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THE INTERNATIONAL CATALOGUE OF SCIENTIFIC LITERATURE.—SECOND CONFERENCE.

I.

IN SCIENCE for August 6, 1897 I gave an account of the steps which led to the holding of the first Conference on an International Conference of Scientific Literature, and a somewhat detailed description of the Proceedings of the Conference.* At the invitation of the editor of SCIENCE, I shall describe below the work done since that time to reach a working plan for this most important undertaking.

The first Conference, in July, 1896, had reached certain definite conclusions, which may be briefly stated as follows: (*a*) That it was desirable to publish a catalogue of scientific literature by means of some international organization; (*b*) that the catalogue was to be primarily for the scientific investigator; (*c*) that papers were to be indexed according to subject-matter; (*d*) that the catalogue should comprise all published original contributions to science; (*e*) that the catalogue be issued in the double form of slips and books.

The Conference passed a resolution to the effect "that the Royal Society be requested to form a committee to study all questions relating to the Catalogue referred to it by the Conference, or remaining undecided at the close of the present sittings of the Confer-

* The article was also published in separate form.

ence, and report thereon to the governments concerned." It was also left to the Committee "to suggest such details as will render the Catalogue of the greatest possible use to those unfamiliar with English."

In accordance with the terms of these resolutions, the Royal Society appointed, in November, 1896, a Committee, with Professor Henry E. Armstrong as Chairman, which presented a report on March 30, 1898. This report consisted of a series of proposed regulations for the conduct of the Catalogue, a provisional financial statement, and schedules of the various sciences. Inasmuch as this report formed, in a large measure, the basis of the discussion and resolutions of the second Conference, it seems desirable to present an outline of its contents.

Schedules of Classification. Authorized schedules are to be prepared for the several branches of science included in the Catalogue; each of these to be indicated by a Roman capital letter known as the Registration letter; the division in each schedule to be indicated by numerical symbols called Registration numbers; when desirable, an alphabetical index of the several headings be appended to each schedule.

Card Catalogue. For each communication to be indexed at least one slip called Primary slip shall be prepared containing title entry, subject entry, registration symbols and significant words. These slips are to be prepared by the bureaus established in the various countries (regional bureaus), which will transmit them to the Central Bureau as rapidly as possible. When a primary slip bears more than one subject entry or registration number copies of secondary slips shall be prepared. Slips of standard size, stoutness and color are to be printed for issue to subscribers, each slip to be revised by an expert official of the Central Bureau.

Book Catalogue. At determined regular intervals the Central Bureau shall issue, in book form, an author's and subject index of the literature published within that period. This Book Catalogue shall be obtainable in parts corresponding to the several sciences or in divisions of such parts. After the first issue of the Book Catalogue the Committee of Referees are to be consulted as to the desirability of making changes in the classification.

International Council. This shall be constituted by one representative of each Regional Bureau and shall be the governing body of the Catalogue. It shall appoint its own Chairman and Secretary, and shall meet in London at least once in three years; this Council is to be the supreme authority for all matters belonging to the Central Bureau, and is to report its doings to the Regional Bureaus.

International Committee of Referees. The International Council shall appoint, for each science included in the Catalogue, five persons skilled in that science to form an International Committee of Referees. The members shall be appointed in such a way that one retires each year. These committees shall be consulted by the Director of the Central Bureau on all questions of classification not provided for by the regulations.

The Central Bureau is to be composed of a paid staff, consisting of (1) a General Director, (2) for each branch of science a skilled assistant, (3) clerks. There is also to be a Consultation Committee, consisting of persons representing the several sciences and residing in or near London.

The next portion of the report is explanatory of the schedules of classification. It is expressly stated that the schedules are put forward as illustrations of feasible methods of classifying the several sciences and not as final or authoritative. A detailed account of the method of the work of the Central Bureau is given, which need not be entered upon here.

Financial Statement. It is estimated that about 40,000 communications will have to be analyzed and indexed per annum. If there are on an average 3 analytical slips for each entry this would make 160,000 slips per annum, or about 530 for each working day. It is further estimated that the Book Catalogue will amount to 16 volumes per annum.

Book Catalogue. The estimated cost of the Book Catalogue (counting an edition of 500 copies) is £5,450, which would be covered by a subscription to 350 sets at £1 per volume.

