The plants from x-rayed seeds were grown under several widely different environments to determine whether it was possible to prolong their existence. These included various temperatures and light and dark chambers, but without exception death occurred in a similar manner under all conditions.

Something suggestive of delayed killing may be observed in old seed. In samples of maize that have been kept until they are nearly dead there will often be seeds that will sprout but die in the seedling stage. The delayed death of old seed, however, is not as clear cut as in x-rayed material and appears to differ in its nature. A few observations were made on the seedling stages of maize seeds injured by heat at 60°–65° C. In this material nothing in the nature of delayed death was found. All seeds that germinated in the sense of producing root and shoot continued to grow with no indication of "delayed killing."

Root tip material of maize seedlings from x-rayed seeds, old seeds and heat-treated seeds were examined cytologically by Dr. A. E. Longley. He found the number of dividing cells in all treated material to be much less than in controls. In the x-rayed material all mitoses were abnormal, many figures exhibiting pycnosis. The abnormality varied in degree from divisions with lagging chromosomes to those in which the chromatin was an undifferentiated amorphous mass. Dividing cells in the old material, though less numerous than in the x-rayed material, showed normal mitosis. In the heat-treated seeds there were dead areas and adjacent to these areas the cell divisions were normal.

These cytological findings are not in complete agreement with those reported in other species.

Working with *Crepis tectorum* L. Navashin[2] found chromosome aberrations in the root tips of plants from old seed that were strikingly like those in x-rayed material. In the later work Shkvarnikov and Navashin,[3] using high temperature to hasten the aging process, got similar results. The illustrations in their publication suggest that seeds of Crepis subjected to 25,000 r units show something similar to the delayed killing in maize.

Peto[4] reports an increasing mutation rate in maize with increasing age and in barley with high temperature, using chromosomal derangements as a measure of mutation.

Our failure to get abnormal mitoses with heat may be associated with the method used, but the absence of chromosomal abnormalities in the old seed examined by Longley is an outstanding difference.

[2] M. Navashin, *Nature*, 131: 435, 1933.

[3] P. K. Shkvarnikov and M. S. Navashin, *Jour. de Biol.*, 4: 25–38. 1935. (Russian with English summary.)

[4] F. H. Peto, *Canadian Jour. of Research*, 9: 261–264, 1933.

From our limited cytological study it appears that in maize the primary effect of lethal dosages of x-rays is to derange the mechanism of mitosis to an extent that prevents the orderly separation of the chromosomes. Since cell division and growth continues for a time in the absence of normal mitosis it would appear that the cessation of cell division is an indirect effect of x-rays. In the absence of properly distributed chromatin, cells may divide, but the process can proceed but a short time. With aging or heat our experiments indicate that the mechanism of mitosis is unaffected and death appears to follow a more general failure of protoplasmic activity.

Aside from cytological considerations, if delayed killing proves to be peculiar to x-ray treatments, it will indicate a fundamental difference between the operation of x-rays and other lethal agencies.

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SOME PROPERTIES OF BAKED SOAPSTONES

HIGH-GRADE soapstone has been mined for centuries in China for the manufacture of carved utensils, ornaments, images of various forms, etc. According to Professor Jung Keng, of Yenching University, an expert in Chinese archeology, Chinese carvers of the Ming Dynasty (as far back as A.D. 1600, if not earlier than this) already knew that after it has been baked to certain temperature, soapstone will undergo a great change in its hardness and so they made use of this very property to prevent the particular characters and figures that they had carved on soapstone from being ground off by others.

Nowadays the uses of soapstone are many and varied and its suitability for certain uses depends closely on its physical and chemical properties. The authors present the following results of their tests on twenty-one samples of soapstone, collected from Hopeh, Shantung, Kiangsu, Chekiang and Fukien provinces, China.

I. *Volume resistivity of soapstones as a function of their baking temperatures.* By means of both the galvanometer and electrometer methods, as used by Curtis,[1] the volume of resistivity of 21 samples were measured, most of which are given in Fig. 1. It is seen that samples Nos. 1, 2, 20 and 21 are very suitable for electrical insulation at high temperatures. The rest either have been cracked into pieces at comparatively low baking temperatures or have much lower values of volume resistivity.

[1] H. L. Curtis, "Insulating Properties of Solid Dielectrics," *Bulletin of the Bureau of Standards*, 11: 359–383, 1913.

