertaken by the Central Advisory Board of Education. I am accordingly to request you to move the Central Advisory Board of Education to take up this question.

2. I am also to state that this Government is prepared to take up the work so far as the following languages are concerned, *viz.*, Marathi, Gujarati and Kannada.

A NOTE ON THE QUESTION OF A UNIFORM SCIENTIFIC TERMINOLOGY FOR INDIA BY MR. B. N. SEAL, I.E.S., DEPUTY DIRECTOR OF PUBLIC INSTRUCTION, POONA.

1. A representative Committee of eminent scientific and technological experts with an intimate knowledge of the theoretical as well as the practical aspects of their respective subjects, can alone succeed in fixing a common scientific terminology which can be expected to be accepted by India as a whole. This Committee, it goes without saying, must be helped by a body of scholars in Sanskrit, Persian and Arabic. If the question of a scientific terminology for India is going to be solved on an all-India basis, with variations to suit regional needs, I think the Central Advisory Board of Education in India should be moved to take up this important problem, as in my opinion, it is the duty of that body to give an effective lead in such a matter. I will, however, go into certain general considerations which I hope will help to clear the issues. That our education in all its grades should be imparted through the medium of the Indian languages is today, almost a hackneyed statement and needs no reiteration. I doubt, however, whether many of those who advocate this policy understand its full and varied implications. Without the concurrent creation of the necessary literature for the teaching of all science subjects in our schools and colleges, the Indian languages cannot fruitfully be employed as the vehicle of instruction. All efforts in this direction are bound to be unsuccessful unless we consciously plan to achieve our ultimate objects. Some, no doubt, may think that it is the business of authors in general to devise and accept independently the necessary scientific terminology for the purpose of producing the appropriate literature. But I cannot share

the view. If this important work is left to private initiative and enterprise, it is more than likely that parochial views will come in the way of the cultural unification of India. I advocate, therefore, that the accepted terminology must be more or less on an all-India basis, and in the main that terminology should be the English terminology. I am suggesting later in this note that the Central Advisory Board of Education and the Provincial Governments should appoint the necessary committees in connection with this work. These committees, however, should not be given the option of adopting the policy of coining words of Sanskrit, Persian or Arabic origin except in a comparatively small percentage of the total number of scientific terms. I am aware that I shall be vehemently opposed in the view by a number of educational authorities in India, and yet I am convinced that this borrowing from a foreign tongue is not only necessitated by the circumstances of our complex educational problems, but it can also be defended on sound educational grounds.

2. This question of an Indian Scientific terminology cannot be settled by a small compact committee representing any particular language or locality. It has to be referred to an authoritative all-India body in the first instance, since, in my view no constructive proposals can possibly be forthcoming unless the question is examined from all its diverse aspects by competent persons.

3. I will, therefore, confine myself to certain general considerations, because I feel I am not competent to give expert advice in relation to all Science subjects, nor in relation to all Indian languages. I fully realise that many controversial issues can be raised in connection with this problem. In my considered opinion, however, the main and the common part of the scientific terminologies, which are to be devised for the principal Indian languages, should be borrowed extensively from the English terminology. In support of my views I give below certain arguments which will incidentally meet the usual criticisms that are levelled against the adoption of a foreign terminology in the body of the Indian languages:

(1) It may be maintained by some that the introduction of foreign words in the Indian languages is not in consonance with the sentiments of nationalism. To be frank, however, the very spirit of nationalism requires a uniform terminology to be used all over India as far as possible. The adoption of the English terminology will settle many a dispute between the pro-Sanskrit and pro-Perso-Arabic parties and will avoid the circumstance of having two entirely distinct and parallel terminologies. Modern science in every sense is a gift of the West, and it has been mainly developed in Western Europe during the last 300 years. I cannot understand how anyone could feel humiliated if he has to accept that science even in its native terminological garb. Knowledge is knowledge—Eastern or Western.

(2) It may be urged by linguistic authorities that foreign words, borrowed from any of the vernaculars of Europe, will spoil the 'sound' quality, and is to say, will mar the music and flow of our languages. This argument is, to a large extent, untenable because the majority of our Indian languages are rich in consonants and vowels, and therefore the imported foreign technical words will hardly cause any phonetic incongruities or consonantal discords, nor will they raise much difficulty by way of pronunciation. The transliteration of these foreign terms in Indian scripts

will be comparatively speaking an easy task and slight variations in the pronunciation should not be forbidden as long as the adapted words or terms remain recognisable.

(3) These foreign terms, some critics point out, will lack native linguistic associations. It is difficult to say what exactly is meant by such a statement. Undoubtedly the scientific terms of the European languages were mainly drawn from Latin or Greek sources by the pioneers of scientific discovery. These terms were chosen not because they were considered to have any sacred and hoary associations, but mainly because they were found convenient, specially in view of the fact that no living language in Europe possessed a wider or more varied vocabulary than that of Latin or Greek. We must not also overlook the fact that the classical languages were almost universally used as the main vehicle of expression by scholars in all European academies. Again, the associations around these terms that appear now to be so firmly established, have really been a matter of natural growth due to the wide and prolonged usage that they have enjoyed in the general scientific literature of modern Europe for centuries. This question of literary associations raises, I am well aware, number of interesting and knotty problems in linguistics, semantics, and the psychology of languages, but I do not wish to enter into a disquisition on these and other allied topics. The two important but somewhat unacknowledged principles relating to this matter are briefly—

- (a) The word 'beautiful' in any language acquires the associations of beauty.
- (b) Good grammar and language in current usage is mainly bad grammar and language of a preceding age. King's English is, therefore, often bad English in current usage. In other words all languages are forms of *apabhransha*.

(4) The foregoing observations are not strictly speaking relevant to the main subject under discussion. Until very recently pure scientific literature was hardly tested by aesthetic standards. It may be that fashions among scientific writers are changing and before long all jargons, scientific, administrative, or otherwise, will reach the same standard of literary excellence. We must not ignore our Hudsons and Whiteheads.

The importation of foreign words in any language should not be discouraged as long as such words do not interfere with the structure and syntax of that language. For instance, the English language has benefited by a steady influx of foreign words from all parts of the far-flung British Empire. Imperialism has thus not only enriched the Britisher materially by an extension of his territories but also intellectually by a similar enlargement of his vocabulary.

(5) It may be held by some interested parties that free competition among text-book writers is all that is required, and in course of time, this will lead to the unconscious acceptance of the very terminology that we are seeking to establish. This laudable procedure, I need only point out, will entail the labour of several generations of writers before any definite achievement is made possible. A *laissez faire* policy in this respect is nothing but the postponement of the solution of the problem to a future date.

4. Although I have maintained that our main terminology should be English I must not be understood to mean that I do not advocate any terminology from indigenous Indian sources. Before I can say as to which terms should be borrowed and which should have their Indian equivalents, it will be necessary to give a broad and somewhat unscientific classification of scientific terms which would enable us not only to see the complexity of our problems, but also to point out the way to solve a few of our difficulties. Broadly speaking, the main groups are—

(i) Names of concrete natural physical objects or phenomena (*viz.*, sun, moon, star, air, wind, water, lightning, thunder, echo, aurora borealis, earthquake, tree, grass, rose, stone, granite, mule, elephant, ant, vein, limb, metal, etc.). Such of these names as are easily available in any of the Indian languages should be accepted and the rest should be kept in their foreign forms.

(ii) Names of concrete physical objects or occurrent phenomena discovered by scientific analysis or investigation (*viz.*, proton, electron, positron, neutron, photon, Alpha particles, Beta ray, X-ray, cosmic ray, ion, atom, molecule, radium, hydrogen, argon, anthrax, sodium, chromosome, neuron, gene, vitamin, enzyme circuit, eclipse, tide, spectrum, nebula, binary stars, Cepheid variables, etc.). Such names should be kept, as a rule, in their foreign forms. There may be a few exceptions.

(iii) Names of concrete artificial (man made) objects, instruments, apparatus, machinery, engines, etc. (*viz.*, barometer, telescope, microscope, galvanometer, gramophone, radio, calorimeter, battery, cathode, anode, dynamo, Davy's safety-lamp, tube, cylinder, piston, valve, transformer, insulator, eccentric wheel, rudder, anvil, furnace, watch, clock, table, screw, nail, mirror, prism, hinge, bolt, nut, pin, needle, Zeppelin, etc.). Such names should be adopted in their foreign forms except where convenient Indian terms are already in current usage.

(iv) Conceptual or abstract names (ideas) as well as adjectival names; these are of two kinds for the purposes of our classification:—

(a) concepts, abstract ideas, qualities, properties, names of subjects of study and of scientific theories, etc., which are of scientific importance and which are to be found in any of the civilized languages of the world (*viz.*, force, centre, volume, weight, dimension, unit, resistance, velocity, heliocentric, number, rotation, speed, impact, nutrition, action, reaction, sensation, size, measurement, pith, resonance, frequency, undulation, oscillation, latitude, longitude, equinox, surface, liquid, solid, gaseous, charge, radiation, dispersion, wave-propagation, centre of gravity, lines of force, Algebra-Geometry, Mathematics, etc.). Such names must be accepted in their native forms (Sanskrit, Persian, Arabic or in any Indian language as required) and names of complex ideas may even be coined from these basic sources, wherever necessary and feasible.

