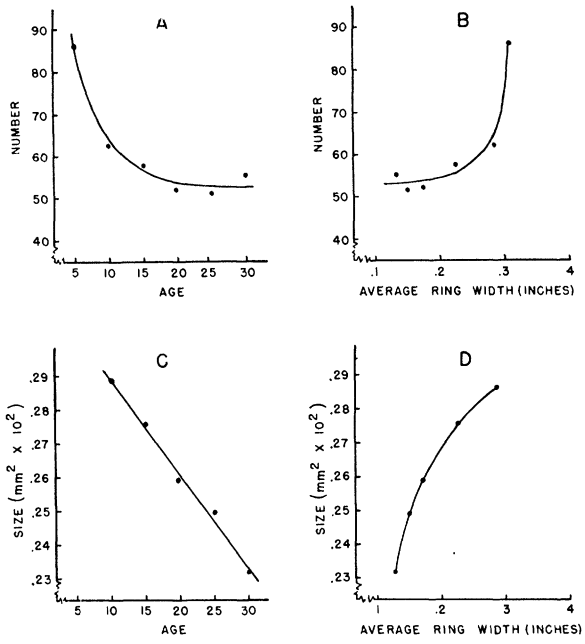

Fig. 2. Relationships of number and size of the radial resin ducts to age of the ring ($A + C$) and average ring width ($B + D$). The number of ducts per square centimeter is given.

to determine definitely whether the effect of age or the effect of ring width was more important. In the 10 trees studied, average ring width decreased with age of tree. By sampling a larger number of older trees it should be possible to find trees with an irregular growth pattern, and thereby evaluate the respective importance of age and width of ring. In a study on the gradient of wood density in trees that had wider growth rings toward the outside, Turnbull (*2*) was able to demonstrate that the density of wood formed in a particular year is not determined by the growth rate, but is proportionate to a function of age.

The relationship of number and size of resin ducts to age and width of ring exhibits a pattern similar to that of wood density and strength characteristics. The volume of resin ducts probably accounts in part for this pattern by directly influencing density and strength of the wood. Their influence is probably greatest in the first five rings where they are most abundant. On the average for the 10 trees studied, the number of horizontal resin ducts at ring 5 was 100 percent greater than at ring 25. The slight increase in the number of ducts at ring 30 is probably a result of traumatic resin ducts formed as a result of wounding for naval stores.

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23 November 1954.

Pheasant-Turkey Hybrids

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Hybrids from pheasants (*Phasianus colchicus*) and the domestic fowl (*Gallus* sp.) have been known for a long time (*1*) and have recently been more fully investigated (*2*). All hybrids out of these two species are apparently sterile. Artificial insemination (*3*), which overcomes some of the isolating mechanisms between species (*4*), has been used (*5, 6*) to obtain hybrids from the domestic fowl and turkey (*Meleagris gallopavo*), but only one hybrid hatched (*6*). Two centuries ago, Edwards (*7*) described, with an illustration, a hybrid "supposed to be bred between a turkey and a pheasant." The pheasant-turkey cross, however, has been neglected, although Sokolow *et al.* (*8*) recently reported that the chromosomes of the turkey and pheasant are more alike than those of the latter and the domestic fowl.

During an investigation of crosses between gallinaceous species made by artificial insemination in 1952, ring-neck pheasant hens were mated with bronze turkey males. At least 10 fertile eggs were obtained; six survived 2 wk or longer, and two were alive after the 24th day of incubation but did not hatch.

In 1953 reciprocal matings were made on a more extensive scale. The results are summarized in Table 1. No similar difference in fertility between the reciprocal crosses was observed in 1954 (*9*). The difference in fertility in 1953 may therefore reflect variations in intervals between inseminations, amount of semen used, and variations in the technique of insemination rather than more fundamental differences between the reciprocal crosses. Early embryo mortality of the hybrids was high, but most of the live 10-day-old embryos survived to 24 days.

The hybrids from pheasant eggs hatched after about 26 days' incubation; those from turkey eggs required 27 to 28 days. The average incubation period for pheasants is 24 days, for turkeys, 28 days. Time of hatch usually varies considerably but the hybrids in pheasant eggs clearly required a longer incubation period than pheasants.

Of the embryos that survived to 10 days of age in the 1953 hatches, the percentage hatched varied from 0 to 50 percent. In 1954 about 50 percent of the eggs

Table 1. Number of eggs set and hatched, 1953.