Slips or Card Catalogue. If but a single or primary slip is considered the additional expense would be £3,076, and allowing £1,000 saving on printing the book it would require 130 complete subscriptions at £16 to cover this expense. If the full, or analytical-slip, catalogue be prepared 120,000 additional slips would have to be dealt with per annum and 171 institutions would have to pay £35 to cover the cost, which would, however, slightly reduce the cost of the primary slips. It would, of course, be provided that portions of the catalogue could be subscribed for separately. The following table furnishes a clear idea of the expenses and charges:

	Total cost.	Least remunerative number of complete subscriptions.	Average subscription to single science.	Maximum subscription to single science.	Complete subscription.
Book Catalogue (1,000 copies)	£5,590	£350	£1 0 0	£2 0 0	£16
Primary Slip Catalogue (200 copies)	3,075	130	1 0 0	1 17 6	15
Secondary Slip Catalogue (200 copies)	5,992	171	2 5 0	4 7 6	35
	£14,657	—	£4 5 0	£8 5 0	£66
Less saving on use of Linotype	1,000				
	£13,657				

The Committee expressed the opinion that if the Book Catalogue alone were published the subscription might be expected to cover the expenditure, whereas if the Slip Catalogue were published as well the expenditure would probably be beyond the sum which can reasonably be expected to be raised.

In view of this conclusion the Committee raises the question as to whether a primary slip might not be sufficent, whether a monthly bulletin in book form would serve the purpose, or, should the entire Slip Catalogue be desired, whether a 'sustenation' fund could be raised to meet the difficulty. The need of a guarantee fund amounting to about £6,000 is also pointed out.

The remainder of the report is taken up with the schedules, which cannot be discussed here. Anticipating somewhat before coming to the Conference, it may be well to mention that in November, 1898, the Committee issued a memorandum on the systems of classification and registration proposed. It is explained that the minute subdivision was adopted because if the cards accumulated several years the number under each head might grow so large as to make it a work of great labor to search through them. Should the Card Catalogue be abandoned the number of divisions might be considerably reduced in the annual volumes, though it would be desirable to retain them in the volumes ranging over decimal periods, if such were published.

System of Registration. — Each principal

science is indicated by a letter. The divisions of each science are numbered. These divisions can be subdivided by the use of significant words or symbols.

This plan is explained in detail and defended. As a further evidence that the Committee did not consider its schedules final it has issued a revised schedule of Physiology (Animal).

THE CONFERENCE.

The second Conference, which, like the first, was summoned by the British government, was attended by the following delegates, many of whom had participated in the first Conference:

Austria. Professor L. Boltzmann (Kaiserliche Akademie der Wissenschaften, Vienna).
Professor E. Weiss (Kaiserliche Akademie der Wissenschaften, Vienna).

Belgium. Chevalier Descamps (Membre de l'Acad. Royale de Belgique, Président de l'Office International de Bibliographe, Brussels).
M. Paul Otlet (Secrétaire-General de l'Office International de Bibliographie, Brussels).
M. H. La Fontaine (Directeur de l'Office International de Bibliographie, Brussels).

France. Professor G. Darboux (Membre de l'Institut de France).
Dr. J. Deniker (Bibliothécaire du Muséum d'Histoire Naturelle).
Professor E. Mascart (Membre de l'Institut de France).

Germany. Professor Dr. Klein (Geheimer Regierungs-Rath, University of Göttingen).

Hungary. Dr. August Heller (Librarian, Ungarische Akademie, Buda-Pesth).
Dr. Theodore Duka (Member of the Hungarian Academy of Sciences).

Japan. Professor Einosuke Yamaguchi (Imperial University of Kioto).

Mexico. Señor Don Francisco del Paso y Troncoso.

Netherlands. Professor D. J. Korteweg (Universiteit, Amsterdam).

Norway. Dr. Jörgen Brunchorst (Secretary, Bergenske Museum).

Sweden. Dr. E. W. Dahlgren (Librarian, Köngl. Svenska Vetenskaps Akademie, Stockholm).

Switzerland. Dr. Jean Henry Graf (President, Commission de la Bibliothèque Nationale Suisse.)
Dr. Jean Bernoulli (Librarian, Commission de la Bibliothèque Nationale Suisse).