(b) Concepts, abstract ideas, qualities, properties, names of subjects of study and of scientific theories, etc., which have been adopted or specially coined during the course of scientific investigation, particularly in the post-renaissance period. Most of these terms or names are of a highly technical nature and may not have any direct or obvious connection with concepts mentioned under (iv) (a) (*viz.*, momentum, horse-power,

erg-kilowatt, ampere, isobar, isotherm, thermodynamic potential, electromagnetic induction, electrolysis, atomic number, atomic weight, specific gravity, specific heat, valency, isotope, amorphism, diffraction, polarisation, achromatism, spectral lines, insulation, conductivity, radioactivity, dissociation theory, wave-mechanics, geodesics, principle of indeterminacy, photon, entropy, acceleration, corpuscular theory, metabolism atavism, recessive characters, electromagnetism, Astrophysics, Mechanics, Electrodynamics, Hydrostatics, Trigonometry, Bacteriology, Entomology, Biochemistry, etc.). Such terms, with few exceptions, should be retained in their foreign forms.

(v) Names of scientific principles, theories or laws associated with the names of their discoverers, inventors, etc. (*viz.*, Boyle's law, Hooke's law, Doppler's principle, Brownian movement, Ohm's law, Planck's quantum, Raman effect, Wassermann test, Lorentz transformation, Copernican Theory, Darwinian Theory, Lamarckism, Mendelism, etc.). Such names should be kept in their original forms.

(vi) Symbolic systems with their constituent concepts devised for expression and development of mathematico-scientific thinking on an exact basis, eliminating the employment of language as far as possible. Most of the symbols in such systems are non-linguistic or what has been termed in recent literature 'illustrative' or 'shorthand'. These systems as well as the symbols should be incorporated in Indian scientific literature, though minor modifications and adaptations of any easy and intelligible nature are to be allowed. (Examples: The major part of pure and applied mathematics, symbolic or mathematical logic, chemical formulæ and other hybrid pictorial methods of scientific exposition, etc.)

(vii) Names of units of weights and measures as well as of other units of scientific measurement (perceptual or conceptual) should be adopted wholesale. Some of these names fall within the scope of groups mentioned above.

(viii) Proper names naturally are proper names and cannot have equivalents.

From the above classification it will be apparent that we are committed to the adoption of any complicated system of accepted nomenclature, which is valuable for purposes of systematic scientific classification and description. (Linnean nomenclature, Anatomical nomenclature, Geological nomenclature, Chemical nomenclature, nomenclature of the British Pharmacopia, etc.)

5. I have deliberately abstained from any reference to verbs in my divisions of scientific terminologies but any body of experts who will tackle the general question will have to bear this in mind and suggest methods of adaptation.

6. It is hardly necessary to point out that the publication of dictionaries and glossaries of technical scientific terms in the Indian languages is useless unless the published terminology has been previously given the stamp of recognition. Terminologies of this kind (published or unpublished) can hope to acquire the requisite amount of importance only when they are uniformly forced upon the writers of scientific literature. It has been suggested in some quarters that teachers of science subjects can help materially in bringing about a standard Indian scientific terminology into currency by

means of oral teaching. This is a dangerous process. If the teachers are left free to introduce their own terminology to their own pupils, the prospect of the establishment of any uniform terminology will be greatly diminished. The resulting situation will become that of the Tower of Babel. In point of fact it is through the appropriate and recognised literature which is in constant use in educational institutions that any particular terminology can be effectively brought into usage and acceptance. Again the question of terminology cannot be taken up by stages of education, that is to say, we cannot attempt at first to evolve and standardise the terminology suited to primary education and then to secondary and still later to university education. This cannot be done compartmentally for the obvious reason that some technical terms embodying scientific concepts, which are to be fully explained in text-books meant for the secondary stage must find mention in text-books belonging to the primary stage, and also the terminology of the university stage will, to some extent, delve into the terminology of the secondary stage. The whole question has, therefore, to be thrashed out, and the sooner we do it the better, because once a particular terminology is adopted unthinkingly for use in text-books as well as in the class-room, it will be very difficult to have it modified or removed afterwards.

7. As soon as the tables of our scientific terminology are settled by accredited authorities, our first duty will be to get text-books written in the main Indian languages for all grades of education. Apart from getting text-books written for use in educational institutions, there is the larger and equally important question of the creation of suitable popular literature in all modern sciences written in a style and manner which are intelligible to the layman. This type of literature will exercise a beneficent influence on the mentality of our literate population, including the so-called educated public, and will ease the course of social reform and propaganda. I must point out that the popular literature of the kind I have in my mind will make copious use of the most modern and up-to-date scientific ideas and concepts which are attracting the attention of the contemporary scientific world. All the more therefore, the question of an Indian terminology cannot be taken by stages or compartmentally. Half-hearted tinkering with these problems will not improve matters, and it is more than likely that we shall have to plan out the completion of our scheme for the production of scientific literature within the space of not less than two decades. There is no room for local and narrow-minded solutions of our problems, and text-books written in non-recognised terminologies must be ruthlessly weeded out. In educational matters defective organisation is often much more deplorable than no organisation, to wit our present system of education.

8. One of the important considerations that has persuaded me to accept a foreign terminology in a major part is the fact that our students in scientific and technological subjects will have to go mainly to British and other European Universities for their advanced studies and research work. India cannot be brought to the forefront of the scientific world in a day. Without question, India has produced one of the world's greatest mathematicians in the present century. Ramanujan is only the beginning of India's modern career in pure science. Other eminent men of science have already appeared on the scene and are winning world reputation. Nevertheless many of our students will have to go abroad for higher technological and scientific training for some time to come. In my view they should, at

no stage of their education, be forced to discard any considerable part of the terminology which they will have learnt in India, and be taxed with the learning of thousands of new terms in a foreign tongue. We should, therefore, see that our students may not have to waste their mental energy in learning, unlearning, and relearning different sets of terms. The proposed predominantly English terminology will have many other advantages. The poorest boy in the village will be able to go up to the university and will not feel himself cut off from the higher spheres of education. There should not be, under any condition, two brands of education, one Indian and meant for the poor and depressed country folk, and the other Europeanised and meant for the urban population and affluent classes. Further it should be borne in mind that a large number of Indian students will be trained in advanced and research work in the Science and Technological Colleges of this country, and they will have to keep themselves abreast of the up-to-date and modern developments in their subjects, which are reported in the scientific journals and proceedings of learned societies. Most of these journals are and will be written in European languages, and therefore, a knowledge of the Indian terminology, if it is mainly English, will be not only extremely convenient but also very desirable. I fully realise that these research and advanced students will have to learn a European language (generally English), if their training is to be effective. The standard of quality of the knowledge of a foreign tongue that is required for such purposes is easily attainable. As an example I might mention the ease with which professors of scientific subjects are being exchanged between different European countries. This is possible because the main scientific terminology is tending to become uniform all over Europe. Science is universal, so should be the scientific terminology within limits. Professor J. B. S. Haldane rightly observes: "Science is an international concern. Any paper on pure science becomes the property of the whole world the moment it is published, and the special scientific terminology so frequently termed jargon is, with all its faults, an international language. One can get the gist of a scientific paper in any European tongue, and even amid a wilderness of Japanese script one comes across cases of mathematical expressions, numerical tables, and chemical formulae."

9. Another point of interest is that, whether we like it or not, a number of English technological and scientific terms have already been accepted in our workshops, firms, yards, etc. Even the illiterate railway-workers, mechanics, motor drivers, fitters, etc., are at present well-acquainted with that part of English technological terminology which comes within the routine of their daily activities and avocations. We cannot drive out the English terminology from the life of these people by publishing literature in Indian terminology in the form of glossaries and dictionaries and text-books.

10. In my scheme the Sanskrit terms which should be adopted in our scientific terminology must be the same in most Indian languages. Similarly Perso-Arabic terms are bound to be adopted in such languages as Urdu, Pushto, Sindhi, etc. To put the matter in a nut-shell, every Indian language will have the following three main divisions in its scientific terminology:

(X) The main English terminology (practically the common all-India terminology).

(Y) The terminology peculiar to any of the Indian languages (a very small but variable section, each language having its own independent section).

(Z) (a) The Sanskritic terminology adopted or coined for all Sanskritic or Dravidian languages, of

(b) The Perso-Arabic terminology similarly adopted or coined for Urdu, Pushto, Sindhi, etc. (Both sections comparatively small, the Sanskritic section for one group of languages and the Perso-Arabic section for another).

N.B.—The X, Y and Z classes in respect of any given languages are mutually exclusive, although they need not be identical in extension with the three respective classes of any other language. I do not wish to enter into the further logical niceties of this division.

As and when Hindustani, in the form of a mixture of Hindi and Urdu, becomes current and is accepted as the common all-India language, the section (Z) relating to it will, as a matter of course, become a convenient component of (Z) (a) and (Z) (b) mentioned above.

