they were completely dry (Table 2). The time of delayed maturity amounted to almost two weeks.

TABLE 2

NUMBER OF FULLY RIPE PODS, ON DAYS INDICATED, FROM 14 UNTREATED PLANTS AND 12 PLANTS SPRAYED WITH A SOLUTION OF 10 PPM OF THE SODIUM SALT OF 2,4-D

Plants	June 14	June 23	June 28	Total
Untreated	45	0	0	45
Treated	7	30	12	49

In the field experiment, seed which was selected for uniformity was planted May 31. On June 24, treatments were made with solutions of 1, 10, and 100 ppm of 2,4-D, using a system of randomized blocks and 5 replications. There were 20 plants in each plot.

TABLE 3

NUMBER OF PODS HARVESTED AT DATES INDICATED FROM BEAN PLANTS SPRAYED WITH SOLUTIONS OF DIFFERENT CONCENTRATIONS OF THE SODIUM SALT OF 2,4-D

	August			September	Total	Relative
	18	21	27	3	yield	yield
Control	282	423	742	63	1,510	100
1 ppm ...	198	505	917	89	1,709	113*
10 ppm ...	138	564	920	64	1,686	111
100 ppm ...	0	72	633	685	1,390	92†

* No significant increase as compared to control.
† No significant decrease as compared to control.

The day after the treatments, the plants sprayed with 100 ppm showed pronounced epinasty, while only slight epinasty was observed at 10 ppm, and none at 1 ppm. The growth of the plants sprayed with 100 ppm was markedly inhibited and, even though the plants recovered, they never became as vigorous as those in any of the other plots. At 10 ppm there was observed only a slight decrease in top growth for a short period, after which the plants became as vigorous as those untreated. No effect upon the growth was observed from treatments with 1 ppm.

TABLE 4

PER CENT OF TOTAL NUMBERS OF PODS HARVESTED AT DATES INDICATED FROM BEAN PLANTS SPRAYED WITH SOLUTIONS OF DIFFERENT CONCENTRATIONS OF THE SODIUM SALT OF 2,4-D

	August			September
	18	21	27	3
Control	19	28	44	9
1 ppm	20	30	54	4
10 ppm	8	33	55	4
100 ppm	0	5	45	50

By the beginning of July, abnormal leaves developed in the plots sprayed with 100 ppm, 5–10 leaves on the lower lateral branches showing formative effects. In the plots sprayed with 10 ppm, only a few plants developed abnormal leaves.

In the middle of July, flowering commenced in the control plots and in plots sprayed with 1 and 10 ppm. In the 100-ppm plots, however, flowering was markedly delayed, although by the end of July the growth seemed to be somewhat accelerated, no more abnormal leaves developed, and flowering was initiated.

Harvesting of all fully matured pods was made at four different times as indicated in Table 3. Table 4 gives the distribution of the total yield as per cent on the different dates, showing that treatment with 2,4-D at 100 ppm markedly delayed maturity, with some slight decrease in number of pods and yield of seed.

The changes in the metabolism of the plant brought about by the treatment with 2,4-D seem to have a secondary effect on the axillary growth and the time of maturity of the plant. Weaver (*3*) mentions delayed and decreased pod production after treatments with 2,4-D. The opposite effect, namely, hastening of maturity, is reported by Wittwer and Murneek (*4*), who sprayed snap beans in the flowering stage with different growth substances including 2,4-D. This difference in response may be due to differences in age of plants and the parts involved. In the case of snap beans the effect seems to be a direct one on the growth of the ovary, while in the present study the effect is an indirect one following stimulated axillary growth.

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Survival Time of Various Warm-blooded Animals in Extreme Cold

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Little is known about the resistance of homoiothermic animals to low temperatures. This paper reports some observations on the survival time and body temperature of various adult animals at an ambient temperature of −35° C.

The experiments were conducted over a four-day period in which the temperature of the cold room varied between −34° and −37° C. Previous determinations by Belding, *et al.* (*1*) had shown the wall temperature of this room

[1] Operated as a function of the Environmental Protection Section, Research & Development Branch, Quartermaster Corps. These experiments were carried out in the Cold Room of the Harvard Fatigue Laboratory; the assistance of its director, W. H. Forbes, is gratefully acknowledged.

to be within ± 1° of the ambient air temperature and the air movement to be turbulent but continuous at a rate of about 2 m.p.h.