United Kingdom. Representing the Government:
The Right Hon. Sir John E. Gorst, Q. C., M. P., F. R. S. (Vice-President of the Committee of Council on Education).
Representing the Royal Society of London:
Professor Michael Foster, Sec. R. S.
Professor Arthur W. Rücker, Sec. R. S.
Professor H. E. Armstrong, F. R. S.
Sir J. Norman Lockyer, K. C. B., F. R. S.
Dr. Ludwig Mond, F. R. S.

United States. Dr. Cyrus Adler (Librarian, Smithsonian Institution, Washington).

Cape Colony. Roland Trimen, Esq., F. R. S.

India. Lieut.-General Sir R. Strachey, G. C. S. I., F. R. S.
Dr. W. T. Blanford, F. R. S.

Natal. Sir Walter Peace, K. C. M. G. (Agent-General for Natal).

New Zealand. The Hon. W. P. Reaves (Agent-General for New Zealand).

Queensland. The Hon. Sir Horace Tozer, K. C. M. G. (Agent-General for Queensland).

The Conference met Tuesday, October 11, 1898, in the rooms of the Society of Antiquaries (Burlington House) the rooms of the Royal Society not being available, as they were undergoing repairs. Sir John Gorst, President of the previous Conference took the chair, and on motion of Professor Darboux (France) was elected President. Professor Korteweg (Netherlands) was elected Secretary for the German language, M. La Fontaine (Belgium) for French, and Professor Armstrong for English. Three short-hand reporters, one for each language, assisted the Secretaries.

Professor Michael Foster then stated that invitations to the Conference had been issued through the Foreign Office, and gave a list of the acceptances.* The Greek government regreted that they were unable to appoint delegates;† the Russian government did 'not consider it necessary to be represented by a special delegate.' The Danish government took the same view,

* List is given above.

† The Russian government has since requested the appointment of a representative on the International Committee.

being satisfied that it could follow the matter from the verbatim reports issued. The German government, on October 4th, requested a postponement owing to the difficulty of appointing delegates, but it was not possible to arrange for this. Professor Klein, of Göttingen, representing Germany, arrived the second day of the Conference.

The time of meeting was then arranged and a resolution agreed to 'That each delegate shall have a vote in deciding all questions brought before the Conference,' it being understood that the decisions of the Conference did not bind the respective governments. It was further agreed that English, German and French be the official languages of the Conference, but that any delegate might employ any other language, provided he supply a written translation into one of the official languages.

Professor Foster then formally laid before the Conference, on behalf of the Royal Society, the report summarized above, and Professor Rücker, in explaining the report, gave it as his opinion that the secondary cards entailed too great an expenditure and should be given up. Dr. Deniker (France) thought the question to be discussed was whether it was better to publish the Catalogue in the form of volumes or cards.

Professor Darboux was opposed to giving up cards which rendered great service to scholars. He thought it best to discuss the scientific questions first and leave this matter to the body which would be charged with the actual workings of the Catalogue.

M. Otlet (Belgium) considered that the order of subjects was threefold: (1) scientific, (2) technical—relative to the method of employing the cards, and (3) financial.

Dr. Graf (Switzerland) dissented, holding that the matter should be taken up in the order indicated by the Royal Society, inasmuch as the financial questions depended upon whether the Catalogue should be issued in both book and card form. He added that his government had given him instructions to advocate the double form.

Dr. Heller (Hungary) also expressed himself in favor of the double form. Dr. Brunchorst (Norway) agreed in principle, but thought at the beginning the Catalogue could only be issued in book form. Professor Boltzmann (Austria) thought that for the present only the book form and primary slips were feasible.

Professor Darboux pointed out that it was at least necessary for the various Bureaus to prepare the Catalogue in slip form and send it to London. The financial question was: Could this Card Catalogue be published? If it could it would be done; if not it could be consulted in London.

Dr. Adler pointed out that if the complete Card Catalogue were published the subscription fee would by no means cover the entire cost to a library; an additional sum for furniture to provide for it, as well as for the arrangement and care would have to be taken into account, as well as the space required, making the total cost of the whole Catalogue and its maintenance to each institution subscribing about £200 per annum.

