choline in saline, twice daily for 3 days. The mean $t/2$ value of 50 choline-treated mice was 0.61 min compared with the mean $t/2$ value of 1.10 min for 30 control animals. Statistical analyses of the differences between the two groups showed that they were highly significant ($P < 0.01$).

The effect of choline on the regenerative capacity of the RES and further studies on other substances are now in progress. The ability to stimulate the phagocytic velocity of the RES indicates a probable activation of RE cells. To what extent phagocytic velocity is indicative of other functions of the RE cells still remains to be established.

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Increased Translocation of Plant-Growth-Modifying Substances Due to Application of Boron[1]

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Translocation of growth-modifying substances such as 2,4-dichlorophenoxyacetic acid (2,4-D) and its salts and esters from leaves to other parts of plants is associated with translocation of photosynthates (*1–4*). Gauch and Dugger (*5*) found that boron accelerated translocation of sucrose applied externally to leaves of bean and tomato plants. Stark and Matthews (*6*) increased the percentage of soluble solids (mostly sugars) of cantaloupe fruits by spraying the plants with a dilute solution of boric acid. Seemingly, this indicates that boron accelerated translocation of sugars to the fruits.

The present investigation was undertaken to determine if boron would accelerate translocation of growth-modifying substances from leaves to stems by affecting translocation of sugars.

In preliminary experiments in darkness, translocation of radioactively tagged 2,4-D (C^{14} of COOH group) from the primary leaves to the stems of bean plants was greater when tips of treated leaves were immersed in an aqueous solution containing 50 ppm of boron and 10% sucrose than when they were immersed in a sugar solution without boron. An aqueous mixture containing 30 μg (γ) of 2,4-D and 0.1% Tween 20 was spread evenly on the upper surface of the proximal half of one primary leaf of each plant. The remaining half of the leaf was immersed in the solution containing boron (as boric acid) and sucrose. Leaves of control plants were treated with 2,4-D in the same way; some were immersed in a 10% sucrose solution and others in a solution containing 50 ppm of boron. Five plants were used for each type of treatment. After 48 hr the stems were dried, ground, and assayed for radioactivity with a flow counter (*7*). In successive experiments translocation of the 2,4-D was increased by approximately 43, 47, and 50% by boron in the sugar solution as compared with the sugar solution alone. Boron alone failed to affect translocation of the 2,4-D.

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TABLE 1

EFFECT OF BORON (APPLIED AS BORIC ACID), SUCROSE, AND BORON PLUS SUGAR ON THE TRANSLOCATION OF 2,4-DNH$_4$ BY BEAN PLANTS*

Treatment	Plant								Av.
	A	B	C	D	E	F	G	H	
2,4-DNH (0.9 γ)$_4$	14	21	0	24	23	0	0	24	13.2
2,4-DNH + sucrose (0.9 γ)$_4$ (2000 γ)	0	16	0	0	0	7	0		3.3
2,4-DNH + sucrose + B (0.9 γ)$_4$ (2000 γ) (160 γ)	38	37	45	33	52	44	29	29	44.7
2,4-DNH + B (0.9 γ)$_4$ (160 γ)	47	26	32	11	27	22	34	27	28.2

* Figures represent degrees of stem curvature that developed during a 3-hr period immediately following treatment of 1 primary leaf on each plant.

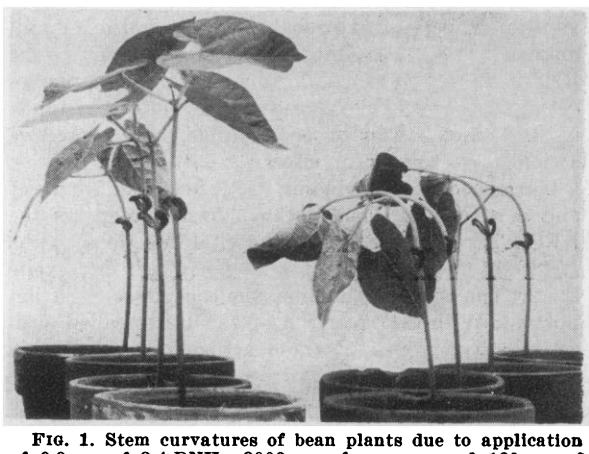

FIG. 1. Stem curvatures of bean plants due to application of 0.9 μg of 2,4-DNH$_4$, 2000 μg of sucrose, and 160 μg of boron to the right leaf of each plant (right row) compared with that induced by an equal amount of 2,4-DHN$_4$ and sugar. Photographed 3.5 hr after treatment.