TABLE 1

Species	No. of animals	Average weight (gm)	Local frostbite noted	Survival time (hrs)
Mouse, Carworth CF1 strain	10	19	Feet & tails	0.4
Canary	2	20		0.6
Rat, Wistar	7	242	Feet &	.75–1.6
albino	5	227	tails	2.0
Rabbit, New	3	1,760	Ears	3.5–5.0
Zealand white	6	1,774		5.0–6.5
Chicken, white	8	1,642	Combs	3.3–16.0
Leghorn	3	1,537	& feet	16.0–29.5
Pigeon, Army	5	395	Feet	22–24
carrier	4	397		24–48
	2	408		48–78

The animals were confined, one at a time, in metal cages with cardboard bottoms. The rectal temperatures of rats and rabbits and the cloacal temperatures of pigeons and chickens were measured either by thermometer or by copper-Constantan thermocouples read with a potentiometer. In a few cases the animals were

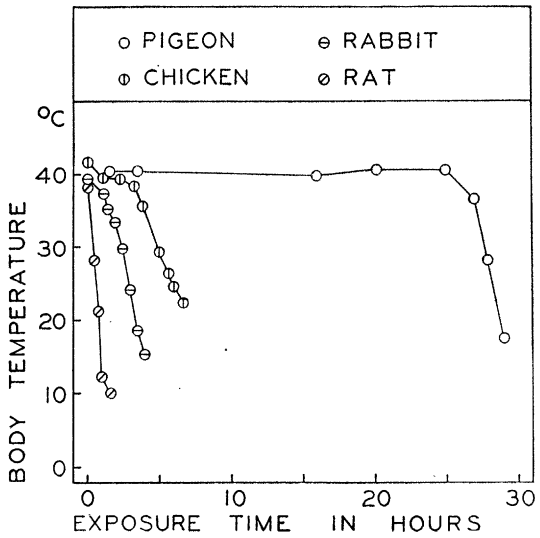

FIG. 1

removed from the cold room into a cool room for insertion and reading of the rectal thermometer. Although the animals had room for movement in their cages, they sat quietly in one place and exposed a minimum of surface. They were not fed during the experiment.

A summary of the results is given in Table 1. Body temperature for representative individuals is plotted against time in the cold in Fig. 1. The last temperatures recorded were obtained on moribund animals. The data indicate that the adaptability to low environmental temperatures varies considerably among species as well as within a species. The pigeon appeared to be especially well adapted to cold, one pigeon surviving without food for 78 hrs in an ambient temperature of − 35° C. Local frostbite was noticed on the ears of rabbits, on the combs of chickens, on the feet of chickens, pigeons, mice, and rats, and on the tails of rats and mice.

Our observations are in accord with the experiments of Giaja (*2*), who found the lowest temperature at which the animal can maintain its body temperature for one hour to be: for the pigeon, − 85° C; for the chicken, − 50° C; for the rabbit, − 45° C; and for the white rat, − 25° C. Giaja's experiments in which environmental temperature was the variable and our experiments in which time was the variable placed species in the same order in regard to the degree of their resistance to cold.

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The Respiration of *Streptomyces griseus*

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Since the presence of air is necessary both for the growth of *Streptomyces griseus* and for the production of streptomycin, an investigation of the respiration of this organism was pertinent. The experiments were designed to determine (1) oxygen consumption during the growth of the culture, (2) its relationship to antibiotic production, and (3) whether a correlation exists between the abilities of different strains to produce the antibiotic and their different rates of respiration.

Strain A2, which was most generally used in these studies, was derived as a single colony isolate from *S. griseus* H9 received from S. A. Waksman. Other strains such as 4c5 and R.M. 1067 were obtained by irradiating A2 with ultraviolet light. All cultures were grown in 500-ml Erlenmeyer flasks containing 125 ml of a modified streptothricin assay medium and were agitated on a reciprocal shaker. Assays for streptomycin were made according to the method described by Loo, *et al.* (*2*), and the growth of the organism was based upon the dry weight of washed and centrifuged mycelium. Studies of oxygen consumption were made in a Warburg apparatus using the techniques described by Umbreit, Burris, and Stauffer (*3*). Fifteen-ml aliquots of the culture were used for determinations of mycelial weight and 2 ml for respiration studies. When dextrose was added to the medium during measurements of oxygen consumption,