Dr. Deniker thought the statement as to the space, cost, etc., exaggerated, and formulated the proposition: "The Conference decides in principle for the publication of the Catalogue in the double form of volumes and cards;" after further discussion this resolution was agreed to.

The report of the Committee of the Royal Society was then taken up *seriatim* and it was agreed after a brief discussion as to the form 'That schedules of classification shall be authorized for the several branches of science which it is decided to include in the Catalogue.'

Professor Foster then moved that "Each of the sciences for which a separate schedule of classification is provided be indicated by a Roman capital letter (hereafter called

a registration letter) as a registration symbol, namely, as follows:

A. Mathematics.
B. Astronomy.
C. Meteorology.
D. Physics.
E. Crystallography.
F. Chemistry.
G. Mineralogy.
H. Geology (including Petrology).
J. Geography.
K. Paleontology.
L. Zoology (including Anatomy).
M. Botany.
N. Physiology (including Pharmacology and Experimental Pathology).
O. Bacteriology.
P. Psychology.
Q. Anthropology."

Dr. Bernoulli (Switzerland) pointed out that the plan of dividing the Natural History sciences into several groups was a departure from systems already in existence.

Dr. Heller (Hungary) did not entirely agree as to the wisdom of the division; he pointed out that in the course of years certain institutions and publications had grown up which treated several of the subjects named. Under this plan the publications would be entirely separated. If, however, this was necessary he would advocate a still further division and suggested the separation of Anatomy from Zoology.

Professor Weiss (Austria) suggested that the question be divided, first, as to whether registration letters be used, and second, how the several sciences should be arranged among them. This being agreed to, the original proposition was withdrawn.

Professor Darboux pointed out that in the list of sciences Geography was given, whereas it was his understanding that the first Conference intended to include only mathematical and physical geography.

Professor Weiss indicated the difficulty in agreeing upon an absolutely definite list, due partly to the different development some of the sciences had taken in England and on the Continent. The specialists of the Vienna Academy had suggested that human anatomy should be separated from zoology. No doubt similar suggestions would come from other countries on special points. He, therefore, advised that a small commission be formed by the Royal Society which might consult various specialists and secure a coordinated scheme.

Dr. Deniker thought too much stress was being laid on the matter. It was his opinion that if Pharmacology were to be introduced it should be as a separate science, with a special letter, pointing out at the same time that it was an applied science and not in accordance with the original program, which was to include only pure science.

M. Otlet propounded several questions in the hope of eliciting information as to how the work of the Committee had been done, and M. Darboux pointed out that the science of Mechanics was put down as a section of Physics. He considered Mechanics a fundamental science and thought it should have an independent section.

Professor Armstrong stated in reply that practical considerations had come into play. For each separate science a separate series of boxes would have to be kept, and they provided as many letters as they thought separate boxes would be required. The separate letters were prepared purely for office purposes. The scheme of Geography was, he admitted, purely from the English point of view. The Committee had no communication with foreign academies, but consulted individuals. It desired, however, that foreign individuals and academies should have the opportunity of examining the schedules. Professor Michael Foster stated that the sub-committee which drew up the schedule for Physiology put itself in communication with distinguished and practiced physiologists in other lands, and

that they were now attempting to put the schedule into practical use. He added for the whole Committee that they did not maintain the schedules in their entirety.

Professor Armstrong pointed out that the introduction of a special science like Mechanics was contemplated and was entirely possible under the scheme. He quoted the following from the report: "It will be necessary to provide a separate volume, to be sold apart, for each science to be distinguished by a registration letter; and in some sciences, Zoology in particular, there will, doubtless, be a demand for separate volumes dealing with special sections of a science." "The extent to which the subdivision of the Book Catalogue into parts is carried will necessarily depend on the demand arising in practice."

Mr. Otlet thought that the matter had been somewhat cleared up and favored the subdivision referred to. Anthropology, he said, comprehended nearly all the sciences not included in the other sciences—such as theology, anthropometry, questions relative to the various human races, their industrial occupations, etc.—the concomitant subjects would be nourishment, and hence agriculture, costume, hunting, navigation, etc. Under communication of ideas grammar and the sciences connected with it would come in history, religion, superstition, sociology, slavery, social organizations, all of which would have to be considered.

