detectable. Thus it is apparent that gross quantitative and even qualitative errors may be introduced into paper chromatography of amino acids if papers wet with phenol are heated during the drying process.

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Effect of Early Cross Transfusion on X-Irradiation Disease[1]

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The literature on the direct and indirect effects of x-irradiation has been reviewed (*1*). The pertinent question that still remains is whether irradiation with roentgen rays results in the formation of specific and/or nonspecific toxic substances which may be transported through the circulatory system and be removed from the irradiated host, thus reducing the process of damage and degeneration on the one hand and/or increasing the process of repair and regeneration on the other. Cross-circulation has been employed to demonstrate the lack of indirect effects *peculiar* to radiation (*1*), as well as to estimate the life span of the neutrophil (*2*) and the thrombocyte (*3*). Studies with parabiotic mice indicate that nonspecific factors are carried from damaged tissue by way of the circulatory system (*4*). The injury incurred by these factors appears to be related to the dosage of radiation and to the volume of tissue irradiated. It has been shown that parabiosis diminishes the deleterious effect of irradiation (*4*).

Arterial cross circulation and parabiotic techniques are formidable surgical procedures of considerable experimental and academic interest but of relatively little practical value. Parabiosis cannot be established in the usual survival period following lethal radiation.

Cognizant of the import of the nonspecific toxicity of massive doses of irradiation and of uncombated infection as causal influences on mortality from irradiation, we have undertaken an examination of possible protective and regulatory factors of cross transfusion in the reduction of toxicity. In this report a summary of some

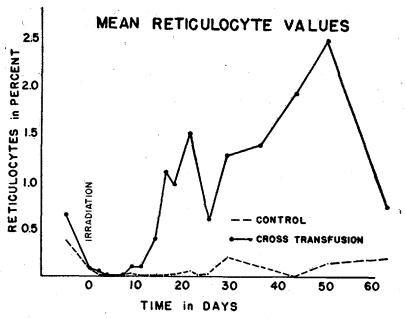

FIG. 1.

of the data obtained with the use of a cross-transfusion apparatus (*5*, *6*) is presented. Heparin was employed with each cross circulation, and mild sedation only was administered to the donor or recipient animal as indicated. Novocaine anesthesia was used locally in the region of the 1–2-cm incision to expose the jugular vein.

Twenty-five adult mongrel dogs were used. The control group consisted of 19 dogs and the treated group of 6. The latter underwent a single cross transfusion for approximately 2 hr within 4 hr after irradiation. A quantity of blood equal to the body weight of the recipient was exchanged between each pair of animals. The donor (nonirradiated) dogs were selected from the animal colony to match in weight the respective recipient dog. Though we were fully aware of the possible hazards of incompatibility, no attempt was made to cross-match the donors with their recipients.

A standard single dose of total-body x-irradiation of 450 r[3,4] (approximately LD 90–100%) was delivered to

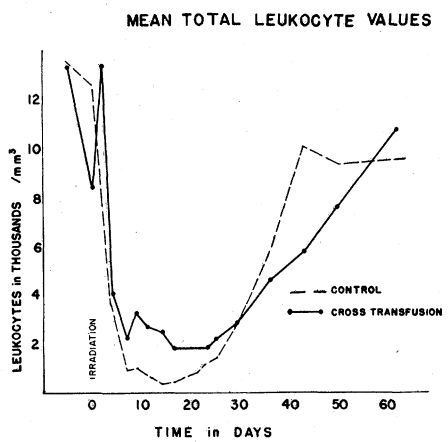

FIG. 2.

each dog used in these tests. Following the irradiation, 16 of the 19 (84%) untreated dogs succumbed in 8–25 days after x-irradiation, whereas only 2 of 6 (33%) cross-transfused dogs died 8 days after irradiation. The 4 surviving transfused dogs presented a clinical picture

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[3] This dosage of x-irradiation has been reported to be LD 90–100% in other laboratories (*7*, *8*).

[4] X-irradiation was administered from a Picker x-ray machine of 220 kvp, 15 ma, 45" tsd, and a parabolic copper filter with a half-value layer for copper of 1.0 mm.

in sharp contrast to that of the control animals. They ate well, were moderately active, had no diarrhea or evidence of sepsis or hemorrhage. In some there was a slight local inflammatory reaction about the neck wound.

All animals that died in the treated and control groups showed depression of the hemopoietic tissues, widespread hemorrhagic manifestations, and, frequently, evidence of sepsis. In the occasional surviving control dog there was evidence of petechiae and ecchymoses in the cutaneous tissues.