The Indian parts of the terminology mentioned above must be fixed by bodies of experts. However, it should be borne in mind that ultimately the choice of these technical terms will be, to a certain extent, arbitrary. In Europe also the choice of the scientific terminology in current usage had been arbitrary, that is to say, the actual terms that are current today were fixed by scientific discoverers and thinkers according to their own imaginative likings. In India we cannot go through this natural process and gallantly propose to remake history. Without wholesale borrowing, the task of inventing our own terminologies will be of a stupendous magnitude, hardly realised by our scientific—or is it unscientific?—enthusiasts, and is beyond the capacity of the men available in India for this purpose. The time-clock cannot be pushed back, in spite of Einstein. Therefore our terminology must be determined mainly on the basis of what has already been achieved by the patient labour of generations of European Scientists. To think otherwise is pure obscurantism. A body of eminent Indian scientists is alone competent to undertake this task in close consultation with one another and they will have to indicate the general lines or principles upon which the work of fixing the different local terminologies is to proceed. They will have to recommend a hybrid terminology if they mean business, and a hybrid terminology it should be. There is no such thing as absolute perfection in these matters—Einstein vindicated!

11. I believe that the Central Advisory Board of Education will advise the local Governments to set up small representative committees in their respective provinces and to take up the work of fixing and standardising the different terminologies coming under (Y) of para. 10 based on certain general principles laid down by the Board. The work in connection with the fixing of the sections (X) and (Z) of para. 10 will require wider and more representative committees.

With regard to the common Sanskritic terminology mentioned in (Y) (a) of para. 10 it is probable that an inter-Provincial committee, helped by Sanskrit scholars, will be in a position to evolve an agreed terminology which will have the prospect of acceptance by Sanskritic India as a whole.

The Bombay University should be associated with the work of our Provincial terminologies. The Mysore University must also be consulted in the case of the Kannada terminology and the University of Nagpur in the case of Marathi. With regard to the Urdu terminology, we shall have

to seek the advice of the Osmania University, Hyderabad, the Muslim University, Aligarh, the Anjuman-e-Taraqqi-e-Urdu, Aurangabad, and the Jamia Millia Islamia, Delhi, and the final Urdu terminology evolved by these bodies and other authorities should be used by the Urdu-speaking population of India. Besides, this part of the work as has been hinted above in the case of Sanskritic terminology is not the concern of one province only.

Probably the Central Advisory Board of Education will find it necessary to set up a permanent Board of Reference whose views must ultimately be accepted by all educational authorities and organisations.

12. It is not possible to give anything like a complete list of the scientific and technological subjects for which we are in immediate need of technical terminologies. A tentative list may, however, be offered:—

1. Mathematics.
2. Astronomy.
3. Physics.
4. Engineering.
5. Some of the main branches of technological subjects.
6. Chemistry.
7. Geology.
8. Botany.
9. Zoology.
10. Anatomy.
11. Physiology.
12. Hygiene.
13. Geography.
14. Psychology, etc.

The list suggested above will have to be revised and modified by experts who have a first-hand knowledge of the actual and immediate needs of our country. It is almost certain that other branches of pure and applied science than those mentioned in the list will deserve our attention. For instance, the whole of medical and veterinary science.

In this connection it may be mentioned that there is also a necessity for fixing standard terminologies for the following more or less humanistic subjects:—

1. Economics.
2. Political science.
3. Anthropology.
4. Sociology.
5. Modern logic.
6. Scientific philosophy.

13. One more point; and that is that the scheme adumbrated in this note may be sent to the Honorary Visitors of the Royal Institute of Science, Bombay, for remarks and criticisms.

EXTRACT FROM A LETTER No- 11/2457, DATED THE 10TH FEBRUARY 1940, FROM THE PRINCIPAL, ROYAL INSTITUTE OF SCIENCE, BOMBAY.

Scientific Terminology—Adoption of uniform—for regional languages.

With reference to the correspondence ending with your letter No. 711-C of 7th February 1940, on the subject mentioned above, I have the honour to say that so far only two out of the four Honorary Visitors have replied. Their opinions are as under:—

(i) *Dr. S. S. Bhatnagar, Director, University Chemical Laboratories, Lahore.*

"I agree whole-heartedly with the suggestion of Mr. Seal and shall be glad to do whatever I can in the materialisation of his suggestions."

(ii) *Dr. Birbal Sahni, Professor of Botany, University of Lucknow.*

"It is apparently a very thoughtful document, containing many valuable suggestions."

* * * * *

8. *The Srishti Dnyan Association* is endeavouring to compile similar collections in other branches of science—Botany, Zoology, Chemistry, Mathematics and Medicine; but the work is considerably handicapped for want of finances.

4. It can be seen from the published articles that the views expressed therein are almost identical with those expressed by Professor Seal.

LETTER FROM THE GOVERNMENT OF BOMBAY, No. 6671-F., DATED THE 24TH APRIL 1940, WITH ENCLOSEURE.

Scientific Terminology—Adoption of uniform—for regional languages.

In continuation of this Department letter No. 6671-F., dated the 1st April 1940, on the subject noted above, I am directed to forward herewith 2 copies of the letter dated the 13th March 1940, from Professor G. Mathai, which contains his views on Mr. Seal's note on Scientific Terminology. The views of the fourth Honorary Visitor are still awaited.

COPY OF LETTER, DATED THE 13TH MARCH 1940, FROM PROFESSOR G. MATHAI, GOVERNMENT COLLEGE, LAHORE.

I have to thank you for sending me a copy of 'A Note on the question of a uniform Scientific Terminology in India' by Mr. B. N. Seal, I.E.S., which I have now read with much interest.

If it is finally decided that higher education (at College and University) and research publications in India are to be in the vernacular, it will be advisable to have a common Scientific Terminology. But it seems to be a complicated question to settle whether the Terminology should be taken from any of the European Languages (classical or modern) or from languages in India. Personally, I am doubtful, if higher scientific teaching and research can be properly carried on in India in any language other than English. It will certainly be helpful, if this general question is discussed by the Central Advisory Board of Education in India in the first instance.

I am sorry for the delay in replying, which was solely due to pressure of other work.

(b) EXTRACT FROM THE PROCEEDINGS OF THE FIFTH MEETING OF THE CENTRAL ADVISORY BOARD OF EDUCATION IN INDIA HELD IN MAY 1940 (PARAGRAPHS 16).

* * * * *

16. *Item 14.*—The question of adopting a uniform scientific terminology for regional languages has been engaging the attention of the Government of Bombay for sometime past. They accordingly asked Mr. B. N. Seal, I.E.S., their Deputy Director of Public Instruction, to prepare a note on the subject and forwarded a copy of it with a request that the question should be taken up by the Central Advisory Board of Education in order that a common scientific terminology acceptable to the whole of India might be evolved. The matter was placed before the Board for its consideration. The Note prepared by Mr. Seal had been previously circulated to its members. The main features of the scheme contained therein are given below:—

- (i) That a common scientific terminology should be fixed for India as a whole;
- (ii) That the question of an all-India scientific terminology should, in the first instance, be referred to an authoritative all-India body;
- (iii) That the main and common part of the scientific terminologies to be devised for the principal Indian languages should be borrowed extensively from the English terminology;
- (iv) That every Indian language should have the following three main divisions in its scientific terminology, *vis.*:—
 - (a) the main English terminology, which will practically be the common terminology for all-India,
 - (b) the terminology peculiar to the Indian language—a very small section,
 - (c) Sanskrit or Perso-Arabic terminology—comparatively small in number—adopted or coined, according as the language is Sanskritic or Dravidian or Urdu, Pushto or Sindhi;
- (v) That standard terminologies should be fixed for the various scientific and humanistic subjects such as Mathematics, Anatomy, Physiology, Economics, Scientific Philosophy, Modern Logic, etc.;
- (vi) That as soon as the tables of scientific terminology are settled, text books should be got written in the principal Indian languages for all grades of education and that all other terminology should be discouraged;
- (vii) That it should be commended to the Provincial Governments that they should set up small representative committees of experts in their areas to take up the work of fixing and standardising the terminology under iv (b) above; and

- (viii) That the Central Advisory Board of Education should set up a permanent Board of Reference whose views must ultimately be accepted by all educational authorities and organisations.

While expressing itself in favour of uniformity in the matter of adopting scientific terminology for regional languages in India, the Board felt that the purpose in view could best be attained by following the English terminology. In order, however, that the question may be examined in detail the Board decided to appoint the Committee named below, with power to co-opt:—

1. The Right Hon'ble Sir Akbar Hydari, LL.D., President of His Exalted Highness the Nizam's Executive Council, Hyderabad State. *Chairman.*
2. The Hon'ble Diwan Bahadur Sir K. Ramunni Menon.
3. Mr. S. C. Tripathi, I.E.S., Director of Public Instruction, Orissa.
4. Mr. W. H. F. Armstrong, I.E.S., Director of Public Instruction, Punjab.
5. Dr. Sir Zia-ud-Din Ahmad.
6. Pandit Amaranatha Jha, Vice-Chancellor, Allahabad University.
7. Dr. U. M. Daudpota, M.A., Ph.D., Director of Public Instruction, Sind.
8. The Educational Commissioner with the Government of India.

The Committee's report when submitted will be examined by the Board.

* * * * *

(c) NOTE BY THE DIRECTOR OF PUBLIC INSTRUCTION, HYDERABAD, ON THE SUBJECT OF ADOPTION OF A UNIFORM SCIENTIFIC TERMINOLOGY FOR INDIA.

The issues raised in the note prepared by Mr. B. N. Seal on the subject of a uniform scientific terminology for India are as important as they are controversial. There can be no two opinions on the question of adopting a common scientific 'terminology' provided one is clear in one's mind as to what, exactly, is meant by 'terminology'. Mr. Seal does not seem to be very clear on this point, and as he has himself admitted in paragraph 4 of his note, his classification of the terms which should be imported into the Indian languages in their present form is "broad and somewhat unscientific".

