namely, *AA*, *AB*, and *BB*. The *AB* type possesses an *A*, a *B*, and an intense intermediate band. Sex of child had no influence on the appearance of placental phosphatase type. The relative proportions of *AA* and *AB*, which were unknown after examination of serum samples, may be projected from the hypothetical allele frequency given in Table 1, being thus approximately 1 (*AA*) : 4 (*AB*) in individuals of European ancestry. Among 12 placentae from such persons three *AA* and nine *AB* patterns appeared. The numbers involved are small; however, the observed ratio tends to support the inference of simple genetic control. Since the placenta has fetal origin, any genetically determined variation in the alkaline phosphatase of this organ would be determined by fetal genotype. The absence in umbilical cord serum of appreciable placental A and B components presumably results from a selective barrier.

It remains that a direct Mendelian proof of genetic control is unattainable at the moment. Nonetheless, if the A and B zones of serum reflect placental phosphatase heterogeneity, as seems likely, and if this diversity has a simple genetic basis, as suggested by the different proportions of A and B zones in several ethnic groups, then the differences in electrophoretic mobility of A and B zones may be due to a single amino acid substitution in placental alkaline phosphatase molecules. Alkaline phosphatase is abundant in the placenta (*13*), and preliminary observations suggest that considerable enzyme purification with good yield is possible. Consequently, it may be practicable to delineate further the differences between A and B placental phosphatase by peptide analysis utilizing the fingerprint technique of Ingram (*14*).

The multiple procedures employed in this investigation, when supplemented by examination of substrate preference, *p*H optimum, and response to inhibitors, may permit identification of the tissue of origin of the divers serum alkaline phosphatases observed after starch gel electrophoresis (*15*).

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Relative Effectiveness of Document Titles and Abstracts for Determining Relevance of Documents

Abstract. Individuals who received documents through a selective dissemination of information system were asked to determine the relevance of documents to their work interests on the basis of titles and of abstracts. The results indicate that there was no significant difference between the usefulness of titles and of abstracts for this purpose.

In two previous experiments, conducted by me and my associates, results seemed to indicate that titles were as useful as various forms of abstracts for determining the relevance of a specific article for a given purpose. But when titles were compared with abstracts as means of obtaining specific information on specific questions, it was found that abstracts were significantly better (*1*). The purpose of the experiment reported here was to compare the effectiveness of titles with that of abstracts when they were used for the purpose of notifying research workers of the availability of documents which might be relevant to their work interests.

During 1960, a selective dissemination of information system was in operation in the Advanced Systems Development Division of the International Business Machines Corporation. One of its purposes was to notify scientists, engineers, managers, and technicians in the organization of the availability of documents which might be relevant to their work interests and to give them the opportunity to order individual copies. A general description of a system of this kind is given by H. P. Luhn (*2*). The system discussed here and an earlier version of it have been described in detail (*3*).

Briefly, the system consists of matching key words that state the interests of users with key words selected from documents processed by the system. When a predetermined percentage *p* of matches occurs, a notification is sent to the user. In the experiment under discussion this percentage was set at between 0.20 and 0.28 (for 93 percent of the documents processed, *p* was at 0.20).

The notification consists of the IBM card printed with the title of the article, the name of the author or authors, the abstract, the source of the document, and the number of pages. Upon receiving the notice, the user determines, among other things, whether or not he is interested in receiving a copy of the document (*4*); if he is, he responds appropriately and is sent a copy. These responses to notices are called "first responses." After reading the document, the user again responds, indicating whether or not the document was in fact relevant to his interests. These are called "second responses." From the results of previous experiments it appeared that utilizing the title only would be as effective for the purpose of ordering documents as utilizing both the title and the abstract. Two hypotheses were formulated to test this assumption.

1) There is no significant difference between the ordering rate for documents when titles are used for notification and the rate when a combination of titles and abstracts is used. ("Hard copy orders on first responses.")

Table 1. Rates of ordering and accepting documents on the basis of notification by title and by title and abstract.

First response (%)		Second response: Judgments of relevance of hard copies received (%)
Hard copy orders	Accepted notifications*	
Notification by title only		
24.6	55.8	61.8
Notification by title and abstract		
24.5	58.1	58.9

* Any of the following responses constitutes an accepted notification: (i) A hard copy is ordered; (ii) the document is of interest, though a hard copy is not ordered; (iii) the document is of interest and the user already has a copy.

2) There is no significant difference between the rate of acceptance of documents ordered on the basis of titles alone and the rate of acceptance when the document is ordered on the basis of title and abstract. ("Judgments of relevance on second responses.")