Type of cross	Set	Fertile	Embryo survival		Hatched
			10 days	24 days	
Pheasant ♀ ♀ × turkey ♂ ♂	381	100	44	43	13
Turkey ♀ ♀ × pheasant ♂ ♂	231	100	50	39	11

from pheasant hens and turkey males were fertile, and of these 23 percent hatched. This indicates that, under favorable conditions, better results than those shown in Table 1 may be expected.

Early posthatching mortality in 1953 was high for hybrids out of pheasant female-turkey male crosses, with only one survivor; but posthatching mortality was low for hybrids out of the reciprocal cross, with five survivors. Differences in survival were apparently due to managerial factors. The hybrids were raised with mixed groups of young birds of several species and their hybrids. Under such conditions the small turkey-pheasant hybrids from pheasant eggs fared badly at first, while the larger hybrids from turkey eggs did better. Much of the later mortality was caused by severe pendulous crop, but several of the survivors were saved by surgical removal of the crop. Provision of adequate shade or prompt surgery would undoubtedly have saved most of the birds that died after they were a few weeks old.

The mature hybrids are intermediate in weight between the turkey and the pheasant. Their head furnishings resemble those of the pheasant; the skin on the sides of the head around the eye is partly free from feathers but otherwise the head and neck are feathered (Fig. 1). When not fully grown, the feathers on the head and neck of some hybrids have been observed to resemble those illustrated by Edwards (*7*). The tail feathers are intermediate in length. The plumage color of the hybrids from this particular cross (ring-neck pheasant and Bronze turkey) is dark brown shading to black, except on the wings, which are lighter.

Neither eggs nor semen were obtained from the year-old hybrids. Mating activity was not observed, although there was some brightening of the skin on the head of the males. Thus, these intergeneric hybrids, like those from the pheasant and domestic fowl, are apparently sterile. The survival of these pheasant-turkey hybrids has, however, been superior to that reported for domestic fowl-turkey hybrids (*5*, *6*), and is about equal to that of pheasant-domestic fowl hybrids.

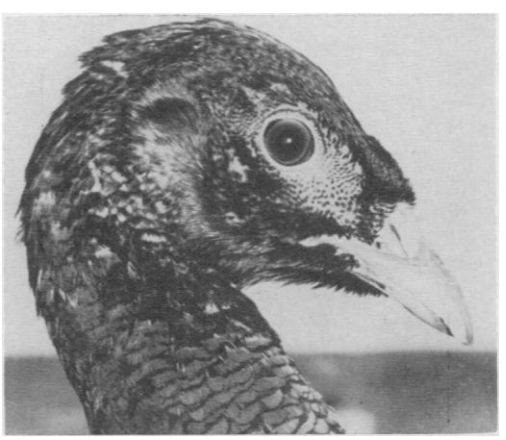

Fig. 1. Head of a 6-mo-old hybrid out of a Bronze turkey female and a ring-neck pheasant male. Except for some variation in plumage color and area of featherless skin around the eye, it is typical of both sexes from this and the reciprocal cross.

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9. Among those who have helped with this cross, we are particularly indebted to John P. Hillerman and Norris E. Wilson.

15 November 1954.

Leukemogenic Effects of Ionizing Radiation on Atomic Bomb Survivors in Hiroshima City

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Following the explosions of the atomic bombs in Japan, a great increase in leukemia was reported among survivors (*1*). However, statistical confirmation of the high incidence of leukemia was not possible because of the unusual distribution of survivors by age and sex. During 1953, additional cases of leukemia appeared among the survivors. Using these new cases, an analysis was carried out that established statistical evidence of the leukemogenic effects of atomic irradiation on man (*2*). The 98,000 survivors in Hiroshima City, and the 50 verified cases of leukemia occurring among them, were distributed according to distance from the hypocenter. In addition, the survivors were further classified according to the degree of irradiation. Thus, individuals with a history of epilation, oropharyngeal lesions, or purpura were classified as heavily irradiated (severe radiation complaints); those without such complaints were considered lightly irradiated (no complaints).

Statistical tests carried out on the data appearing in Table 1 indicate the following. (i) A highly significant difference in incidence exists between survivors with serious radiation complaints and those with no complaints. Within each distance group, the incidence of leukemia is higher among the survivors with serious complaints. (ii) There is a significant difference in incidence among the distance groups. For each complaint group, the incidence of leukemia is highest among survivors exposed closest to the hypo-