Theorem II. For a pack of $P(P^{m-1}+2)$ cards, $m+1$ operations are necessary and sufficient to shuffle the bottom card of one of the P piles into the middle of the pack.

After the first deal it is the first card in its pile; after the second, its number in its pile is $I\left(\frac{p(P^{m-1}+2)+1}{P}\right) = (p \,.\, P^{m-2}+1)$; after the third, $I\left(\frac{p(P^{m-1}+2)+p\,.\,P^{m-2}+1}{P}\right) = (p \,.\, P^{m-2}+p \,.\, P^{m-3}+1)$; after the mth, $(p \,.\, P^{m-2}+p \,.\, P^{m-3}+\ldots+p\,.\,P+p+1)$; after the $(m+1)$st deal it is $I\left(\frac{p(P^{m-1}+2)+p\,.\,P^{m-2}+\ldots+p+1}{P}\right) = (p \,.\, P^{m-2}+p \,.\, P^{m-3}+\ldots+p+2) = p\left(\frac{P^{m-1}-1}{P-1}\right)+2 = \frac{(P^{m-1}+2)+1}{2}$ or it is the *middle* card in its pile.

The number of operations necessary to shuffle the card selected into the middle of the pack is evidently greatest when this card is the bottom [or top] card in its pile. Further, this number will increase (not continuously, however), if the number of cards in each pile be increased, the number of piles being constant. Hence from Theorems I and II it follows: For a pack of n cards, n being an odd multiple of the odd number P such that $P^{m-1} < n \leqq P^m$, m operations are sufficient (and, for the extreme cases, necessary) to shuffle a card chosen arbitrarily into the middle of the pack.

If in the condition $a^{n-1} \geqq b$ we make $b = a^{m-1}$, we get m as the least value of n; if we make $b = a^{m-1}+2$, we get $m+1$ as its least value. But from Dr. Hudson's condition m would be the least value of n in the latter case, contrary to Theorem II.

THE UNIVERSITY OF CHICAGO, *January* 28, 1895.

A CARD CATALOGUE OF MATHEMATICAL LITERATURE.

Répertoire bibliographique des sciences mathématiques. Première série: fiches 1 à 100. Paris, Gauthier-Villars, 1894. Price 2 francs.

AT an international meeting held in Paris in 1889, under the auspices of the French Mathematical Society, it was resolved to prepare a complete bibliography of the literature of mathematics for the period 1800–1889 and of the history of mathematics since 1600. An international committee was

charged with the execution of this plan, and also with the subsequent preparation of supplementary bibliographies to be issued every ten years. M. H. Poincaré was elected president of this *Commission permanente;* its secretary is at present M. C.-A. Laisant.

As it had been decided to arrange this bibliography by subjects, a detailed classification of mathematics was adopted at this meeting and published with the proceedings in 1889. A revised and enlarged edition of this classification was published by the Committee in 1893 (*Index du répertoire bibliographique des sciences mathématiques*, Paris, Gauthier-Villars, 1893, 8vo, xiv and 80 pp.). In October, 1894, the Committee sent out a few additions and modifications, together with a preliminary list (comprising nearly 200 numbers) of the abbreviations to be used for designating the various periodical publications containing mathematical papers.

We have now before us the first instalment of the bibliography prepared by the Committee. It consists of a set of 100 cards, 14 × 8 cm., or about $5\frac{1}{2} \times 3\frac{1}{2}$ in., each of which contains on an average 9 or 10 titles. At the head of every card we find the symbol that indicates the subject-matter to which all the articles entered on this card belong according to the adopted classification. Thus, one of the cards bears the heading $\overline{|D\,6\,c\,\alpha|}$; by referring to the *Index du répertoire bibliographique* it appears that D denotes the group "general theory of functions," etc., that $D\,6$ indicates the subgroup "algebraic, circular, and other functions," $D\,6\,c$ "development of such functions," and $D\,6\,c\,\alpha$ "development of such functions into power-series."

Every entry consists of the name of the author, the full title of the paper, and the reference to the place where it was originally published. This reference is short but complete, giving the name of the periodical in the adopted abbreviation, the number of the volume in full-face type, the first and last page, and the year of publication. The titles of papers written in any language except French, English, German, Italian, Spanish, Portuguese, and Latin are given in French translation only.

This first set of 100 cards contains memoirs from a wide range of periodical literature. Along with a large number of papers from Crelle's Journal and some from the most prominent French periodicals, we notice numerous articles from Portuguese, Norwegian, Russian, Polish, Bohemian, and Hungarian journals and transactions of academies.

