and nonequilibrium systems. In quantitative work it will be necessary to determine ε_0[1] experimentally or to estimate it theoretically. In many experiments an appreciable fraction of the substrate is allowed to react. From equation (12) and Fig. 1 it is obvious that the isotope effect decreases with the amount of reaction and thus the isotope effects in the use of C^{13} and C^{14} will be even smaller than .12 and .25 respectively.

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Shielding of Syringes Used for Injecting Radioactive Solutions[1]

H. C. Dudley, J. F. Bronson, and R. O. Taylor

Naval Medical Research Institute, National Naval Medical Center, Bethesda, Maryland

The delayed general effects of total body radiation, intermittant, subclinical, and of no apparent immediate significance, have had serious consequences for some radiologists and radium therapists (*3*, *5*). The introduction of radioisotope therapy offers additional sources of exposure to these persons since they are, in general, best trained to handle the new tools. Similarly, lesions appearing on the hands of some radiologists later in life indicate the latent effects of localized ionizing radiations (*2*, *4*).

During an investigation of the biological significance of radiogallium (Ga^{72}), it was found that for protection against the strong gamma spectrum (2.5 mev) of this isotope some type of remote central apparatus or some dense shield over a standard syringe was necessary. Because of the difficulty of using a remote control injection apparatus clinically, there have been designed and constructed two types of shields to be placed over syringes of standard stock sizes.

Fig. 1 presents details of construction of a two-piece Lucite shield adequate to protect the hands of persons injecting alpha emitters and beta emitters having energies less than 2 mev. This type of shield offers protection against the following isotopes: C^{11}, C^{14}, F^{18}, P^{32}, S^{35}, Cu^{64}, and Sr^{89}. It is emphasized that the isotopes listed here emit no gamma radiation. For those which do, the metal shield described in Fig. 2 must be used.

The design of the Lucite shield (Fig. 1) is similar to that described by Anthony and Norris (*1*), the essential difference being in arrangment for locking the needle in place by tightening the threaded top. This prevents loosening of the needle and subsequent leakage, which is a serious hazard when very active or long half-life isotopes are being injected.

[1] The opinions or assertions contained herein are the private ones of the writers and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

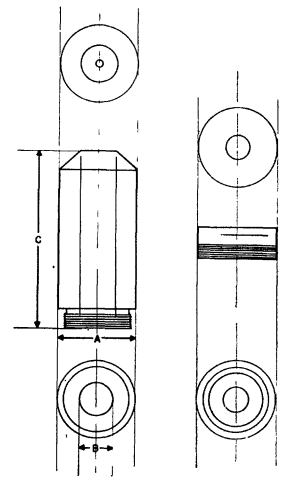

FIG. 1. Plastic syringe holder.

Dimensions:		A	B	C
Size	1/4 cc.	1 1/2 in.	5.5/16 in.	3 11/16 in.
"	1 "	1 "	3/8 "	2 15/16 "
"	5 "	1 3/16 "	10.5/16 "	4 "

Fig. 2 presents details of a metal syringe shield which has been constructed in sizes to fit all standard syringes from 1/4 cc to 30 cc. This piece of apparatus is made by filling an aluminum tube with a commercially available lead alloy (type metal—82 Pb, 12 Sb, 4 Sn), and machining to the dimensions shown in Fig. 2. The slot, which is milled in the metal case, permits observation of liquid levels, absence of air bubbles, etc. To facilitate these observations, a dark colored solution is preferable, and the inside surface of the shield is coated either with

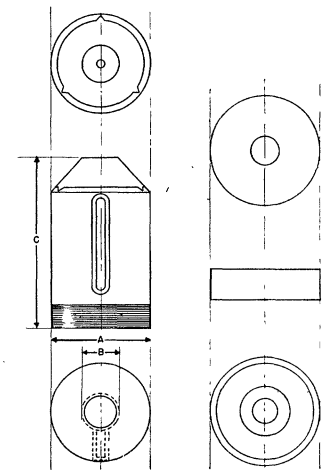

FIG. 2. Metal (Pb) syringe holder.

Dimensions:		A	B	C
Size	1/4 cc.	1 1/2 in.	5/16 in.	3 1/4 in.
"	1 "	1 1/2 "	3/8 "	4 3/16 "
"	5 "	2 "	3/4 "	3 3/4 "
"	10 "	2 "	7/8 "	4 3/4 "
"	20 "	2 1/2 "	1 "	5 1/2 "
"	30 "	3 "	1 1/8 "	6 3/4 "

a phosphor activated by radioactive emanations or by some luminous dial paint.