During the experiment the normal operating procedure for the system was followed, except that some of the notifications contained only the title, author or authors, source of document, and number of pages, whereas others included the abstract. Four hundred documents were selected for the experiment. These documents consisted of internal I.B.M. reports and published journal articles. Since there was no way to control the type or number of documents received by the system, it was decided to process the normal document flow as it came into the system from the various document sources. As a result, 51 percent of the documents processed were articles from the *Journal of Applied Physics,* 36 percent were internal I.B.M. reports, and 13 percent were internal I.B.M. patent disclosures.

Incoming documents are numbered consecutively in this system. Four hundred document numbers were selected and separated into two groups, on a random basis. Notifications of corresponding documents in one group contained title and abstract; notification of documents in the other group contained the title only. The documents were processed in the normal fashion, and notifications were distributed to some 400 users who were served by the system in the course of the experiment. The users were not told that an experiment was taking place. The only change from the usual procedure that they might notice was that some of the notification cards did not contain abstracts.

Results with the nonparametric Mann-Whitney U test (*5*) showed that both hypotheses could be accepted at the .05 level—namely, that (i) there is no significant difference in ordering rates for documents when titles are used for notification purposes and when a combination of titles and abstracts is used; (ii) there is no significant difference in the rates of acceptance of documents ordered on the basis of titles alone and of documents ordered on the basis of both title and abstract (see Table 1).

Because the documents were from only three sources, one might expect that the source of the document had considerably biased the results of the comparison. When, however, the source of the document was considered, it was found that both hypotheses were still tenable (see Table 2). The first-response acceptance rate for the entire document population was approximately 57 percent. It was interesting to note that there was considerable variance with respect to sources of the document on both the first and the second response. For example the second-response acceptance rate for the *Journal of Applied Physics* was approximately 53 percent, whereas the second-response rate for the internal I.B.M. patent disclosures was about 70 percent and that for the internal I.B.M. reports was about 63 percent (see Table 2). In spite of these large variances, there were no significant differences in second-response acceptance rate *within* the title and abstract groups.

Table 2. Rates of ordering and accepting documents, by document group, on the basis of notification by title and by title and abstract.

Document group	First response (%)		Second response: Judgments of relevance of hard copies received (%)
	Hard copy orders*	Accepted notifications†	
	Notification by title		
Patents	32.8	54.2	72.6
Internal reports	30.0	60.6	67.7
J. Appl. Phys.	19.6	53.9	52.7
	Notification by title and abstract		
Patents	33.2	54.1	67.3
Internal reports	36.2	68.2	59.9
J. Appl. Phys.	16.3	53.8	54.3

* Differences between values in rows 1 and 3, 2 and 3, 4 and 6, and 5 and 6, respectively, are significant at the .05 level or below. † Differences between values in rows 2 and 3, 4 and 5, and 5 and 6, respectively, are significant at the .05 level or below.

An interesting sidelight was that, despite the fact that most of the 400 users had been regularly receiving abstracts along with the titles for over 6 months, when the abstracts were omitted from 2092 notifications generated from 200 different documents, only seven users registered any complaints.

The results clearly indicate that at the percentages of match (p) utilized in this experiment there were no significant differences, at the .05 level, between titles and abstracts as notification media for this particular system. From all indications it seems that the setting of p is one of the critical variables in determining whether a document is accepted or rejected by the user. In an earlier experiment (*3*), when p was set at 0.08, rather than between 0.20 and 0.28, the rate of acceptance of notifications was only about 41 percent as opposed to about 60 percent in this experiment. Thus one can conclude that increasing the required percentage of match makes it more likely that the document will be of interest to the user, and that consequently a higher percentage of documents will be ordered. Thus, if there were a significant difference in acceptance rate, it would be less noticeable with a high p. Therefore, it seems that if significant differences are to be found they would occur when p is at some low value. This experiment shows that the value must be below 0.20. This fact has little practical utility, however, since selection of low values of p is inconsistent with the objective of effective selective dissemination of information. Selection of low values of p generally results in sending users a high proportion of unwanted notifications.

Other areas for research which could be considered are the effect of the quality of key words selected from documents for matching with users' interests. Is the educational level or professional background of the encoder a significant factor in the selection of key words, and hence in the results in a given experiment? Would a list of key words or descriptors for each document furnished the user be of more use for deciding the relevance of documents than either titles or abstracts?

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Cytogenic Behavior of a Knobbed Chromosome 10 in Maize

Abstract. Unlike maize plants heterozygous for the abnormal chromosome 10 (K10) and the normal chromosome 10 (k10), those heterozygous for a knobbed chromosome 10 (K_T10/k10) do not undergo preferential segregation or "meiotic drive." Ting's chromosome 10, however, does show neocentric activity, although the extent of this is not as pronounced as is the case in K10 homozygotes. The K_T10 chromosome is considerably shorter than and is cytologically distinguishable from the K10 and the k10 chromosomes.