TABLE 2

EFFECT OF BORON ON TRANSLOCATION OF VARIOUS GROWTH MODIFIERS FROM LEAVES TO STEMS OF BEAN PLANTS*

Growth modifier	Amount of acid applied per leaf (γ)	Average curvature (degrees)		Average increase in curvature (%)
		Acid + sucrose	Acid + sucrose + boron	
3-Indoleacetic acid	0.5	2.8	34.2	1120
2,4,5-Trichlorophenoxyacetic acid	0.9	8.0	36.5	356
Alpha naphthaleneacetic acid	2.0	13.4	28.8	115

* One-hundred-sixty micrograms of boron (as boric acid) plus 2000 μg of sucrose were applied together with the designated amounts of acid per leaf. Average curvature based on four replications.

In subsequent experiments boron, 2,4-D, and sugar, separately and in all combinations, were applied directly to the leaves of plants grown in composted soil in a greenhouse. Stem curvatures were used to indicate translocation of 2,4-D. Black Valentine bean plants were subjected during the test to light from Daylight fluorescent tubes (700 ft-c intensity). The primary leaves were 3–4 cm wide and the trifoliate leaves still folded in the terminal buds. The entire upper surface of one primary leaf of each plant (with a lanolin barrier at the distal pulvinus) was treated with 0.02 ml of an aqueous mixture containing ammonium 2,4-dichlorophenoxyacetate (2,4-DNH_4) and 0.1% of Tween 20. Eight plants were used for each type of treatment.

Nine-tenths microgram of the salt induced moderate stem curvature. Ten micrograms of boron together with 0.9 γ of 2,4-DNH_4 increased by approximately 50% the average curvature developed within 3 hr. Larger amounts of boron, including 160 γ per leaf, caused still greater increases in curvature.

Considerable variability in curvature resulted when 2,4-DNH_4 was used alone, probably due to variability in physiological activity of individual leaves (Table 1). Compared with 2,4-DNH_4 alone, 0.9 γ of the salt plus 2000 γ of sucrose reduced the average curvature 75%, apparently because of dilution of the 2,4-DNH_4 by the sugar. In contrast, addition of boron to the 2,4-DNH_4-sucrose mixture more than overcame this dilution effect by increasing stem curvature almost 14-fold (Fig. 1).[2] Even without externally applied sugar, boron accelerated translocation of 2,4-DNH_4 by 114% over that which resulted from the use of 2,4-D salt alone. This experiment was repeated twice and similar results were obtained each time but the magnitude of response varied.

Boron also accelerated the translocation of 3-indoleacetic, 2,4,5-trichlorophenoxyacetic, and alpha naphthaleneacetic acids from leaves to the stems of bean plants (Table 2).

Sucrose, fructose, and glucose plus 0.9 γ of 2,4-DNH_4 and 160 γ of boron were compared as external sugar sources. Two thousand micrograms of the sugar being tested were applied to each leaf. For comparison, leaves of comparable plants were treated with equal amounts of the sugar and 2,4-DNH_4 without boron. Boron with sucrose increased stem curvature by an average of 235, with fructose 427 and with glucose 1520% over that observed on plants not receiving boron.

It is concluded that the accelerating effect of boron observed in these experiments was directly upon movement of sugars and that translocation of growth modifiers was thus indirectly accelerated.

[2] When these experiments were repeated with both solutions adjusted to a pH of 5.4 (pH of the latter) a similar response was obtained.

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A Transplantable Rat Lymphoma

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A neoplasm arose spontaneously in the region of the submaxillary gland of a 1953 female breeder of the Lewis inbred strain of rats. The animal had already borne 3 litters; consequently, her offspring were available for transplantation of the tumor. Microscopical examination of the primary tumor and its metastases showed it to be a lymphoma.[2] Identification of the neoplastic cells by their mode of locomotion in tissue cultures (*1–3*) indicated that the majority of the cells were lymphoblasts, although large and small lymphocytes were also present.

Metastases were found in the mediastinal, axillary, inguinal, and lumbar lymph nodes of the host, and the spleen and thymus were greatly enlarged by growths of tumor cells. Macroscopical examination failed to

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