These shields have been used when studying the biological effects of radiogallium (Ga^{72}) which has an unusually energetic spectrum (β 3.1 mev, γ 2.5 mev). Persons wearing film badges and pocket electroscopes on the body and on the hands have received less than 20 milliroentgens (mr) total body radiation and less than 40 mr on the hands, when injecting solutions of 0.4 mc/ml activity, in quantities up to 4 mc per injection and a total of 25 mc.

The difficulties encountered in using shields of the types described are those of manipulation, due to their size and weight, particularly of the metal shields.

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Erroneous Ascorbic Acid Values Resulting from Interference by Anthocyanins

G. F. Somers, W. C. Kelly, E. J. Thacker, and Anna May Redder

U. S. Plant, Soil, and Nutrition Laboratory, Agricultural Research Administration, Ithaca, New York

The determination of ascorbic acid in anthocyanin-containing plant products presents special problems. If the usual indophenol dye reduction methods are used, the color due to anthocyanin is very similar to that of the dye in acid extracts. In highly colored extracts, it then becomes desirable to eliminate this color. This is easily accomplished by a xylene extraction of the excess dye following the reaction of the dye with ascorbic acid (*1, 2, 5*). Anthocyanins are not extracted by xylene under these conditions. This procedure has been used in the analysis of colored plant materials (*3, 5*).

We attempted to use a xylene extraction method (*2*) for determining the ascorbic acid content of red beets. As previous workers had reported, it was found that the anthocyanin, betanin, was not extracted by xylene and hence did not interfere with the determination due to its color *per se*. However, analytical difficulties of another sort were encountered. It was found, for example, that aliquots of a single metaphosphoric acid extract of beet hypocotyl did not check if the aliquots were of different sizes. Also, similar metaphosphoric acid extracts containing different amounts of tissue per unit volume failed to give comparable results. When aliquots of such extracts were treated with formaldehyde (*6*), the capacity to reduce the dye was decreased to only about one-half its original value. Ascorbic acid is rendered nonreactive under these conditions, and in the absence of interfering substances formaldehyde-treated aliquots no longer reduce the indophenol dye. Hence, it was concluded that these extracts contained appreciable quantities of reducing substance (or substances) other than ascorbic acid. It was observed that this residual reducing capacity was closely correlated with the color of the metaphosphoric acid extracts (coefficient of correlation $= +0.724$, $n = 81$).

These observations led to an investigation of the extent of similar interference in other anthocyanin-containing products. In fresh fruits the amount of interference was found to be small; but in a number of fruits stored for months at 0° F, during which time the ascorbic acid largely disappeared, the amount of interference became relatively important.

In order to determine whether or not anthocyanins were the cause of the interference, an attempt was made to isolate various anthocyanins in more or less pure form and to study their reaction with the indophenol dye. It was found that betanin could be obtained in a somewhat concentrated form as follows: Fresh beets were sliced and frozen and the juice was pressed out; this juice was frozen and dried *in vacuo*. When the resulting powder was suspended in water and adjusted to about pH 3.5, the anthocyanin was precipitated by adding ethyl alcohol to give a concentration of about 80%. The precipitate was washed with 95% ethanol and then with acetone by centrifuging, and dried *in vacuo*. The resulting red powder was readily soluble in water and it reacted with the indophenol dye in much the same way as the interfering material present in extracts from fresh beets. Its reaction was not prevented by formaldehyde. Betanin isolated according to the procedure of Pucher *et al.* (*4*) reacted in a similar manner. Thus, it appears evident that the interfering material in extracts from fresh beets is the anthocyanin, betanin.

In view of these results, it seemed desirable to determine the antiscorbutic activity of the concentrated anthocyanin by means of a bioassay. Betanin was prepared from lyophilized beet juice by alcoholic precipitation as outlined above. This material was then assayed chemically and was fed to guinea pigs at the rate of 4 mg daily of apparent ascorbic acid (chemical assay) per animal. The bioassay selected was the depletion technique as used by Tressler, Mack, and King (*7*). From the results obtained it was concluded that the anthocyanin concentrate had no antiscorbutic activity for the guinea pig.

These results will be reported in greater detail elsewhere.

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