ionizing radiation. Such reactions could be continuous until the dithiol was completely destroyed. If the proportion of dithiol to oxidizers was in favour of the latter, this could explain the increased $ST50$ day and the unaffected total mortality observed in the group receiving the dithiol immediately prior to irradiation. Pre-irradiation medication could also result in protection of radiosensitive groups in the tissues by direct combination, but it might be difficult to obtain complete coverage. Post-irradiation medication could assist in breaking the chain reaction involving organic peroxides[5] but still not prevent the early damage which would tend to decrease total survival. Thus it would appear that a dithiol can increase survival time, possibly by the above mechanisms, yet give no permanent protection against the lethal effects of ionizing radiation.

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A Direct-Plating Method for the Precise Assay of Carbon-14 in Small Liquid Samples

When aqueous solutions containing carbon-14 compounds are dried on planchettes for assay under an end-window counter, surface tension often makes it difficult to ensure that the solids are deposited in a layer sufficiently uniform to give reproducible self-absorption and counter geometry. The essential feature of the present method is that the compound to be assayed is incorporated in a layer of gel which will dry to a perfectly even film.

Agar is first dissolved on a boiling water-bath to make a 2 per cent sol, which is drawn into lengths of precision glass tubing of 3 mm. bore, and there allowed to solidify. A cotton-wool plug, inserted into one end of such a tube, is pushed along it with a rod to extrude a cylinder of agar gel. This cylinder is sliced into blocks 3 mm. long with a cutter consisting of 17 spaced safety-razor blades. By passing the teeth of a comb between the blades, the 16 agar blocks are expelled on to a glass slip, from which they are all transferred to a standard flat-bottomed planchette of nickel-plated steel, 25 mm. in diameter and 2 mm. deep. (Before use each planchette must be briefly heated to redness, to ensure adherence of the dried agar film.) The solution to be assayed is pipetted on to the planchette bearing the agar blocks. It is convenient to take a volume of 0·8 ml., the maximum which can be accommodated on each planchette; if the volume of the sample is smaller, water is added until the planchette is just filled.

The planchettes so prepared must now be heated sufficiently to disperse the agar, and this must be done in a saturated atmosphere to prevent evaporation. One method is to place the planchettes in Petri dishes, covered by lids lined with filter-papers saturated with water. A small central hole in each filter-paper prevents it from being sucked down on to the samples as the dish cools. The dishes are placed in an oven at 105° C. for 20 min., and are then withdrawn for inspection; the agar blocks should have disappeared completely, and gentle swirling will ensure uniform distribution of the agar. The filter-papers are removed and the dishes are left to cool on a horizontal surface until the agar has set. The details of the heat treatment may need modification to suit the particular agar used.

By this procedure the liquid in each sample is immobilized in a uniform layer of dilute agar gel. The planchettes are next exposed to a current of air under an infra-red lamp, and in about an hour the gel dries to a hard, stable, uniform film of low and reproducible self-absorption. The weight of agar in the film is about 1·5 mgm./cm.^{2}, and less than 20 per cent of the radiation from the carbon-14 in it is lost by self-absorption due to the agar. Solutes in the sample may, of course, add significantly to the self-absorption.

Although the dried agar film is slightly hygroscopic, exposure to a saturated atmosphere does not normally alter the count; strongly hygroscopic solutes might, however, cause errors. Another limitation of the method is that the solution to be assayed must contain no constituent (such as acid) which would interfere with the setting of the agar. Obviously none of the carbon-14 must be in a volatile form. Some solutions tend to creep over the edge of the planchette; this can be controlled by smearing the lip of the planchette with a trace of silicone grease.

To test the precision of the agar-plate method, 10 replicate determinations were made on 0·8 ml. samples of a solution containing carbon-14. Counts of the order of $1{\cdot}2 \times 10^6$ on each gave a standard deviation of $\pm$ 0·3 per cent, which is scarcely greater than the expected error due to random variations in the counting rate. As the planchettes with the agar blocks can be prepared beforehand, and afterwards processed in large batches, the method is convenient when long series of samples are assayed; it has found application, for example, in the estimation of carbon-14 in fractions of eluate from ion-exchange columns[1]. Agar plates are also suitable for the measurement of other radioactive isotopes.

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Cytogenetical Studies in the Genus *Citrus*

The diploid, $2n = 18$, seems to be a physiologically optimum condition in the genus *Citrus*. In many species the polyploids are known to arise spontaneously from seeds. But there are comparatively few instances of vigorous and economically useful polyploids in this genus. It is really interesting that such a large genus, having numerous species, should generally have the same chromosome numbers. With this idea in view, cytogenetical studies were undertaken to