irradiation hemorrhage in man, this knowledge would afford a more intelligent basis for the use of blood and would channel the limited supply available in the directions in which it may be used most effectively.

The frequent administration of fresh blood transfusions without antibiotics in dogs failed to improve the survival rate or to ameliorate spontaneous bleeding after exposures to total body x-radiation (LD_{50}–LD_{100}). On the basis of these experiments a more cautious attitude toward the use of frequent blood transfusion alone as a therapeutic measure in the treatment of the *latent* symptoms of irradiation injury in man may be indicated. These data do not relate in any manner to the use of blood in the treatment of shock incident to the *early* blast effects of an atomic burst, or to blood needs in anoxic anemia, where the therapeutic importance of adequate blood and plasma transfusion is soundly established.

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Comments and Communications

Some Punkins!

DR. ZACKS' statistical note on "How Does the Ivy Grow?" in SCIENCE (**114**, 332 [1951]), with a later correction (**114**, 469 [1951]), is interesting, but either Harvard ivy is a laggard as regards its rate of growth, or else the fertility of Boston soil falls far short of that in the garden of a member of the University of Missouri faculty, as these records will show.

A single stray pie-pumpkin seed was found sprouting in a row of garden beets on May 17, 1951, and the plant was permitted to "root for itself" until killing frosts laid it low while still in the vigor of life on November 5, 1951. The plant received no added fertilizer and no cultivation or other care, except that some of the more ambitious runners were turned back into the garden from a traveled city alley at the edge of the garden. In all fairness, however, it should be said that there were no squash bugs in the garden to pester it.

In the 173 days, or 249,120 minutes, of its active life the plant produced a total over-all vine growth of 1986 ft, or 605,332.8 mm. This would mean a total average vine growth of 2.43 mm/min. However, this is a measure of total vine growth and not of the tip growth of any one runner. The longest single branch measured slightly over 75 ft, or 22,860 mm, which means that this vine made an average tip growth throughout the summer, rain or shine, of .092 mm/min. Observations showed that at the peak of growth it was greatly exceeding this record. In other words, this vine made an average daily growth of over 5 in., so one could actually see it grow.

But that is not all. While growing almost twice as fast as the ivy, this vine also produced 20 pumpkins weighing a total of 300 pounds, besides several small immature ones. In kitchen parlance this means that the vine produced one pumpkin pie every 7 hr. It overran every growing thing, including a grape arbor, fruit trees, and flowers, in 1600 square feet of garden space. Some of its leaves were 15 in. across. And yet the whole story of this waif of a pumpkin seed has not been told, for during its remarkable vegetative growth and its production of the makings of over 500 pies, the seed actually reproduced itself twenty thousandfold, for the 20 mature pumpkins contained an average of 1000 seeds each. To my way of thinking, the Harvard ivy, with no serious accomplishments to its credit other than tip growth and perhaps a few seeds, really made a poor showing.

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The Alleged Disappearance of Hunger During Starvation

KEYS *et al.* (*1*) stated that the sensation of hunger disappears in a matter of days during total starvation, but that no diminution of hunger occurred during a type of semistarvation studied by them. Cannon (*2, 3*) seems to have been mainly responsible for the persistence of claims that hunger sensations cease after the first few days of starvation, although he made no study of hunger during prolonged starvation. Cannon only cited reports made by others, including hunger-strikers and individuals who tried the fasting cure (*4*). One of us (F. H.), after having fasted 8 days in 1912 and 26 days in 1913, also believed that the reference of hunger to the stomach disappeared in 5 or 6 days. In 1916, he thought that the senior author's study during 5 days of starvation (*5, 6*) was not sufficiently prolonged to reveal the true nature of hunger. Hence, a study of hunger was made by the senior author in which the junior author served as the subject during a 15-day fast in 1917 (*7*).

It was found that the periodic gastric contractions, which Cannon as well as the senior author attributed to hunger, persisted throughout the 15 days of fasting, and that the desire to eat or to resume eating was always keenest when the periodic gastric contractions occurred. A modification of the sensations was experi-

enced after about the sixth day of starvation, but this was regarded as involving a depression of appetite rather than hunger. Cannon did not appear to distinguish between hunger and appetite in connection with prolonged starvation.