Mr. Seal's note does not disclose any knowledge of the great work of compiling technical terms in *Hindustani* on which the Osmania University has been working for the last 20 years. A study of the methods followed at the Bureau would have been helpful in clearing some of the misunderstandings which Mr. Seal seems to entertain.

The question as to whether the English terminology used in scientific books should be retained in translations, and if so to what extent, was

examined in the Osmania University as far back as 1920, and the University Council in its meeting held in May 1920, passed the following resolutions:—

- (a) Resolved that in view of the immense difficulties with which the evolution of a complete system of indigenous nomenclature is beset, and the facilities accruing from the use of international nomenclature in the prosecution of research and further study in other branches of learning like Medicine, Engineering, etc., it is advisable at present to adopt the latter;
- (b) That the international terms used be written both in English and in Urdu in the body of the text;
- (c) That the international formulæ and symbols be adopted; and
- (d) That the movement for coining Urdu equivalents be kept up, and that the co-operation of learned bodies outside the State should be solicited so as to evolve a common nomenclature.

In the light of the principle laid down in the resolution quoted above, technical terms used in the Osmania University translations have been divided into the following three groups:—

- (i) Nomenclature,
- (ii) Notation,
- (iii) Terminology.

Words coming under group (i) are not translated, but are incorporated in their English form. Thus names of Elements and their compounds, names of gases in Chemistry, and the names of phylum, classes, orders, genus and species in Biology are treated as international and retained in their original forms.

Words coming under group (ii)—Notation—belong mostly to mathematics. These symbols and abbreviations are translated like the full terms of which they are the symbols.

Under group (iii)—Terminology—are included all those scientific words which are either names of phenomena, properties, processes, apparatus, etc., or such terms as Heat, Light, Electricity, Sound, Magnetism which have connotations in common language also. These words form by far the largest part of scientific vocabulary, and have necessarily to be translated if a student has to understand scientific thought in his own language.

The above is the only scientific classification, for purposes of translations, that has ever been attempted in any Indian language, and experience at the Bureau and the lecture-rooms of the Osmania University has proved beyond doubt that it is the only sound method, consistently with the policy of imparting instruction in the highest Arts and Sciences of the West, through the medium of an Indian language. This experience will prove invaluable in any attempt that is contemplated to form an All-India Terminology.

To take some examples from the classification suggested by Mr. Seal (para. 10 of his note), if we are to retain terms such as 'spectrum', 'nebula', 'prism', 'valency', 'conductivity', 'radio-activity', etc., in their original English form, what shall we do with their derivatives such as 'spectral', 'spectroscope', 'spectrometer', 'nebulous', 'prismatic'.

'prismatically', 'monovalent', 'di-valent', 'conductive', 'conductor', 'conductiveness', 'radio-active', etc. Experience at the Osmania University has shown that where a technical term has a number of derivatives, it is always not only desirable, but also necessary, to translate it in order to express properly the different shades of meanings of the derivatives. This becomes all the more necessary where a technical term is also used in ordinary language.

The Osmania University has always been liberal and open-minded in its handling of the scientific terms. It has never allowed sentimental considerations of the kind mentioned by Mr. Seal (paragraph 3 of his note) such as "national vocabulary" or "beauty of sound" or "native linguistic associations" to stand in the way of its determination to transfer the highest thought of the West into Hindustani. Nevertheless, it is felt that the adoption of Mr. Seal's classification of terms which should be borrowed exclusively from the English vocabulary, would militate against the very purpose which it is intended to serve, namely, that of disseminating scientific knowledge through the medium of the Indian languages. Nearly 80 per cent. of the technical terms used in scientific text-books fall under the category of terminology as defined above, and to retain them in their original English form would mean, in effect, the retention of English as the medium of instruction.

Mr. Seal's suggestion (paragraph 11 of his note) that a permanent Board of Reference should be set up whose views must ultimately be accepted by all educational authorities and organisations is a valuable one. It should be one of the duties of this Board to decide, in the light of experience gained at the Osmania University, as to which category of terms should be incorporated into the translations in their present form and which should be translated.

A word about Mr. Seal's division of terminology mentioned in paragraph 10 (X, Y, Z) of his note. He has included Urdu in the Perso-Arabic group, which is only a half-truth. With all its verbs derived from the Brij Bhasha, and being a composite language, Urdu has a greater claim to be made a basis of terminology than any other language and the present technical terms coined at the Osmania University may well serve the purpose of an All-India terminology.

(d) COPY OF A LETTER No. 34997-B.-1, DATED THE 12TH SEPTEMBER 1940, FROM THE GOVERNMENT OF MADRAS, TO THE DEPARTMENT OF EDUCATION, HEALTH AND LANDS.

Reference: Your letter No. F. 10-10/40-C. A. B. (C), dated 23rd August 1940.

The first official attempt at producing lists of scientific terms in Indian languages was made in 1923 when this Government appointed a Committee for the purpose of compiling such lists in the four main languages of this Presidency. This Committee completed its work in 1931 and the lists made by them were printed at the Government Press. These lists have not been looked upon as complete nor have they received universal acceptance by scholars. The lists were not accordingly specially approved by Government for use in schools.

2. Owing to a decision taken by Government that as from the school year 1938-39 the use of the mother tongue as the medium of instruction should be begun in the IV Form of secondary schools and continued in successive years in the V and VI Forms, the question has now acquired added importance. In June, of this year the Government appointed a Committee of officials and non-officials for the purpose of settling the general principles on which a uniform system of standardised technical and scientific terms could be introduced in the Indian languages of this province. This Committee has just sent in its report. I am to forward a copy of this report and to add that the report is under the consideration of Government. The report is being published.

REPORT OF THE TECHNICAL TERMS COMMITTEE.

The Government in their Order No. Ms.-1051-Education, dated the 8th June 1940, appointed a Technical Terms Committee with the following terms of reference:—

- (1) (a) To what extent the equivalents of foreign technical terms in the South Indian languages which are now in use are acceptable for educational purposes;
 - (b) Whether it is desirable to retain for school purposes the use of English technical terms where there are no accepted equivalents in the South Indian languages;
 - (2) Whether in the alternative it is necessary to draw up new and standardised lists of equivalents of certain foreign technical terms for all the South Indian languages;
 - (3) What direction should be issued to publishing houses and authors in regard to the decisions arrived at on references (1) and (2).
2. The following were the Members of the Committee:—
1. The Rt. Hon. V. S. Srinivasa Sastri, P.C., C.H., M.L.C., (Chairman).
 2. Dr. C. R. Reddi, M.L.C., Vice-Chancellor, Andhra University.
 3. Mr. R. M. Statham, C.I.E., Director of Public Instruction.
 4. Mr. H. C. Stagg, Messrs. Macmillan & Co., Madras.
 5. Mr. A. Daniel, Headmaster, Christian College High School, Guntur.
 6. Sri T. Suryanarayana, Principal, Government Arts College, Rajahmundry.
 7. Vidwan G. J. Somayaji, Andhra University.
 8. A representative of the Madura Tamil Sangam; Sri T. C. Srinivasa Ayyangar, B.A., B.L., M.L.C.
 9. Sri N. Venkatarama Ayyar, Headmaster, Zamorin's College High School, Calicut.
 10. Sri T. Rama Pisharodi, Commercial Instructor, Government College High School, Mangalore.
 11. Miss C. L. Kausalya, Lecturer, Queen Mary's College, Madras.
 12. Sri Rao Bahadur M. C. S. Anantapadmanabha Rao, Retired Professor of Physics.
 13. Dr. Muhammad Abdul Huq, Principal, Government Muhammadan College, Madras.

14. Sri V. Rajagopala Ayyar, Headmaster, Board High School, Kollegal (Coimbatore).

15. Professor K. Swaminathan, Addl. Professor of English, Presidency College, Madras (Secretary to the Committee).

8. The Committee met in the Committee Room of the Legislature, Fort St. George, on Monday, 24th June, on Tuesday, 25th June and on Monday, 15th July 1940, éach day at 11 A.M., with the Rt. Hon'ble V. S. Srinivasa Sastri in the Chair.

4. Dr. C. R. Reddi was absent owing to ill-health on the first two days and Mr. T. C. Srinivasa Ayyangar was absent on the 25th June. All the members of the Committee were present on the 15th July.

5. The Committee had before it—

- (a) a confidential memorandum on Uniform Scientific Terminology for India by Mr. B. N. Seal, I.E.S., Deputy Director of Public Instruction, Poona, submitted to the Central Advisory Board of Education, Government of India, Delhi;
- (b) a memorandum on the Language of Science Subjects by Mr. G. R. Paranjpe, M.Sc., A.I.I.Sc. (Royal Institute of Science, Bombay);
- (c) a memorandum by Vidwan G. J. Somayaji, M.A., L.T., Andhra University.

6. All the Members of the Committee took part in the discussions which centred round the difficulties felt at present by pupils, teachers, publishers and examiners and the various methods for bringing about efficiency in teaching and uniformity in scientific terminology within each language and as between South Indian languages as a whole.