In the *A* genome of maize there exist several morphologically distinct forms of chromosome 10. The knobless form (k10) is the most frequently encountered one and is the shortest of the *A* chromosomes. The rare forms have been designated as "abnormal" and are longer than and uniquely different from the "normal" chromosome 10. The origin of these abnormal chromosomes 10 is still to be established, although Ting has proposed a possible mechanism (*1*).

The abnormal chromosome 10 designated as K10 is characterized by the presence of three small but conspicuous chromomeres in the region corresponding to the distal one-sixth segment of the long arm of the normal chromosome 10 and by the presence of a foreign segment of chromatin possessing a very large heterochromatic knob in the subterminal position. Of the several forms of abnormal chromosomes 10 present in the maize genome, this K10 form is the most common (*2*). In the presence of this abnormal chromosome, several intriguing events occur: (i) the formation of neocentromeres in regions other than the true centromeres (*3, 4*); (ii) the precocious anaphase movement of chromosomes possessing such newly arisen centromeres during meiosis with the neocentric regions leading the chromosomes to the poles (*3*); (iii) the preferential segregation or nonrandom recovery of certain chromosomes in the egg cells during megasporogenesis (*4, 5*); and (iv) an increase in the frequency of chiasma formation (*6*) and crossing over (*7, 8*) in the chromosomes thus far studied. The neocentric activity is especially pronounced in plants homozygous for the K10 chromosome, and it is not uncommon to observe highly attenuated chromosomes at meiotic anaphases.

A second form of abnormal chromosome 10, here designated as Ting's abnormal choromosome 10 (K_T10), is readily distinguishable from the K10 form. The K_T10 chromosome is longer than the normal chromosome 10 by approximately one-fifth the length of the latter. In the subterminal position of this abnormal chromosome is located a large knob, and in the region corresponding to the distal one-sixth of the long arm of the normal chromosome 10 is found a single chromomere which is very often quite conspicuous. Ting found this particular form of chromosome 10 in one of three plants from a cross between a Peruvian variety and a U.S. inbred strain. The plant possessing the K_T10 chromosome carried no supernumerary or *B*-chromosome, while each of the other two sister plants was homozygous for the normal chromosome 10 and possessed a single *B*-chromosome. According to Ting, the foreign piece of the K_T10 chromosome closely resembles the proximal region of the *B*-chromosome which includes the terminal centromere and the large, elongate, pycnotic region (*1*). He also reported the existence of a "high degree of 'homology'" between the knob of the K_T10 chromosome and the pycnotic regions of the *B*-chromosome (*9*). It is of interest to note that Rhoades and Dempsey found no appreciable frequency of association between the knob of the K10 chromosome and the *B*-chromosome (*10*). Because of the frequent association of the pycnotic regions of the K_T10 chromosome and the *B*-chromosome and the apparent morphological similarity between the foreign segment of the K_T10 chromosome and the proximal region of the *B*-chromosome, Ting has suggested that the K_T10 chromosome arose as a consequence of a simple translocation involving the normal chromosome 10 and the *B*-chromosome (*1*). As is the case with the K10 chromosome, neocentric activity was observed during the two meiotic divisions of microsporogenesis in plants carrying the K_T10 chromosome (*1*).

During the course of the present study it was found that Ting's abnormal chromosome 10 is considerably shorter than the K10 chromosome, the end of the long arm approximately coinciding with the position occupied by the most distal of the three conspicuous chromomeres of the K10 chromosome. Furthermore, the knob present on K_T10 is only about a third as large as that found on the K10 chromosome. Insofar as neocentric activity is concerned, plants homozygous for the K_T10 chromosome display activity not unlike that found in K10/k10 heterozygotes.

Inasmuch as both forms of abnormal chromosome 10 possess neocentric activity and since the preferential segregation hypothesis (*3, 4*) involves the action of these neocentromeres, it was deemed of interest to ascertain whether Ting's abnormal chromosome 10 is also capable of inducing preferential segregation during megasporogenesis. The data presented below represent the results of the initial experiment.

In this experiment the normal or k10 chromosome was genetically marked with the dominant *R* (aleurone color) factor, whereas the abnormal partner, K_T10, was marked with the recessive *r* (no aleurone color) allele. At the same time, one of the chromosomes 9 which

Table 1. Results from backcrosses of *R* k10 / *r* K_T10; $K^{M}9$ *Sh* / $K^{S}9$ *sh* compounds.

Family	Kernels (No.)						$\chi^2(1:1)$	*P*
	R	*r*	Total	*Sh*	*sh*	Total		
61 : 35	1366	1332	2698				0.428	> .50
61 : 36	1388	1380	2178				0.649	> .30
Totals	2704	2712	5416*				0.012	> .90
61 : 35				975	956	1931	0.042	> .80
61 : 36				1053	1049	2102	0.0076	> .90
Totals				2028	2005	4033*	0.132	> .70

* The two populations are not of identical size because a few of the plants were pollinated by *r* testers homozygous for the *Sh* factor.