In further studies of the effect of fasting 10–41 days by human subjects (*8–11*), it was found that hunger persisted throughout the fasts, whether it was considered as the pangs produced by the periodic gastric contractions or as a centrally produced impulse to eat (*12*). The kymographic record of a period of gastric hunger contractions obtained on the fortieth day of fasting was published in 1927 (*9*), and data concerning the periodic gastric motor and secretory activity obtained without the use of an inflated balloon in the stomach, as well as data regarding sensations experienced during fasts of 33 and 41 days, were published in 1944 (*11*). In dogs and rabbits, the periodic gastric hunger contractions were likewise found to persist during prolonged starvation (*5, 6*). Some rats, after fasts of 15–25 days, were so voracious that they died, apparently from overeating, within a few hours after being supplied with food (*13*). Their stomachs were greatly distended with food, but evidently little was digested and absorbed. Hibernating animals resume eating after prolonged abstinence from food, presumably because of hunger.

In man, hunger sensations nevertheless usually appear to become modified or less acute after the first few days of fasting. The complete disappearance of hunger in some hunger-strikers and sick individuals who resort to the fasting cure cannot be regarded as normal. Observations made by the junior author (*14*) indicated that the acute hunger sensations experienced during the first few days of fasting after living on a mixed or high carbohydrate diet are chiefly due to carbohydrate starvation or a lack of adaptation to living on a purely carnivorous diet, such as one actually lives on while fasting. Evidence that hunger is influenced considerably by carbohydrate starvation or the blood sugar level was previously obtained by Bulatao and Carlson (*15*) in a study on dogs, and more recently by Mayer and Bates (*16*) in a study on rats.

Hoelzel (*11*) also found that the contractions of the fasting stomach were felt only when the contents of the stomach were less than about 5 cc, and that the emptying of the fasting stomach became complicated by increasing reverse peristalsis or regurgitation of the duodenal contents after the first few days of fasting. Under such circumstances, gastric pangs of hunger were not felt, but the desire to eat was experienced, with increased restlessness, general weakness, and, eventually, some degree of nausea. Janowitz and Grossman (*17*) apparently did not regard such "hunger sensations" as related to the periodic fasting gastrointestinal activity. Hunger, or the desire, impulse, or drive to resume eating, normally increases again after the initial acute sensations decrease. Advocates of the fasting cure regard the return of hunger (normal, natural, or instinctive hunger) after the early disappearance of "hunger" ("habit-hunger" or "false appetite") as evidence that health has been restored by fasting and that eating should be resumed. The normally increasing desire to resume eating or the return of hunger with the prolongation of fasting appears to be mainly due to protein starvation. Protein starvation alone was found to give rise to the most acute type of epigastric hunger sensation (*11*). In rats and mice protein starvation produced peptic ulcers (*13*). In short, hunger in some form normally seems to persist about as long as life is maintained.

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Escherichia coli in the Intestine of a Wild Sea Lion[1]

Little literature is available concerning the presence of *Escherichia coli* in the intestinal tract of marine mammals. Coliforms have been found in polar bears (*1*) but were not confirmed to be *E. coli*. ZoBell (*2*) states that *E. coli* does not appear to be a normal inhabitant of the intestines of seals in captivity. Recent work by the authors, however, suggests that *E. coli* is commonly found in the intestines of captive seals maintained in either fresh or sea water. This organism is a very common contaminant of stored marine fish (*2*) and may be introduced into the seal's alimentary system by the feeding of such material. Therefore, when a wild sea lion (*Zalophus californianus*) was captured near the Scripps Institution of Oceanography, an attempt was made to determine whether *E. coli* might be present under natural conditions.

The specimen, an adult female, was sacrificed, and samples were removed aseptically from the stomach and from the initial, central, and terminal sections of

[1] Contribution from the Scripps Institution of Oceanography, New Series No. 559.