7. The Committee noted with gratification the proposal now before the Central Advisory Board of Education for introducing uniform scientific terminology for the whole of India to the extent it may be possible. If such an All-India terminology comes to be adopted, it would affect only the second class of words recommended by this Committee and it may be possible after a time to revise our lists so as to bring them into line with the rest of India.

8. The Committee also resolved to direct the attention of the various special committees to the developments in this direction in Travancore and Cochin for Malayalam, in Mysore for Kannada and in Hyderabad for Urdu.

9. The Committee resolved to submit to Government the following general principles on which a uniform system of standardised technical and scientific terms can be introduced in the South Indian languages:—

(i) The equivalents of foreign technical terms in the South Indian languages now in use in the lower secondary classes have mostly established themselves and are acceptable for educational purposes. Other terms which are current in the South Indian languages may also be adopted, such as the names of concrete natural (physical) objects or phenomena, like lightning, thunder, echo, earthquake, metal, limb, mule. This group of words may be peculiar to each of the South Indian languages.

(ii) It is necessary to draw up a standardised list of technical terms, common to all South Indian languages, for conceptual or abstract names and ideas, as for example, qualities, properties, names of subjects of study; force, centre, volume, nutrition, action, reaction, sensation, latitude, longitude, equinox, surface, liquid, solid, gaseous, rotation, algebra and geometry. These names may be based on Sanskrit elements for Dravidian languages and on Persian and Arabic for Urdu. This group will necessarily be small.

(Our colleague, Mr. Fisharodi is of opinion that for the first few years at least the practice may be adopted of enclosing within brackets the English equivalents of the technical terms under this category).

(iii) The remaining technical terms, not included in the two previous groups, will be bodily taken from English and transliterated into the South Indian scripts, accompanied wherever necessary by the original words in English script enclosed within brackets;

Provided however that candidates at examinations will be permitted to use, at their option, either the original forms in English or the transliterated forms or both.

(iv) In Mathematical and scientific books, Arabic numerals and the signs and symbols in use in English books are to be retained.

10. The Committee recommends to Government that a special committee be appointed for each one of the South Indian languages with power to co-opt members for different subjects to prepare lists of technical terms in each language in the light of the above principles. The Special Committee may in the first instance consist of five persons one of whom at least may be chosen from this Committee. Another Special Committee consisting of chosen members from each of the language committees may be appointed to frame the common lists referred to in resolutions (ii) and (iii) above.

11. When the various lists have been submitted by these Special Committees this Committee may be re-summoned for examining how far its recommendations have been followed and for making such revision of the terms as it may consider necessary.

12. When the lists have been finally adopted by this Committee it would be necessary for Government by order to prescribe them for use by the writers and the publishers of recognised text-books, by teachers in recognised schools and by examiners at public examinations.

13. While the use of the lists as finally passed by this Committee and approved by Government should be enforced by order of Government, the lists should be subject to revision and modification at stated periods, say five years, and by properly constituted authorities. This would enable a uniform and acceptable terminology to evolve in due course and at the same time would free pupils, teachers, authors and examiners from the distractions of rival systems.

14. The Committee is of opinion that instruction in English shorthand and English type-writing can only be given through the English language.

(Sd.) V. S. SRINIVASA SASTRI,
Chairman,
Technical Terms Committee.

APPENDIX III.

NOTE BY PANDIT AMARANATHA JHA, VICE-CHANCELLOR, ALLAHABAD UNIVERSITY.

Scientific Terminology in the Indian Languages.

The first attempt at organised work on Science in an Indian language was made in 1888 by Prof. T. K. Gajjar. The Baroda Darbar made for this purpose a grant of Rs. 50,000. In his report for 1891-92, while explaining why only 5 books had been prepared, professor Gajjar said:

“The reason why but few books were received at the end of the academic year seems to be the want of suitable words—the difficulty of coining appropriate technical terms..... The transference of European knowledge to this country involves the search and creation of adequate words to signify all kinds of European ideas”.

Then the Bangiya Sahitya Parishad did some useful work. The Nagari Pracharini Sabha of Benares next undertook to prepare a glossary. They kept before themselves the following principles:

1. Preference should be given to the common and current Hindi terms.
2. In the absence of appropriate Hindi equivalents:
 - (a) Certain appropriate terms existing in some of the prevalent vernaculars—Marathi, Gujarati, Bengali, and Urdu—should be used.
 - (b) Failing these
 - (i) The existing Sanskrit terms should be taken.
 - (ii) The English terms should be used.
 - (iii) Terms should be coined from Sanskrit.

This work, comprising 360 pages, was published in 1906, with the title “Hindi Scientific Glossary”, and included separate chapters dealing with Geography, Astronomy, Political Economy, Chemistry, Mathematics, Physics, and Philosophy.

A revised and enlarged edition of this was published by the Sabha during the years 1929—34. The Glossary on Physics was revised by Dr. N. K. Sethi, D.Sc., and covers 116 pages. That on Chemistry was edited by Prof. P. S. Varma and in 82 pages. The Mathematics Glossary was edited by Prof. S. D. Pande and extends to 138 pages. That on Astronomy has 85 pages. One on Electricity has 60 pages. These five subjects have thus been carefully dealt with in 431 pages.

In 1932 Mr. Daya Shankar Dubey of the Economics Department of the Allahabad University brought out a Glossary of Economic Terms, covering 148 pages and one of Political Terms, covering 174 pages.

The Vijnan Parishad of Allahabad has since 1915 been publishing a Scientific Journal every month in Hindi and has brought out a valuable collection of scientific terms.

There is next, the “Twentieth-Century English-Hindi Dictionary”, compiled by Mr. Sukhsampathirai Bhandari, and published by the Dictionary Publishing House, Ajmer. It contains terms of “Commerce,

Economics, Politics, Medicine, Anatomy, Physiology, Surgery, Midwifery Science, Astronomy, Mathematics, Botany, and Zoology". It devotes to Commerce and Economics 120 pages; to Politics 102 pages; to Medicine, Anatomy, Surgery and Physiology 294 pages; to Physics and Chemistry 216 pages; to Astronomy 17 pages; to Mathematics 14 pages; to Botany 14 pages; to Zoology 13 pages and to Law 72 pages—a big work altogether comprising 862 pages.

So far as I am aware this is the work achieved so far in Hindi on this subject.

In Bengali, the Calcutta University has published glossaries in Physics, Mathematics, Geography, Biology, Chemistry, and Health and Hygiene.

I am not aware of what has been done in Marathi and Gujrati, and the languages of South India. But, as may be expected, there is much similarity between the Bengali and Hindi Terms, and presumably these will also be easily comprehended by those who speak Marathi and Gujrati. Here are a few identical terms, selected at random from the glossaries of the Nagari Pracharini Sabha and of the Calcutta University:—

Abbreviation	Sankshepa
Addition	Yog
Angle	Kon
At par	Sam mulya
Complex	Mishra

In Urdu also much work has been done. In 1915, the Rifah-i-Am Press of Lahore brought out, on behalf of the Anjuman Taraqqi-i-Urdu, a book on Physical Geography, with an eight-page glossary of technical terms; in 1916, a Geological Glossary, also of 8 pages. The main achievement has been that of the Osmania University. It has brought out Urdu books on Practical Anatomy, Mensuration, Chemistry, Sound, Astronomy, Mechanics, Sketching and Mapdrawing, Logic, and numerous other subjects. It has for the most part drawn on Arabic for coining new terms. Here are a few examples:

Dislocation	الانفكاك
Natural Phenomena	آيات طبيعى
Eruption	التهاب
Jointed	في مفصل
Soil	تراض
Mixture	اختلاط
Hollow	مخروط
Curve	منحني
Function	كامل
Discovery	الاشاء
Diagram	اسيلة
Corresponding	متلاخر
Protection	تاييد
Joint Cost	مصروف مشترك
Gold Standard	معياريه

The Hindustani Committee, appointed by the Bihar Government, has, during the last month, sent round glossaries of Geographical, Geometrical, Algebraical, and Arithmetical Terms. They have attempted to discover or invent words which can be used both in Hindi and Urdu. Their endeavours are praiseworthy, although some of the terms recommended cannot possibly find favour with scholars (*e.g.* 'Horizon' is explained as 'Nazargher'; 'Local Time' as 'muqami waqt') and although Sanskrit and Persian words seem to have been used now here and now there to produce an impression of unity (*e.g.*, 'Figure' as 'shaql'; 'Diagram' as 'chitra'; 'Constant' as 'atal'; 'Inference' as 'natija'); and although, in the really crucial instances, they are forced to fall back on separate Sanskrit and Arabic words (*e.g.*, "alternando" is translated by 'Ekntaranupat' and 'Ekantarnisbat'; 'Quantity' by 'Rashi' and 'Miqdar'; 'Fraction' as 'bhinna' and 'kasar'; 'Fourth proportional' as 'chautha samanupat' and 'tan-sub'; 'Relative' as 'Sapaksha' and 'Izafi'; 'Magnitude' as 'pariman' and 'miqdar'; 'projection' as 'pras' and 'ta'abir'.