M. Korteweg said that the subdivision of sciences would also create great difficulties; he favored the exclusion of Political Geography. Professor Darboux said that he was in practical accord with what had been said, but still thought that Mechanics should form a separate class. Dr. Graf desired that Anatomy be separated from Zoology and be placed in a separate class. Dr. Boltzmann suggested that the first class be General Science. Meteorology, he thought, should be connected with Physical Geography. Chemistry should stand between Crystallography and Mineralogy. Anatomy should be in a separate class. The questions raised concerning Mechanics and Anthropology were of great importance, but he thought that the Conference was not ripe for their solution.

Professor Armstrong said that the question raised about Mechanics was a practical one, whereas the definition of the limits of Geography and Anthropology was a scientific matter, and suggested that the latter be dealt with first.

Dr. Heller suggested, instead of the term Geography, that of Geo-Physics; this would include physical geography and meteorology and exclude political geography. He thought, too, that experimental psychology might be included under Anthropology.

Professor Armstrong, to bring the discussion to a conclusion, moved that Geography be limited to mathematical and physical geography, to the exclusion of political and general geography. In doing so he pointed out, however, that this action might lead to the Geographical Catalogue, being of no use to the general geographical student and not being subscribed for.

Dr. Adler stated that travels were of great importance to naturalists and anthropologists and had been included in the Bibliography published by the German Geographical Society. Dr. Duka also favored their retention, but Dr. Mond dissented, holding that this view deviated from the original intention of the Catalogue. The motion to limit the scope of Geography as above stated finally prevailed.

After a brief discussion by Professors Armstrong, Boltzmann, Darboux and Deniker, a resolution was adopted that after Zoology, Anatomy be entered on the list as a separate subject.

The following resolution was then unanimously agreed to:

"It is proposed that a separate schedule be provided for each of the following branches of science: Mathematics, Astronomy, Meteorology, Physics, Crystallography, Chemistry, Mineralogy, Geology (including Petrology), Geography (Mathematical and Physical, excluding Political and General) Paleontology, Anatomy, Zoology Botany, Physiology (including Pharmacology and Experimental Pathology), Bacteriology, Psychology and Anthropology."

The next question taken up was that of the Registration Symbols. Professor Darboux objected to voting on a resolution naming specifically the letters for each science. He thought that it was a detail of execution and would change the character of the Conference if matters of such secondary importance were discussed.

Professor Armstrong, in accordance with this suggestion, presented a motion as follows: "That each of the sciences, for which a separate schedule of classification is provided, shall be indicated by a symbol." Professor Korteweg thought that the question involved that of many different systems of classifications and various schemes of symbols, but Professor Armstrong pointed out, in reply, that if the resolution passed it would not bind the bureau to any particular symbols. M. Deniker thought that the question did not have the importance attributed to it—that the symbols were simply a practical scheme for securing order in the publication and handling of the cards. M. Otlet was inclined to lay more stress on the question; he thought they were not simply a matter for the convenience of the clerks, but would become useful to librarians and scientific men. The resolution was then adopted.

The next question taken up was the regulations concerning the preparation of the cards or slips. These regulations refer not to the Catalogue itself so much as to the preparation of the Catalogue. Professor Foster moved that, "For each communication to be indexed, at least one slip, to be called a 'Primary slip,' shall be prepared, on which shall be either printed, or typewritten, or legibly hand-written in Roman script: Title entries, the author's name, and the full title of the communication in the original language alone if the language be either English or French, German or Latin." In the case of other languages the title shall be translated into English, or such other of the above four languages as may be determined by the Regional Bureau concerned; but in such case the original title shall be added when the language is one which can be conveniently printed. Professor Foster presented this with an amendment to the effect that Italian should be added to the languages named.

Dr. Brunchorst thought it best to have but three languages and omit Latin and Italian, holding that there were very few publications in Latin and that its introduction was not important. He further made the interesting statement that within a few years the Latin language will have disappeared from use in Norway, and that there would probably be no public school in Norway in which Latin could be studied. Professor Rücker stated that, although the title of a paper might be given in Latin, it did not follow that the subject-entry should be in that language. Professor Foster added that Latin was introduced chiefly in the interest of zoologists. Mr. Triman, delegate from Cape Colony, thought it important to retain it. Dr. Adler held that every title should be given in the language in which the paper is written, without any exception whatsoever. Professors Foster and Armstrong both pointed out that some translation of titles was necessary, but Dr. Adler stated that, while translations of titles might be given when necessary, the original title should also be given, either in the original character or in a transliteration. It was agreed to omit Italian but retain Latin, and the first part of the resolution was then carried.

