Table 1. Amounts of Po^{210} in 20 vegetable samples and their associated soils. One tissue and one soil sample were taken from each site. The standard deviation is the ratio of the square root of the number of counts per minute to the time. The relative error is the ratio of the standard deviation to the observed result. The background was subtracted from the values.

Sites (No.)	Soil type	Mean activity of Po^{210} ± S. D. (pc/g)	
		Soil	Tissue
2	Loamy sand	1.92 ± 0.13	−0.04 ± 0.09*
13	Silt loam	2.05 ± 0.12	−0.04 ± 0.09†
5	Muck	5.92 ± 0.27	0.00 ± 0.09‡

* Carrots, snap beans. † Cabbage, cucumbers, red beets, sweet corn. ‡ Carrots, onions, potatoes, radishes, red beets.

not in samples of as much as 100 g (dry weight) of sweet-corn tissue. There were no detectable amounts of Po^{210} in the vegetable samples, whether storage was for 6 or for 11 months.

Table 1 shows the content of Po^{210} in soils in which various vegetable crops were grown. More Po^{210} was found in muck soils than in mineral soils. The average value of Po^{210} in five muck soils was 5.92 pc/g, while the 15 mineral soils contained an average of 2.03 pc/g. The higher concentration of Po^{210} in muck soils may have been caused by an accumulation of Po^{210} or its radioactive precursors in the organic matter. A likely precursor would be Rn^{222}, which is known to be in the soil atmosphere in relatively large concentrations (10^5 to 10^6 pc/m^3) (*6*), as well as in the atmosphere in concentrations of 50 to 200 pc/m^3 (*7*).

Table 2. Amounts of Po^{210} in cured tobacco leaves, in green leaf tobacco, and in their associated soils. With the cured leaf tobacco one tissue and one soil sample from each site were tested; for the uncured tobacco eight tissue and three soil samples were tested.

Site	Mean activity of Po^{210} ± S.D. (pc/g)		
	Soil	Leaf after 6 months' storage	Leaf after 11 months' storage
Cured leaf tobacco			
Coon Valley	3.56±0.17	1.20±0.08	1.03±0.08
Westby	2.92± .17	0.77± .06	0.69± .06
Viroqua	2.83± .17	1.29± .10	1.54± .08
Soldiers Grove	2.53± .16	0.34± .04	0.34± .04
Viroqua	2.44± .17	1.29± .10	1.50± .10
Edgerton	2.28± .13	0.98± .08	0.64± .08
Edgerton	2.28± .13	0.77± .04	0.87± .06
Coon Valley	2.27± .13	0.60± .06	0.17± .01
Ferryville	2.14± .17	1.33± .08	1.50± .08
Coon Valley	1.76± .13	1.03± .06	1.13± .08
Uncured green leaf tobacco			
	3.46± .17	0.00± .09	0.00± .09

Po^{210} activities in samples of cured leaf tobacco and in the soils associated with these samples are shown in Table 2. The average amounts of Po^{210} in cured leaf tobacco after 6 months of storage and in soil samples were 0.96 and 2.50 pc/g dry weight, respectively. All cured tobacco samples were analyzed again for Po^{210} after 11 months of storage, and the results were similar.

Twenty-one freshly harvested tobacco leaf samples, 11 greenhouse-cultured and 10 field-grown samples, failed to show any detectable activity of Po^{210}, even after some samples were stored 6 months in a dry, ground state. A significant amount of Po^{210} was found, however, in the associated soils. Also fresh bluegrass leaf samples, harvested in May 1965, did not contain detectable Po^{210}, nor did the same samples 3 months later. Since freshly harvested tobacco samples showed no detectable Po^{210} even after considerable time for ingrowth, whereas cured tobacco contained significant quantities of Po^{210}, it appears that Po^{210} accumulates in the tobacco leaf during curing.