The Oxford University Press published in 1939, "A List of Technical Terms" in English, Urdu, Marathi, and Hindi. It covers more than 200 pages, and is in many ways illuminating. Here are some words; the Bengali equivalents are taken from the Calcutta University Glossary:—

English.	Urdu.	Hindi.	Marathi.	Bengali.
Algebra	Jabromuqabla.	Beejganit.	Beejganit.	Beejganit.
Antecedent	Muqaddam.	Purvapada.	Purvapada.	Purvapada.
Cube	Maka'ab.	Ghan.	Ghan.	Ghan.
Formula	Zabta.	Sutra.	Sutra.	Sutra.
Transposition	Tanqeel.	Pakshantara.	Pakshantara.	Pakshantara.
Arithmetic	Umulhisab.	Ankaganita.	Ankaganita.	Ankaganita.
Consequent	Tali nisbat.	Uttarapada.	Uttarapada.	Uttarapada.
Dividend	Maqsoom.	Bhajya.	Bhajya.	Bhajya.
Magnitude	Miqdar.	Pariman.	Pariman.	Pariman.
Negative	Munfi.	Rin.	Rin.	Rin.
Odd number	Tqadad.	Visham sankhya	Visham sankhya.	Visham sankhya.
Recurring	Kasar asharya.	Avartha.	Avartha.	Avartha.
Atmosphere	Kurra-e-bad.	Vayumandal.	Vayumandal.	Vayumandal.
Cattract	Jandal.	Jalprapat.	Jalprapat.	Jalprapat.
Anarchy	Adam hukumat.	Arajakta.	Arajakta.	Arajakta.

English.	Urdu.	Hindi.	Marathi.	Bengali.
Chancellor of the Exchequer	Diwan-i-Khalsa.	Koshadipati.	Koshadipati.	Koshadipati.
Epoch	Zamana.	Yug.	Yug.	Yug.
Amalgam	Malgha m.	Paradmishran.	Paradmishran.	Paradmishran.
Analysis	Tashrib.	Vishleshana.	Vishleshana.	Vishleshana.
Test Tube	Imtihaninali.	Parikshana-nalika.	Parikshana-nalika.	Parikshana-nala.
Assumption	Farziya.	Pramaya.	Pramaya.	Pramaya.

Thousands of other instances can be mentioned where the Hindi, Marathi, and Bengali terms are identical. I do not know if in Gujrati also they would not be acceptable. Urdu has gone to Arabic or Persian sources and the Urdu terms would not be understood in the areas where Hindi, Bengali, Marathi or Gujrati is spoken and written.

The principles on which the different institutions have worked in preparing their terms are as follows:—

1. *The Bihar Hindustani Committee—*

- (a) Scientific terms should be, as far as possible, drawn from current Indian sources, commonly understood, and not directly from Sanskrit, Arabic, or Persian, or any other language.
- (b) Failing, terms usually employed in scientific terminology in the West should be adapted to our requirements.
- (c) The two above methods failing, words from Sanskrit, Arabic or Persian may be used with equivalents (as now used in Urdu or Persian) printed in brackets, so that the learner may become familiar with both sets of terms.

2. *The Vijnan Parishad, Allahabad—*

- (a) To find out such Hindi words as can correctly express the meaning of the European terms.
- (b) Failing them, to find out such European technical terms as are already used in factories and technical institutions and firms, possibly in a modified and corrupt form.
- (c) Failing these, to coin new terms derived from Sanskrit, but effort should be made to prevent these becoming difficult.
- (d) If none but exceedingly difficult Sanskrit terms are available, European terms should be adopted.

8 *The Anjuman Taraqqi-i-Urdu, Aurangabad (in Dr. Abdul Haque's Preface to Farhang Istilahat-i-Ilmia)*—

- (a) Terms may be borrowed from all those languages which have contributed to Urdu, *vis.*, Arabic, Persian, Hindi, and Turkish.
- (b) When terms are borrowed from other languages they should conform to the laws of Urdu.
- (c) As far as practicable short rather than long terms should be preferred.
- (d) Such English terms as are already in use should be retained.

While scientific terms derived from Sanskrit will be intelligible to a very large proportion of Indians, it cannot be overlooked that an important section of the population will be more at home with words of Arabic or Persian origin. The attempt to compel either section to adopt one set of terms based either on Sanskrit on the one hand or on Arabic-Persian on the other will arouse bitter controversies. It is not possible that in all sciences all the terms can be derived from these sources. The attempt to confine newly-coined terms to Sanskrit or to Arabic will cause communal discord. English terms are now in use in India and will continue to be understood and used by all engaged on advanced scientific work. The adoption of these terms will prevent waste of energy and time in the attempt to invent their Indian equivalents. These English terms are practically the same in every European language and a knowledge of these enables one to follow the scientific books and journals published abroad.

For all these reasons, it is advisable to adopt English terminology in all scientific writings in all Indian languages.

APPENDIX IV.

NOTE BY DR. ABDUL HAQUE, SECRETARY, ANJUMAN-E-TARAQQI-E-URDU (HIND).

The subject covered by the Agenda is dealt with here in three sections. Section (I) will specify my general attitude towards the question of scientific terminology for India. Section (II) will give a brief account of the experiments carried on till now to prepare a code of terminology, and to impart education with its aid. The last section will sum up my observations on the work so far done in this direction, and advance my views in respect of what might be done in the future.

SECTION I.

Item 1 of the Agenda requires the members of the Committee "to consider whether a common scientific terminology should be fixed for India as a whole, and, if so, whether the main and common part of such terminology should be borrowed extensively from the English terminology".

A common terminology for a sub-continent like India as a whole is possible only when it is superimposed by a powerful central authority, i.e., the English or Indian. But the march of events points to no such possibility. The British Government have made it clear that India is soon to attain Dominion Status and that its administration will have to be run by her own sons in future. The possibility of any superimposition on the part of the British being thus eliminated, the question remains whether such an imposition from within is possible. This is certainly possible if one of the two major communities of India should dominate the administration at the centre, and in the constituent units of India, so that a language favoured by the dominant party might be chosen to form the basis for a common terminology. To every sensible observer of the prevailing situation in the land, it should be clear that an agreed constitution giving the dominant voice to one party will never be set up.

Such being the difficulties lying in the path of superimposition of a common terminology, whether foreign or Indian, for the whole of India, the question arises what is the alternative which might be followed so as to keep in check endless multiplication of terminologies. The aim before us, then, should be to see that we evolve terminologies such as might be agreeable to the genius of as many Indian languages as possible. This being so, *the question which will call for consideration is this; can we for the purpose of common terminology resolve Indian languages into the minimum number of convenient groups?*

During the course of my close association with the All-India 'Anjuman-e-Taraqqi-e-Urdu for nearly thirty years, and no less close association with the Osmania University since its very inception—institutions which have devoted themselves to imparting modern knowledge in arts and science through an Indian language—I have had to give deep thought to the subject of common terminology. And my firm conviction is that India would need two sets of terminologies—one serving the interests of the Aryan group of languages including Urdu, and the other the Dravidian groups, the *international* terminology forming part of both. I cannot, therefore, agree with Mr. Seal that every Indian language should have a separate terminology, and that the main portion of it should be bodily imported from English. Nor can I agree with him in his classification of the Indian languages into *Sanskritic* (covering even the Dravidian languages) and *Perso-Arabic*.

So far as the Aryan group is concerned, the work done through Urdu may easily form the basis or groundwork for the building up of a code of terminology common to other languages of Aryan origin—languages spoken in the Hindustan proper as well as the languages outlying it, *viz.*, Bengali, Marathi, Gujrati, Sindhi, Punjabi, etc.

SECTION II.

To understand the value of the work done through Urdu and to see how it can be utilized for larger purposes, a brief account of it may be worthy of consideration.

Old Delhi College.

The earliest attempt ever made to supply scientific terminology in Urdu text books, was undertaken in the thirties of the past century by the old Delhi College, run by European Principals of whom Mr. Batrons and Dr. Springer deserve special mention.

The principles laid down by the Translation Society of the College for guidance in translation are set out here in the original:—

Proposed rules for the expression of English terms in Urdu translation.

1. Whenever a scientific word has no equivalent in Urdu and expresses a simple idea, as Sodium, Potassium, Chlorine, etc., there is apparently no objection to its being transferred bodily into the vernacular language. The same rule applies to titles, etc., not strictly corresponding to any other titles or dignities known in Indian History such as Bishop, Duke, Judge, Earl, Collector, Magistrate, etc.

2. If the scientific word expressing a simple idea has an equivalent in Urdu the latter must be used, as Loha for Iron; Gunduck for Sulphur; Wuzeer for Minister; Tulubnama for Summons.

3. If the word be a compound one, and the two original words be English and have neither of them equivalents in Urdu, the word must be transferred bodily into the Vernacular language as Hydrochloric for instance, the words Hydrogen and Chlorine having no equivalent in Urdu*. This should not however, be considered warranting the transfers of a whole English SENTENCE into a translation, as Justice of the Peace, which should perhaps rather be expressed by Justice peace ke—Military Order of the Bath, Lushkuree Jummat Bath Malta ke—Military and religious order of Malta, Lushkuree wo muzubee Jummat Malta ke.

4. If the word be a compound one and have no equivalent in Urdu, but be made from the words which singly have Urdu equivalents, the latter may be used in conjunction with each other, or some other equivalent translation made, as chronology, Ilmzemanee—House of Lords, Cutchery Ameeran ke—House of Commons, Cutchery Waklaia raiake, or simply Cutchery Waklaia ke.

5. When this or the following cannot conveniently be adhered to, the foreign word should be transferred to Urdu as Hydrogen, Nitrogen.