The next proposition under discussion was as follows: "In the case of other languages the title shall be translated into English, or such other of the above five languages as may be determined by the Regional Bureau concerned, but in such case the original title shall be added when the language is one which can be conveniently printed."

Dr. Adler suggested that instead of the last phrase the resolution shall read: "In such cases the original title shall be added; if convenient it shall be printed in the original script, otherwise in Roman script." Professor Foster inquired of the Japanese delegate whether the Japanese language could be conveniently written in Roman script and whether educated Japanese could read transliterations of Japanese, and received an affirmative reply. The amendment was then unanimously agreed to.

The question arose in connection with this matter as to the meaning of the term 'regional bureau,' and Professor Rücker explained that it had been decided to employ this term instead of the word 'National' because it might happen that one nation, as, for instance, the British Empire, may have more than one bureau, whereas some of the smaller countries, like Holland and Belgium, might unite in a single bureau. If there was any objection, he said, to 'regional,' the term 'Collecting Bureau' might be employed.

M. Otlet desired to add to the resolution the phrase 'to diminish the number of necessary translations,' which he pointed out as being extremely desirable, but the President thought this question might be more conveniently raised at a later stage. The entire resolution as amended was then carried.

Professor Foster then moved that "the title shall be followed by every necessary reference, including the year of publication, and such other symbols as may be determined."

The next resolution was "Subject-entries, indicating, as briefly as possible, the particular subjects to which the communication refers. Every effort shall be made to restrict the number of these subject-entries. Such subject-entries shall be given only in the original language of the communication if this be one of the five previously referred to, but in other cases in English, or in such other language as has been used in translating the title."

M. LaFontaine pointed out what seemed to him certain inconsistencies in subject-entries presented in the schedules, and thought that the idea of the subject-entries was not fully understood, but both Professors Foster and Armstrong combatted this idea. Dr. Adler pointed out the difficulty of grouping the subject-entries satisfactorily in view of the fact that the analysis could be made in five languages, but Professor Rücker explained that the alphabetical arrangement would be according to English words.

Chevalier Descamps stated that the book issue would require the repetition of titles, and that on the whole it would be more economical to repeat them entire. To this suggestion Professor Armstrong agreed, pointing out that its necessity had been recognized by the Committee.

M. Deniker inquired as to the relative value of the terms subject-entry and catch-word. Was the subject-entry to be subordinated to the significant word, or *vice versa*? Professor Foster explained that the subject-entry was to give an idea what the paper was about, the symbols to aid in keeping the Card Catalogue in order, and the significant words to aid the student who did not carry the symbol in his mind.

M. Deniker replied that it was now clear to him that what was proposed was not simply a catalogue, but an analysis. What limits he asked, would be imposed. Thus four or five subject-entries might be given

in describing a single memoir. While recognizing the usefulness of these, he thought some limit would have to be considered.

Professor Foster replied that for three years past the Royal Society had requested each author to give an analysis of his paper in such form that it might serve as a subject-index, and that in a large majority of cases it had been found possible to limit the analysis to three subject-entries.

Professor Rücker pointed out that significant words would serve as a sort of temporary expedient where a sudden interest sprang up in some new discovery, instancing the Röntgen rays. After some further discussion the resolution as to subject-entries was carried unanimously (the Belgian delegates abstaining from voting).

Professor Armstrong then moved that "registration symbols, in accordance with those in the schedules of classification, shall be entered upon the slips in some conspicuous manner, and upon a uniform plan." He explained that at the first Conference schedules in accordance with the decimal system had been prepared and submitted, and that the Conference had decided against them. The plan now proposed is distinctly not the Dewey system. The figures given have no absolute value, and are solely for the purpose of enabling librarians to sort the cards and arrange the material.

This point was emphasized by Professor Rücker, who stated that in a system in which the numbers had an absolute value the method was equivalent to starting a new language, and he did not believe that the average scientific man would learn a language for such a purpose.