Peripheral blood studies showed a depression of the total leukocytes to a mean value of 400 cells/mm^3 or less in the control group, whereas the cross-transfused group manifested a depression to only 1,800 cells during a corresponding period after irradiation (Fig. 1). The reticulocyte response in the control group was 0.2% or less in the entire post-irradiation period, whereas the cross-transfused dogs showed a response between 1% and 2% by the 15th day after irradiation (Fig. 2).

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Methane Gas in Water Well

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Methane gas was discoverd in small amount in a water well cable-drilled by the Steel and Hodgdon Company, of Auburn, Maine, about 3.2 miles northeast of the center of the village of Winthrop in Winthrop Township. The village is about 10 miles west of Augusta, Maine, and is shown on the map of the Augusta quadrangle published by the U. S. Geological Survey. The well site is located a few feet west of Highway 135, 1.2 miles north of its intersection with State Highway 100—the Augusta road. It is near the southern nose of a low ridge that runs approximately north-south midway between Carlton Pond (elevation 340′) and Lake Maranacook (elevation 210′, Fig. 1).

General groundwater conditions. Several swamps at elevations ranging from 200′ to 230′ above sea level are within a 0.5-mile radius of the well site. Water was encountered in a well 72′ deep (102′ above sea level) near East Winthrop, 1.8 miles southeast of the "methane" well site. One and one-half miles north of the well site several wells show water at average depths of 150′–195′ (or 200′ above sea level). In the methane well under discussion water was not encountered until a depth of 510′ was reached, or at 160′ below sea level. The methane gas was encountered at about 250′, but none was found below that zone.

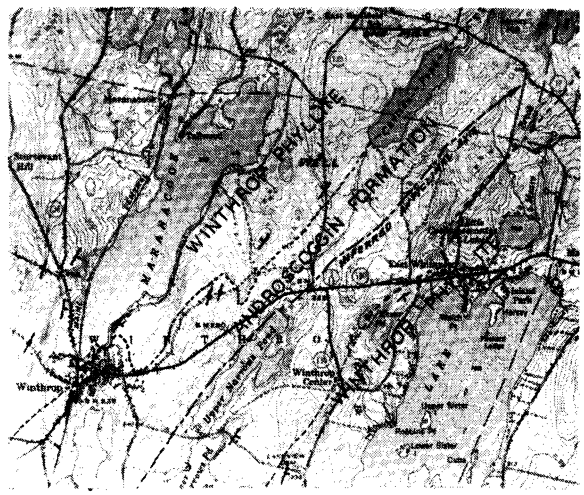

FIG. 1. Geographic location of methane well near Winthrop, Maine. Geologic formations and structures indicated.

Geologic conditions. Two sedimentary rock formations now in the middle grade zone of metamorphism (Fig. 1) are mapped in the area (*1*), and the contact between the two formations trends northeasterly through the southern end of the ridge 0.5 mile south of the well site. The Winthrop phyllite consists of two facies—one characterized by chloritoid (ottrelite), the other by garnet and some staurolite. Northward along the strike the phyllite passes into the low-grade metamorphosed Waterville shales of Silurian age. Underlying the Winthrop formation are the limy phyllitic beds of the Androscoggin formation, which is the nearest exposed formation to the well site. Both formations are part of a major syncline that strikes northeast and plunges slightly in the same direction. The Winthrop dark grayish-blue phyllite is fine-grained in surface exposures and is definitely foliated. Minute metacrysts of ottrelite, biotite, and a white micaceous mineral are visible. The limy phyllitic member of the Androscoggin is lighter gray in color than the Winthrop phyllite and includes visible calcite, biotite, and feldspar.

Study of well cuttings. Cable-drill cuttings taken from various depths (Fig. 2) along the wellhole show a marked change in color at a depth of about 325′. Samples from the upper portion of the wellhole are bluish-gray, and binocular examination indicated that the formation penetrated to that depth is the surface-forming Winthrop phyllite. Small chips from this portion of the well contain slender veinlets (0.5 mm) of calcite. Three % of 100-150-mesh fragments are heavier than 2.817 sp g (bromoform separation). Most of the heavy material is biotite. Screened well cuttings from 500′ show 5.5% heavy mineral, which is composed of biotite, graphite, and pyrite, with the first predominating. Acid solubility was determined, and results are as shown in Table 1. Based