control to bring about the enduring sterility of the soil upon which thallium sulfate baits have been used. But there is real danger that the practice will lead to such an end, as will be evident from the observation here noted.

Thallium sulfate baits were suspended on stakes at a height of a few inches above the earth on a grassy slope in the arboretum of the Hawaiian Sugar Planters Association Experiment Station.[1] This lies in the head of the Manoa Valley near Honolulu, a region of heavy rainfall. The baits, each containing about 0.5 gm of Tl_2SO_4[2] were set out in July, 1929. At the time of my inspection, July, 1931, there was below each stake a patch of bare earth, from one to three feet long and perhaps a third as wide, upon which all vegetation was killed soon after the baits were set out. *Not a single trace of plant life was or had been apparent on these areas during the intervening two years.* While no exact records have been made, there appeared to have been no diminution in the size of these denuded areas.

Thallium sulfate scattered or placed as bait ultimately reaches the soil, whether the bait is taken or not. Under our continental conditions, where rainfall is much less than at the locality here cited, thallium sulfate would presumably be even less rapidly removed from the soil by leaching. Continued scattering of thallium sulfate baits will presumably lead to:

(a) Complete denudation of numerous small areas of pasture or range land, leading to reduction of plant yield and also perhaps to erosion or blow-hole formation.

(b) General toxicity or complete sterility of cultivated land, which may be expected to destroy its agricultural value completely for an unknown period.

Any group or organization which allows or urges the extensive use of measures entailing the possibility, even, of such results incurs grave responsibility; and any owner of agriculturally valuable land should look well to his own future before allowing thallium compounds to be spread upon his soil.

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[1] The writer is indebted to Mr. E. L. Caum, of the Hawaiian Sugar Planters Association Experiment Station, for the invitation to visit the arboretum.

[2] This corresponds very closely to the amount of Tl_2SO_4 in "a handful" of barley treated with 1 lb. of Tl_2SO_4 per 100 lbs. of grain. Dilling has reported (*Ann. Appl. Biol.*, 13: 160–167, 1926) that N/600 Tl_2SO_4 completely and irrevocably prevents the germination of seeds of *Lepidium sativum*. More dilute solutions were not studied. On this bases it might be guessed that one bait, containing 0.5 gm of Tl_2SO_4, would under average conditions sterilize not less than half a cubic foot of soil. The observations here recorded seem to suggest a slightly greater effectiveness.

ESSENTIAL FATTY ACIDS AND GOITER PRODUCING SUBSTANCES[1]

Two recent papers indicate that the writers have not yet come to a realization of the importance of the question of *iodin-fat* balance which was raised by R. McCarrison[2] and the Mellanbys,[3] but has apparently been forgotten by those authorities as well.

G. O. Burr, M. M. Burr, and W. R. Brown,[4] studying the nutritive value of cod liver oil, find that the feeding of cod liver oil does not prevent scaliness of the feet and tail in rats given their fat-free diet. They state that of the more unsaturated oils, cod liver oil is distinct in that it leaves the skin of the animals scaly, while lard, olive oil, corn oil, linseed oil, methyl linolate and methyl linolenate all produce skin free from scales and dandruff. They emphasize the fact that cod liver oil is highly unsaturated without linoleic and linolenic acids being present in appreciable quantities. Burr and Burr for some time contended that linoleic and linolenic acids must be furnished as a part of the diet in their fat deficiency experiments.

The findings of the writer and associates[5] indicate clearly that the reason why cod liver oil is ineffective in Burr's fat disease is on account of the iodin carried with it. Burr's animals, long depleted of fats and at the same time receiving KI, must be given fats lacking iodin, or the iodin-fat balance will not be restored. The significance of Burr's essential fatty acids[6] depends on their *degree* of *unsaturation* and not upon any specificity.

E. J. Bauman, Anna Cipra, and David Marine,[7] in a paper just published, have shown that goiter-producing substance in cabbage was extractive with ether from "cabbage fat." They failed to refer to the important pioneer work of McCarrison and the Mellanbys, to our own recent work and to the suggestion that we advanced[8] to the effect that their "goiter producing substance" was quite probably the *unsaturated fat* of cabbage from which they had permitted a loss of iodin.

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[1] From the Laboratories of West Virginia University, Morgantown, West Virginia. Aided by a grant from the National Research Council.

[2] *Ind. Jour. Med. Res.*, 7, 633, 1919–1920.

[3] E. and M. Mellanby, *J. Physiol.*, 55, vii–viii, 1921.

[4] *Proc. Soc. Exp. Biol. and Med.*, 28, 905, 1931.

[5] SCIENCE, 68, 42, 1928; Collecting Net, 5, Nos. 32 and 33, 1930; *Proc. Soc. Exp. Biol. and Med.*, 28, 187–189, 1930; *Anat. Rec.*, 47, 3, 304, 1930; *Med. Times and L. I. Med. Jour.*, 59, 138–9, 1931.

[6] G. O. Burr and M. M. Burr, *J. Biol. Chem.*, 82, 345, 1929; G. O. Burr and M. M. Burr, *J. Biol. Chem.*, 86, 587, 1930.

[7] *Proc. Soc. Exp. Biol. and Med.*, 28, 9, 1017–18, 1931.

[8] Chidester and Wesson, *Med. Times*, 58, 11, 319–321, 1930.