Chevalier Descamps addressed himself to the question of classification. He recognized the serious attention which had been given to the subject by the Royal Society, but said that the Society was not the first to take up the study which had been pursued by a large number of authors, men of science and practical men. To provoke a general debate on classification seemed inopportune. He had pointed out in 1896 the possibility of a bibliographical classification based on the decimal system. This did not meet with favor, and the Royal Society had endeavored to produce a purely scientific classification. For its labors it merited the most profound recognition, but he regretted that the Royal Society had not explained the ideas which underlay its schedules. To be good a bibliographical classification should be both stable and elastic. The adoption of a mixed system of symbols, and more especially the lack of identity of meaning of the same symbols in the different sciences, seemed regrettable. He saw no objection to giving symbols a definite significance.

The statement of Chevalier Descamps (of which the above is but a brief abstract) brought from Professsor Rücker an argument which probably expressed the opinion of most of the scientific men present, and is accordingly given in full:

"I think it would be desirable if I say a few words with regard to the very interesting remarks with which Chevalier Descamps has favored us. I think we must all agree that the questions he has raised are questions of the greatest interest to any one who has attempted to take any share in a work of this sort. But I very much regret, speaking for myself, that I find myself at variance with him on several fundamental points. In the first place, he urges us to adopt the scientific system of classification, which shall not change from five years to five years, or ten years to ten years, but which shall hold good for all time, or for a very long period of time. One of the very great advantages of our system is that we recognize that science is a growing subject. The notation that fits it to-day will not fit it next year, or ten years hence. Let us

suppose scientific knowledge had sooner led us to recognize the close relation of electricity and light. Surely the mode of division would be quite different. The definition of Zoology before and after Darwin would have been different. A classification which then appeared to be scientific would now be recognized as inadequate. The very first thing we must recognize is that our scientific knowledge is imperfect and growing, and we must adopt a system capable of easy modification as our knowledge increases. Another point which Chevalier Descamps made was that we adopt different methods with regard to different sciences; in some cases the numbers are followed by symbols; in some cases the numbers are separated by a hyphen, and so on. We have gone into this question as scientific men, and, although perfectly ready to submit the result of our work to the criticism of other scientific men, we do believe that the plan that suits best one science will not suit another. Take one example. Take, for instance, Zoology. There is the question of arrangement of the subject in accordance with the species of animals, and the question of arrangement with regard to the geographical distribution. Here are two ideas to which there is nothing similar in physics or chemistry. It would be disastrous if we attempt to force all these sciences to adopt the same method. If two things are essentially different, we do not apply the same principles to both. In the last place, Chevalier Descamps says the main object of classification is to tell us where to find a particular object with which we are dealing. I do not much believe in the average memory of scientific men being able to grasp a large number of numbers. I believe it is much easier to find the place by using symbols, which are more distinct than a large number is from a small one. Significant words which are for temporary use have their own meaning. You find them alphabetically. I do think, on the question of general principle, that it is very desirable that the Conference should express an opinion as to whether or not they think the symbols are to be devised in such a way as to help the memory or to find the place; secondly, whether they do or do not hold the view that the plan good for one science is good for all, and whether it is desirable to attempt to plan a scheme in the belief that it will hold good for all time."

Dr. Bernoulli said that after hearing the statements in favor of the two systems he wished to add that the decimal system was in actual working order in Switzerland, and that its practical utility had been demonstrated there. He considered it superior to the system proposed by the Royal Society, although originally he had been an opponent of the decimal system.

M. Deniker replied that it was necessary to consult an alphabetic index to use the decimal-system catalogue. He favored a methodical or subject catalogue alphabetically arranged.

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(To be Concluded.)

COLOR-WEAKNESS AND COLOR-BLINDNESS.

IT is generally accepted as a well established fact that the traveling public is fully protected by the present tests for color-blindness to which railway employees and pilots are subjected. Yet several of the mysterious accidents that have occurred during the last two years might be explained on the supposition of color-blindness on the part of responsible lookouts. In fact, I believe myself in position to prove that persons of dangerously defective color-vision actually do pass the regular tests and obtain positions where their defects are continual dangers to public welfare.

In the first place, I have at the present time among my students one who is abso-