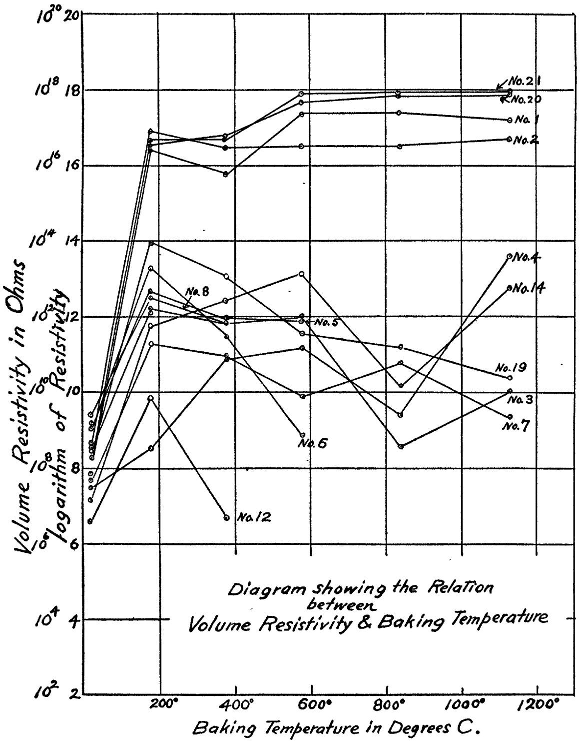

FIG. 1.

Samples Nos. 1, 2, 20 and 21 were again baked up to as high as 1870° C. and their corresponding volume resistivities computed and listed in Table 1.

TABLE 1

Sample	Sample baked up to 1130° C.	Sample baked up to 1350° C.	Sample baked up to 1700° C.	Sample baked up to 1870° C.
No. 1	1.30×10^{17}	1.15×10^{17}	9.6×10^{16}	1.0×10^{17}
" 2	4.37×10^{16}	5.56×10^{16}	3.25×10^{16}	1.25×10^{16}
" 20	6.85×10^{17}	2.30×10^{17}	2.10×10^{17}	1.68×10^{17}
" 21	7.50×10^{17}	6.78×10^{16}	5.81×10^{16}	5.40×10^{16}

It is evident that on further baking beyond 1130° C. the volume resistivity of these four samples decreases gradually.

II. *The compressive strength of soapstones.* The four samples mentioned above were tested by a laboratory oil press and showed the result given in Table 2.

TABLE 2

Sample	Compressive strength in pounds per square inch	
	Raw state	After baking up to 1130° C.
No. 1	2,500–3,300 lbs.	14,000 lbs.
" 2	2,000–2,500 "	10,000 lbs.
" 20	4,500–6,500 "	over 16,000 lbs.
" 21	2,000–2,800 "	over 16,000 lbs.

III. *Action of acids and alkalies on soapstones.* Raw and baked soapstones of these four samples have shown no noticeable sign of slight chemical change after being dipped for five minutes into concentrated hydrochloric, nitric and sulfuric acids and sodium hydroxide.

IV. *Hardness of raw and baked soapstones.* These four samples are approximately of the same order of hardness as that of quartz, which is about 6. In consequence of this great change in its hardness, from 1 to 6, baked soapstone can not be machined by ordinary shop tools.

V. *Change of colors at different baking temperatures.* See Table 3.

TABLE 3

Sample	At 22° C.	180° C.	380° C.	580° C.	840° C.	1130° C.
No.1	grayish white	gray	dark gray	dark gray	white	white
" 2	light pink	gray	dark gray	dark gray	white	white
" 20	grayish white	gray	dark gray	dark gray	white	white
" 21	grayish white	gray	dark gray	dark gray	white	white

VI. *Linear shrinkage and loss of weight after being baked.* After being baked to a temperature of 850° C.: (a) The average linear shrinkage of these samples is about 1 per cent.; (b) the loss of weight is about 5 per cent.

These results, together with others, will be published in detail in the forthcoming issues of the *Journal of the Chinese Chemical Society.*

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

THE DEMONSTRATION OF INTACT NERVOUS SYSTEMS OF INVERTEBRATES BY MACERATION OF WHOLE ANIMALS

Cornwell[1] has demonstrated the nervous systems of vertebrates by the maceration of whole animals with 30 per cent. nitric acid. We were curious to know whether this maceration method would work satisfactorily upon invertebrates and whether or not the logic used for the explanation of this phenomenon could be verified. The present report records the results obtained when using the nitric acid maceration method upon invertebrates having nervous systems

1 W. S. Cornwell, Science, 79: 162–163, 1934.