Analysis of dead tree leaves (7.2 pc/g) and of dead bluegrass (6.6 pc/g) showed that they had 7 to 8 times more Po^{210} than did cured tobacco (0.96 pc/g). These moist samples were taken near the soil surface in the spring of 1965. Heads of dead cabbage left in the field over winter had in their outer leaves 5 to 6 times more Po^{210} than did cured tobacco. A definite decrease in Po^{210} content was found with increasing distance from the outermost leaves. The first and second leaves contained 5.4 pc of Po^{210} per gram of dry tissue, whereas the fourth, fifth, and sixth leaves contained 1.03 pc/g. The inner portion, from the seventh leaf to the core of the cabbage heads, showed no detectable Po^{210}. Most of the Po^{210} in the cabbage heads was found in the outermost two leaves. The dead inner portion of the cabbage heads should have also contained Po^{210} if this element or one of its radioactive precursors was taken from the soil. Therefore, the sorption of Po^{210} or of its radioactive precursors may occur at the atmosphere-plant interface.

There are then three kinds of evidence suggesting that Po^{210} is not taken up from the soil directly by plant roots and translocated to other plant organs. First, no detectable quantity of Po^{210} was found in the center of the cabbage heads. Second, common extracting solutions used to evaluate "available" forms of many mineral elements failed to extract from various vegetables a detectable amount of Po^{210}. Third, even after sufficient time for ingrowth, there was no detectable quantity of Po^{210} in green leaf tobacco grown in a soil medium containing significant amounts of Po^{210}.

A common extracting solution (0.1*N* HCl and 0.03*N* NH_4F) for available soil phosphorus and potassium was used to determine how much available Po^{210} was in the above soils (*5*); none was detected. Extracting solutions of 1*N* ammonium acetate and 0.2*N* HCl gave similar results, suggesting that Po^{210} does not exist in an available form in the soil complex.

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Centrifugal Homogenizer

Abstract. *Tissue can be homogenized in conventional ground-glass tissue grinders in conjunction with centrifugation. The method may be of special value for separating soluble from insoluble material during homogenization of tissue. As yet only yeast cells and spores of slime mold have been homogenized, but the method may be useful for many tissues.*

Tissue is homogenized by various mechanical devices including ground-glass tube and pestle grinders, Waring blenders, VirTis grinders, French hydraulic presses, and ultrasonic vibrators (*1*). I have developed a new technique of homogenization in conventional ground-glass tissue grinders in conjunction with centrifugation (Fig. 1). In the pilot model a tissue grinder was adapted for use with an Inter-