6. If the compound word be formed from two single words one of which has an equivalent in Urdu and the other not, the Urdu compound one

* The nomenclature of Chemistry may perhaps be bodily transferred into Urdu. The Chemical elements which have Urdu names would retain them, but assume the English names in composition; as Hydro-Sulphuric, etc. The roots of that nomenclature not being numerous it would not be difficult to explain them clearly and distinctly.

must be made of the English and the Urdu single words, as Court of Directors, Cutchery Directoron ke-Archbishop, Bishopala.

7. Such words as Order, Class, Genus, and Species, although having in respect equivalent in Urdu might however, be transferred into that language, because the Urdu equivalents are synonyms of each other, and would constantly lead to a very objectionable confusion in distinctions highly important in the study of natural history.

8. The names of the natural families of plants* are derived each from one of the most remarkable individuals of the family or some of its common properties, and a similar rule may be followed in Urdu unless it should be found more convenient and advantageous that the distinctive names of each family should invariably be drawn from some of its special and distinctive characters.

1. The above rules might, it is hoped, prevent any great discrepancies in the translations. When speaking of a word having an equivalent in Urdu it is meant that some word similar to it in meaning is well-known among the middle and educated classes of the native community. If it were necessary for an equivalent to a scientific word not found in our Oriental Dictionaries, to refer to a learned Pundit or a Moulvee, it is obvious it would be better to adopt the English word, which, if equally unknown to the Urdu language, would have at least the advantage of being known to the translator, who might thus proceed in this translation without any Moulvee's or Pandit's assistance. As all, or nearly all, the science which is to be infused into Urdu must come from the English language, it is next to impossible, even if it were desirable, to prevent the introduction of many English words into it.

2. In the above, of course, are meant such words as are names of things and express simple ideas, or words formed from them, and not such derivative substantives and adjectives as are daily made from each other according to the well-known Arabic Forms.

3. On the whole English words must not be used in Hindustani translations when this can be avoided without any inconvenience, and any person who intends to translate a work on any given science should, as much as possible, provide himself with any work which may have been already published on that science, and made use of the same words in his translation which were used in that which preceded it, unless there be in any particular instance some material objection to this. Whenever an English sentence assumes as known a fact probably familiar to an Englishman, but unknown to a Native, some short explanation

* What has been said above of the nomenclature of Chemistry may apply to the great divisions of the Linnean system, but to make a complete proper Botanical language is perhaps the most difficult task to perform in the work of translation. A literal transfer of our European nomenclature and terminology into an Urdu translation would make of Botany a perfectly unintelligible chaos. The second mode alluded to in this paragraph indicating the names of the natural families of plants, appears the best as it is universally applicable, whereas the most remarkable individuals of a family in Europe are not always so in India. On the whole it is extremely desirable that some gentlemen having at least a general knowledge of Indian Botany well acquainted with Urdu should undertake the task. Some works on Anatomy and Physiology having some years ago been translated into Urdu, the difficulty relative to the technical terms of sciences must have been already overcome in some way or the other, but how this has been done has not as yet been ascertained by the Secretary.

of the fact alluded to should be given by the translator, either in a note or in the text of the translation if this can conveniently be done.

4. In general the translator must not endeavour to translate literally word for word. It is the spirit, the meaning of every sentence which it is important to transfer from one language to the other, however different the construction, or expression, of the sentence may be.

Keeping the above rules in view, the Delhi College was responsible for the compilation and the translation of about two hundred books dealing with Mathematics, Astronomy, Chemistry, Physics, Medicine, Natural History, Jurisprudence, Economics, Logic, Philosophy, Political and Constitutional History and several other subjects. The English educational authorities and scholars who paid visits to the College in those days highly appreciated this system of teaching sciences in particular through a vernacular and were pleased to record that the students of the Delhi College were as proficient as, if not more, than those who learnt those Sciences through the English language in other Colleges.

After the great disturbance of 1857, Delhi was annexed to the Punjab Province. No greater punishment could have been inflicted on that ancient city or harder blow dealt to it than the closing down of that noble institution which had created an intellectual and cultural atmosphere of a type new to India and produced some of our best minds and makers of Urdu in the last century, as for instance Master Ram Chandra, Nazir Ahmed, Mohammad Husain Azad, Zakaullah and others. Had this College been spared and allowed to continue its work of intellectual regeneration, it would have, assuredly, revolutionised educational thought in the country and anticipated by at least three quarters of a century the establishment of Universities like the Osmania conducting education through the medium of Indian languages. It is an irony of fate that no historian—neither a Britisher whose forefathers were responsible for its foundation, nor any son of the soil, who would have been proud of it—has ever had the kindness to refer to it in his work.

Osmania University.

The next attempt—this time more serious and determined—was the establishment of a Bureau of Translation in Hyderabad, preparatory to the inauguration of a full-fledged statutory University to impart learning in all its branches through the most widely spoken language of Urdu.

The work of the University and its results have been under the public eye for nearly a quarter of a century—as admitted on all hands, the system is now no longer regarded as an experiment. Indeed it has already powerfully influenced the working of other Universities in the land; so much so that strong hopes are entertained everywhere that, sooner or later, they will all fall in line with the Osmania University and provide education to Indian children through Indian languages. A careful study of the system of terminology followed by such a University catering for students speaking different mother-tongues at home, is worth making. The principles of this system may be stated as follows:—

1. In order that a proper code of scientific terms be prepared, it is essential that collaboration should be arranged between experts in languages and experts in sciences, the object being that on the one hand the connotation of the original may be fully brought out in the translation and on the other the resultant term should be expressive of the genius of the language.

2. The primary principle which should be kept in view is this; the term should be a word or part of a word for Hindi, Persian or Arabic, such as is either in common use or is easily comprehensible and possessing adaptability for grammatical manipulation in Urdu. This condition being satisfied, perfect freedom is to be allowed for interchange of suffixes and prefixes from any of the three languages and combination of two or more words from the different languages taken together.
3. Terms from English which have become part of the language by usage should be retained. In addition, terms from a European language, for which an equivalent cannot be devised so as to bring out the full significance of the original, should be bodily transplanted.
4. Terms derived from foreign proper names should be so adopted as to retain on the one hand the proper name and on the other suit the structural and grammatical peculiarities of the language.
5. Old terms which are current and which can sustain the meaning in their modern application should be retained.
6. There are in current use certain scientific terms which originally bore one conception about which subsequent researches have come to convey a different conception. In translation of such terms the equivalent should follow not the literal sense of the terms but the present sense or significance of them, in spite of the fact that in the original language the same term is maintained.

Anjuman-e-Taraqqi-e-Urdu.

The work of terminology carried on by the Osmania University cannot be said to have reached any stage of finality. From the very nature of it, it will go on improving as time advances with its aim always concentrated on the need for greater simplification and greater expressiveness. In this task of simplification, it is my privilege as the life Secretary of the All-India Anjuman-e-Taraqqi-e-Urdu to submit that the Anjuman has unreservedly collaborated with the University at every stage. Not merely this, the Anjuman, in the interest of that wider public not directly accessible to the University, has so far compiled:—

- (a) nearly 175 works dealing with different branches of learning (published).
- (b) the Urdu translation of Oxford Concise English Dictionary (published),
- (c) nine volumes of terms technical to different professions and handicrafts,
- (d) glossary of terminology in Chemistry, Physics, Botany, Astronomy, Economics, Sociology, History and Political Science (some of these still in press).

In addition to the work of above character, the Anjuman conducts among other journals, the *Science* quarterly which aims to popularise sciences among the Urdu speaking public. I may add that in my individual capacity I am preparing a comprehensive Urdu Lexicon for the Osmania University, some volumes of which are now ready for the press.

These endeavours of the Anjuman have all been directed towards supplementing the efforts of the Osmania University in evolving a more and more simplified code of terminology.

SECTION III.

What is the net result? For aught I can say the Urdu language now possesses a code of terminology which with a little further simplification can easily be adopted by any of the Aryan languages which form the Indo-Aryan group mentioned above, whatever the receipt. If this were done, you would have provided for the major portion of India, nearly three-fourths, a common terminology. As for the third, the Dravidian area, a common terminology can be evolved on parallel lines. It is only in this way that a right solution of the problem might be sought. If unfortunately the advocates of Hindi should insist on a Sanskritized variation of the terminology at present available in Urdu adopted for the Indo-Aryan group of languages, I shall certainly raise no objection. In that case there will be two terminologies for the area where the Indo-Aryan languages are spoken and one for the Dravidian. In all three sets.