It was recently stated by the secretary of the Committee that over 16,000 titles had been received at headquarters from the contributors. This would mean that the material for about 16 sets of 100 cards is ready for the printer. It is

therefore to be expected that the publication will proceed rapidly and will be completed within a reasonable time. The mathematician will then have a card-catalogue arranged by subjects and covering the whole literature of mathematics since the beginning of the present century. The card-system has the great advantage of allowing of easy supplementation in the future.

There can be no doubt as to the great value of such a catalogue to every student and worker in mathematics. Whether the classification of mathematics on which the whole system is based will prove sufficiently elastic for all purposes is a question that can be answered only by experience. Slight defects in the classification will not destroy the usefulness of this magnificent bibliography.

The execution is in general very satisfactory. Somewhat greater accuracy and uniformity in details will probably be attained as the work progresses and the editors learn from experience where slips are likely to occur. In a first venture of this kind perfection is of course impossible.

We notice some want of uniformity in the use of initials and titles with the names of authors. Professors Studnička and Puchta seem to be the only two authors honored with the title of "Dr." It would certainly be best to omit all such titles. The initials, however, should always be given, even when not in the original title. In the cards before us no definite rule seems to have been followed in all cases. Thus, on card 21, we find "Binet" where the original has "J. Binet," "L. Cauchy" for "A.-L. Cauchy"; on cards 20 and 22 repeatedly "J. Jacobi" for "C. G. J. Jacobi"; on cards 13 and 14 "C.-J. Hill" for "C. J. D. Hill." It might also be better to omit the hyphen between the initials, at least for names that are not French. In German names the "von" had better be printed in full, as the form "V." cannot be distinguished from an initial. Kronecker's initial on card 14 should be L. and not N.; Neumann's on card 67 C. and not G. On card 39 for "Buoncompagni" read "Boncompagni"; on card 68 for "Wöpke" read "Woepcke"; on card 26 for "Schlöfli" read "Schläfli."

On the whole the number of misprints does not appear to be greater than must be expected in work of this kind. It is not apparent why two different forms of type are used to mark the *umlaut* in Germanic names; the two dots are certainly better than the two dashes used in some places. The second *a* in the Polish name Zajaczkowski should have an inverted cedilla.

A question of more importance arises in connection with papers published more than once. We notice that Abel's memoirs are referred both to his collected works and to the

original places of publication. But in the case of Jacobi's papers the reference is to the periodical only and not to the works. As the *Répertoire* is planned to include not only the periodical literature but also works published separately (with the exception of text-books not containing any original work), it would certainly be very desirable to add to any title the references to all the places where the paper can be found. But it is quite possible that this would involve so great an amount of editorial labor that it cannot be attempted at the present time.

What is to be desired above all other things is a speedy execution of this capital enterprise which, if successfully carried out, will probably serve as a model for subject-bibliographies of other sciences. ALEXANDER ZIWET.

NOTES.

A REGULAR meeting of the AMERICAN MATHEMATICAL SOCIETY was held in New York, Saturday afternoon, March 30, at three o'clock, the president, Dr. Hill, in the chair. There were twelve members present. On the recommendation of the council the following persons, nominated at the preceding meeting, were elected to membership: Mr. Alton Cyrel Burnham, University of Illinois, Urbana, Ill.; Professor Cooper Davis Schmitt, University of Tennessee, Knoxville, Tenn. Three nominations for membership were received. The following paper was presented:

"On the motion of a body under the action of two centres of force," by Mr. RALPH A. ROBERTS.

In the absence of the author the paper was read by the secretary. The recent publications received by the Society, and a collection of celluloid models of the regular, semi-regular, and stellated regular polyhedra, constructed for the mathematical department of Columbia College by Mr. V. A. Hlasko, of New York, were exhibited at the close of the meeting.

WE regret to announce the death on March 27 last, in his sixty-sixth year, of Professor James Edward Oliver, head of the department of mathematics at Cornell University.

PROFESSOR C. L. DOOLITTLE, of Lehigh University, has been appointed professor of mathematics and astronomy at the University of Pennsylvania, the appointment to take effect at the beginning of the next academic year.

PROFESSOR F. N. COLE, of the University of Michigan, has been appointed to a newly created professorship of mathematics at Columbia College. He will enter upon the duties of his new position in October next.