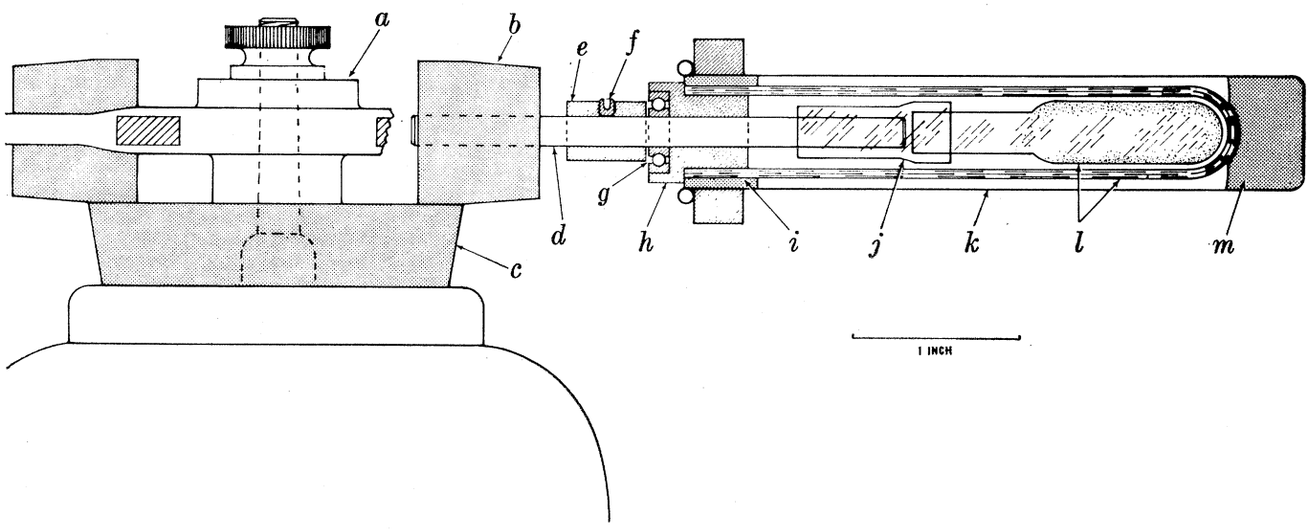

Fig. 1. Homogenizer, longitudinal section. (*a*) Centrifuge head, (*b*) rubber-stopper drive, (*c*) stationary rubber stopper, (*d*) aluminum shaft, (*e*) manganese collar, (*f*) locking screw, (*g*) ball bearing, (*h*) manganese plug, (*i*) rubber gasket, (*j*) plastic-tubing connector, (*k*) metal centrifuge-tube holder, (*l*) ground-glass tube and pestle, (*m*) rubber cushion.

national clinical centrifuge, model 49891H. The rotation of the centrifuge is transferred to rotate the pestle of the grinder, while the centrifugal force of the centrifuge maintains the tissue at the bottom of the tube where grinding is effective. As homogenization proceeds the solubilized material at the bottom of the tube is continually displaced by intact cells or by particles of higher density.

One unit of the device consists of a ground-glass homogenization tube and pestle. The glass shaft of the pestle is attached to an aluminum shaft by a length of plastic tubing. The shaft is centered in the tube by a magnesium plug into which a ball bearing is inserted. The shaft is machined to fit through the bearing with sufficient clearance to allow free adjustment of the shaft for regulation of the depth of the pestle in the tube. A small manganese collar fitted with a set screw, through which the shaft may slide, is adjusted after the pestle is positioned, so that it rests against the inner bearing surface; the collar is then locked to the shaft by the set screw and prevents the pestle from being forced to the bottom of the tube by gravity (in which event abrasion between the two surfaces would soon destroy the homogenizer). The collar also rides on the inner surface of the bearing; when the shaft turns, friction between shaft and bearing is negligible. The homogenizer is mounted on and rotates with the centrifuge, while the shaft of the homogenizer is rotated by friction between the rubber stopper on the end of the shaft and the stationary stopper mounted at the base of the centrifuge. Preliminary tests with slime-mold spores and yeast cells indicate that homogenization is effective and rapid with the homogenizer shaft turning at 3000 to 4000 rev/min.

Many refinements of the apparatus are possible. Tests have been restricted to the cells mentioned. Homogenization of other types of tissues may be improved by mounting a small cutting blade on the pestle shaft; the resultant small fragments of tissue would be further homogenized upon reaching the grinding surface. Specific tasks, such as isolation of intact nuclei from cells, could be accomplished by selection of appropriate ground-glass homogenizers. Sonic vibration or other principles of homogenization might be incorporated in the system. Installation of the device in a refrigerated centrifuge, with homogenizer speed independent of centrifuge speed, should control excessive heating. The method may be of special value for separating soluble from insoluble material during homogenization of tissue.

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Classical Conditioning of Electric Organ Discharge Rate in Mormyrids

Abstract. *Weakly electric fish of the African family Mormyridae emit pulses at variable intervals with a distribution skewed toward longer intervals. Fourteen specimens of the genera* Mormyrops, Gnathonemus, *and* Marcusenius *were classically conditioned to increase briefly their discharge frequency. The unconditioned stimulus was electric shock and the conditioned stimulus was light. These results are novel in that the overt conditioned response involves neither secretion nor movement.*

The rate of discharge of electric organs in freshwater fish of the African family Mormyridae is known to vary spontaneously and to be accelerated (or sometimes decelerated) by a variety of novel or noxious stimuli (*1*). The electrophysiology and morphology of the electric organs in these and other weakly electric fish have been described in detail (*2*). These organs