I am, therefore, of clear opinion that the proposal made by Mr. Seal to have a common terminology for the whole of India composed extensively or mainly of borrowings bodily imported from the English terminology is neither desirable nor possible. No civilized country anxious for progress has a foreign terminology slavishly incorporated into its language. Take the case of Europe. In spite of the fact that the European countries have so much in common culturally, every country has its own scientific terminology. There is no doubt that a minimum quantity of international terms has been accepted by each language as an indispensable common factor and to that extent I should be agreeable to a similar latitude for Indian languages. But the wholesale importation will be demoralising, indeed it will disfigure the languages and crush their genius. Further, the Indian languages are so constituted that if the English terminology is imported even for the sake of sheer fancy, this will not feel quite at home when derivatives have to be employed. I give below a passage which observes the lines suggested by Mr. Seal:

تھر مورڈ ٹامکس کے پڑنے قانون سے بہکا مطلب ہے کلا جب کسی کی یکال ہی ایکشن سے جسکی
یلووی تک ویلیو U ہے ایکسٹرنل ورک کے یرٹس حاصل ہوتے ہیں اور حرارت کے Q یرٹس کی
ڈیپنڈنٹ ہوتی ہے تو

$$\begin{aligned} U &= A - Q \\ Q &= A - U \end{aligned} \quad \text{یا}$$

تھر مورڈ ٹامکس کے دوسرے قانون کے یہکا معنی ہیں کلا جب کسی ایٹمو تھر مل ریزر میل عمل میں
لیپنڈنٹ ڈیپنڈنٹ T پر Q حرارت سے اینرجی کی dA مقدار حاصل ہوتی ہے تو

$$\begin{aligned} dA &= Q \times \frac{dT}{T} \\ Q &= T \times \frac{dA}{dT} \end{aligned} \quad \text{یا}$$

ان دونوں ایکویٹنوں کو ملا کر Q نکال لینے سے گتھر ہلپولٹنز کی ایکویٹن حاصل ہوتی ہے —

$$A - U = T \times \frac{dA}{dT}$$

What is this stuff? Is it an expression of any recognisable language? Is the genius of Urdu visible anywhere in it? Let the contents of the

above passage be similarly expressed in any other Indian language and it will not be difficult to see that the result will be equally interesting.

To sum up, taking everything into consideration my humble suggestion is that instead of frittering away energy in an idle pursuit to evolve a common terminology for the whole of India whether based on English terminology or not, the sensible procedure will be to attempt two sets of terminology—one common to the Indo-Aryan group of languages, the other to the Dravidian on the lines indicated above.

APPENDIX V.

NOTE BY DR. MOZAFFARUDDIN QURAISHI, PROFESSOR AND HEAD OF THE
DEPARTMENT OF CHEMISTRY, OSMANIA UNIVERSITY.

The question of adopting English scientific terminology as a whole was considered in all its aspects by several committees of scientists and linguists when the work of imparting higher scientific education through the medium of an Indian language was taken up for the first time in the Osmania University. The worthy chairman of this meeting was himself responsible for initiating and guiding these discussions. After long deliberations and after weighing arguments on both sides, it was finally decided that a middle course would be the best to follow under the present circumstances. Scientific terminology admits of a fairly sharp division into two sections, international and national. The international section, covering nomenclature and notation includes the following:—

- (a) Names of chemical elements and compounds such as sodium, potassium, chlorine, aluminium, nickel, hafium, sodium chloride, calcium carbonate, etc.
- (b) Names of minerals such as calcide, dolomite, hæmitite, magnetite, bauxite, etc.
- (c) Symbols of elements and compounds, such as H, O, C, H₂O, NH₃, H₂SO₄ etc.
- (d) Names of units of measurement such as gram, centimetre, second, pound, foot, inch, dyne, erg., amp., volt, Watt, etc.
- (e) Names of units of matter and energy, such as molecule, atom, electron, neutron, proton, quantum, photon, etc.
- (f) Names of laws, theories, phenomena, effects, instruments, apparatus, machinery, etc., which are named after their discoverers or inventors, such as Boyle's law, Dhun's law, Tyndal effect, Zeeman effect, Raman effect, Bunsen burner, Solvay's process, Allenmore's cell, borrowed, etc.
- (g) Mathematical notation such as log, sine, cos, tan, dx, Ax.
- (h) Names of classes, orders, genera and species in biology such as Dicotyledon (two seed flower) Reptilia Annacææ, Annelida, Anona, Pheritima, Squamosa, Posthuma.

This international section of terminology has been adopted by us in its English form with the following few exceptions:—

(1) Words already existing in the language such as 'loha', 'sona', 'chandi', 'neela thotha', 'Jauher', are also used along with their English equivalents, 'Iron', Gold, Silver, Copper sulphate and atom. It may be pointed out that in European languages, too, names of elements and

compounds peculiar to these languages find extensive use in scientific publication. Here are a few examples:—

English.	French.	German.
Nitrogen.	Azote.	Stickstoff.
Lead.	Plomb.	Blei.
Sulphur.	Soufre.	Schwefel.
Tungsten.	Tungstene.	Wolfram.
Formic acid.	Acide Formique.	Ameisensaure.
Tartaric acid.	Acide pyrotartarique.	Weinsaure.
Succinic acid.	Acide succinique.	Bernsteinsaure.

(2) A part of the mathematical notation had to be translated in order to make it fit with the Urdu alphabet and Indian numerals. For instance $\frac{1}{x}$ is used for dx and $\frac{1}{x}$ for Ax. Some abbreviations of Arabic origin have been retained and used in place of their modern international equivalents, as these terms were already in current use in the schools of this country before the advent of English. For instance \sin is used for the trigonometrical ratio 'sine', \cos for 'Cos', \tan for 'tan' and \cot for 'Cotan'. It is well known that Arabs made Algebra an exact science and laid the foundation of analytical geometry and plane and spherical trigonometry. The word 'sine' is evidently derived from the latin translation (sinus) of the Arabic term \sin , meaning 'a bay or curve'.

This question has recently been reconsidered and it has been decided to recommend the adoption of the International system for Notation for Mathematics.

The other section of scientific terminology, the national section, includes the following:—

- (a) Names of concepts, qualities and properties, such as matter, energy, wave, force, weight, volume, velocity, valency, chemical reactivity, equilibrium, saturation, density, solubility, surface tension, viscosity, centre of gravity, lines of force, conductivity, refractivity, specific heat, specific gravity, spectrum.
- (b) Names of phenomena and processes and their adjectival and other derivatives, such as, chemical reaction, combustion, distillation, radiation, conduction, induction, dispersion, refraction, diffraction, polarisation, incubation, magnetisation, electrification, dissociation, association, magnetism, isomerism, polymerism, allotropy, electric discharge diffusion, solution, ionisation, parallax, projection, secretion, sterilisation, solution.

(c) Names of instruments, apparatus, tools and machinery, such as, microscope, telescope, spectroscope, spectrograph, polarimeter, furnace, clock Rheostat, viscometer, manometer, test-tube, flask, crucible, refractometer, wheel, axle, lever, refrigerator, etc.

(d) Names of mathematical figures—such as line, curve, triangle, rectangle, polygon, etc.

In this section of terminology, Urdu equivalents already existing in the language have been adopted, and where Urdu equivalents did not exist new equivalents have been coined. If Mr. Seal's suggestion for retaining most of these terms in their foreign form is followed, about 5,000 foreign words and their derivatives, at a rough estimate, will have to be imported, which is very much beyond the capacity of any Indian language to absorb and assimilate. I shall make my point clearer by taking two examples. If we adopt the word spectrum in its foreign form, we shall have to accept the following additional words in our language.

Spectra, Spectral, spectroscope, spectroscopy, Spectrometer, Spectrograph, Spectrography, Spectro-photo-meter, Spectrometry, Spectrophotometry.

If we adopt the word solution, we must also accept solutions, dissolvē, solute, solvent, soluble, solubility, solvate, solvation. Such words, which denote concepts, properties and processes and their several derivatives are not uniform even in different European languages, which are closely related to one another, as the following few examples will show:—

English.	French.	German.
Density.	Densite, epaisseur.	Dichte.
Weight.	Poids.	Gewicht.
Surface tension.	Tension superficielle.	Oberfläche spanng.
Viscosity.	Viscosite.	Innere reibung or Zähigkeit.
Conductivity.	Conductivite.	Leitungsvermogen.
Radiation.	Radiation.	Strahlung.
Horse power.	Force de chevaux.	Pferdestärke.
Reflection.	Reflexion.	Zurückwerfung.
Refraction.	Refraction.	Brechung.
Acceleration.	Accelération.	Beschleunigung.
Specific gravity.	Gravite spécifique.	Spezifische Gewicht.
Specific heat.	Chaleur spécifique (or speciale).	Spezifische Wärme.

English.	French.	German.
Atomic weight.	Poids atomique.	Atomgewicht.
Equilibrium.	Equilibre.	Gleichgewicht.
Equation.	Equation.	Gleichung.
Valency-	Valence.	Wertigkeit.
Solution.	Solution, solute (Pharm).	Losung.
Solvent.	Solvant.	Losungsmittel.
Soluble.	Soluble.	Loslich.
Solubility.	Solubilité.	Loslichkeit.

To sum up, the Osmania scientific terminology has two main divisions, namely, the International, which covers nomenclature and notation, and the National which covers names of concepts, properties, processes, instruments, mathematical figures, etc. The first part is, in the main, in English, while the second is, in the main, in Urdu. We have, therefore, already borrowed the essential international elements of scientific terminology from English, and the question of borrowing more does not arise in our case at least. If the other Indian languages follow the course adopted by us, the international section of terminology will be common to all the languages of the country. With regard to the national section, it is difficult to see how this could be achieved unless there is one common national language for the whole of India. But it is possible to minimise the differences by dividing the languages into two main groups, namely, Aryan and Dravidian, as suggested by Dr. Maulvi Abdul Haque, and having a common national section of terminology for each division. The national section of the Osmania terminology is devised in such a way that it contains words both of Perso-Arabic and Sanskrit origin, as dictated by the very nature of the Urdu language. It can, therefore, serve as a common terminology for the Aryan group of languages.

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