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