effective on adrenalectomized cats, was then tested. The material was injected intraperitoneally, and the subsequent effects on the ability to work were ascertained.

The working capacity of a normal (uninjected) dog is affected by training. It increases rapidly at first, but later it varies only slightly from the "standard output." Pulse rates increased from between 80 to 104 per minute during rest, to between 118 and 144 per minute at the end of a severe bout of exercise. The rates returned to normal within 20 to 40 minutes after the conclusion of an experiment. During the early stages of training the pulse rates were somewhat higher than those observed after a number of experiments had been carried out. The blood-sugar level in the normal dog showed a tendency to decrease during long-continued work, and to increase during the subsequent rest period. There was no close correlation between the glycemic level and the condition of the dog after exercise.

Injection of extract brought about a slight rise in the blood sugar of the resting, unexercised animal. The glycemic level was higher during experiments when the animal was under the influence of extract than when the effect of the extract was disappearing. Intraperitoneal injection of cortico-adrenal extract considerably increased the energy output. The extract was slowly acting in this respect, and exerted its maximum effect usually within 5 to 10 days. In one case, 20 cc of extract given intraperitoneally brought about a gradual increase in the total energy output in excess of basal metabolism. The increase reached a maximum of 115 per cent. in 10 days; thereafter a gradual decline in energy output was observed, and the previously established normal was eventually attained.

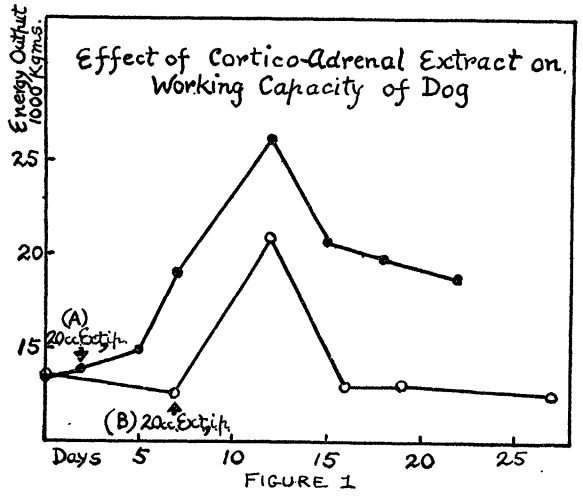

FIGURE 1

Fig. 1 shows graphically the effect of the extract on the energy output in excess of basal metabolism in two groups of experiments. Extracts of the adrenal cortex, of proven potency in overcoming adrenal insufficiency, are observed to augment markedly the capacity of the dog to perform work.

On man also cortico-adrenal extract has been found by ergographic record to increase notably the ability to carry out muscular exercise.

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VITAMIN G AND THE GROWTH FACTOR IN TOMATO JUICE

DURING the course of some vitamin assay determinations on canned tomato juice, we obtained evidence to show the lack of vitamin G (B_2) in either canned or fresh whole tomato juice. This is in disagreement with the findings of Goldberger and his associates[1, 2] and Hartley,[3] if we accept the statement that pellagra, black-tongue and dermatitis are all caused by the lack of vitamin G.

Evidence is also contained in table I for the differentiation of vitamin G and a purely growth-promoting factor. This distinction has previously been pointed out by Reader[4] and Williams and Waterman.[5]

The animals in the group reported here were young rats approximately four weeks old, weighing 30 to 40 grams each. They were placed in individual screen-bottomed cages and fed the following ration: Casein (acetic acid extracted) 18 per cent., cornstarch 66 per cent., Osborne and Mendel salt mixture 4 per cent., lard 10 per cent., and cod liver oil 2 drops per rat daily. After one week of depletion on the basal ration devoid of all factors of the B complex, constant weights were obtained. Graded doses of tomato juice, as indicated in the table, were then fed daily in separate cups for an eight weeks' period. Weights of the animals were recorded daily as well as symptoms of deficiency.

In the groups that lived long enough to develop a dermatitis, it always appeared in approximately 44 days, regardless of the amount of tomato juice fed. That the dermatitis shown by these rats was of nutritional origin, and not of epidemic nature, is indicated by the fact that they were kept on the same racks as some rats used in vitamin A assay experiments, and

[6] P. F. duPont fellow in physiology.

[1] Goldberger, Wheeler, Lillie and Rogers, U. S. Public Health Reports, 42: 1299, 1927.

[2] Goldberger and Wheeler, U. S. Public Health Reports, 43: 1385, 1928.

[3] Hartley, 1930 (personal communication to Sherman and Smith), "The Vitamins," p. 139, 1931.

[4] Reader, *Biochem. J.*, 24: 1827, 1930.

[5] Williams and Waterman, *J. Biol. Chem.*, 78: 311, 1928.

TABLE I

Dose	No. rats in group	Days lived. Average	Polyneuritis[1] developed on day. Average	Dermatitis developed on day. Average	Average gain 8 weeks
					gms
Neg. controls	5	23	13.4	None	−12.4
3 cc fresh juice	7	46	28.8	None	− 9.86
3 cc canned " [3]	7	45.8	27.1	None	−11.0
4 cc fresh "	7	50.28	44.1	43.57	−11.0
4 cc canned "	7	54.9	51.85	43.4	− 4.14
5 cc fresh "	7	56+[2]	51.1	43.1	− 1.8
5 cc canned "	7	56+	53.16	45.16	+12.7
6 cc fresh "	7	56+	55.0	44.1	+ 1.3
6 cc canned "	7	56+	56+	44.7	+11.0
7 cc fresh "	7	56+	56+	43.5	+ 5.1
7 cc canned "	7	56+	56+	43.0	+10.3
			Average	43.8	

Autopsies in all cases confirmed the symptoms shown.

[1] Severe type.

[2] 56+ indicates animals still alive at termination of experiment.

[3] Beechnut Brand.

these rats showed no dermatitis. This shows the absence of vitamin G from the tomato juice.

On the smaller quantities of juice, the rats showed a loss of weight and on the larger doses a gain. It is shown that this gain can not be correlated with any presence of vitamin G and probably is not related to the presence of vitamin B (B_1) since Reader[4] and Williams and Lewis[6] have shown the absence of growth when rats were fed an abundance of this vitamin. This growth factor, therefore, probably is Reader's B_4 or the vitamin F, of which Sure, Smith and Kik[7] speak.

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ARE LEAF LIPIDES RESPONSIVE TO SOLAR RADIATION?[1]

EXPERIENCE reported elsewhere[2] led to the present inquiry. The earlier work had shown a consistent increase of lipide content in various plant species reared under Vita glass in comparison with common glass. Vita glass is one of the several products which transmits greater proportions of both ultra-violet and infrared radiations than does common glass. Additional evidence of favorable rôles of this glass has been obtained which can not be presented in detail here. Livingston Globe tomato plants transplanted to the field from beneath Vita glass have yielded an earlier and larger crop than plants simultaneously transferred from common glass; and Early Fortune cucumber plants have developed more rapidly under Vita glass than under common glass in the early spring, ultimately producing larger fruits in the greenhouse. In these cases the air temperature was maintained essentially equal under the two forms of glass by use of a fan. Inasmuch as the tomato (*Lycopersicum esculentum*) had responded prominently in the manner indicated above, it was subjected to special examination of the lipide fraction.

A large quantity of leaf tissue was taken from potted plants of the Bonnie Best variety late in February. The height under common glass at this time was about 30 cm, while development had recently been noticeably more rapid under Vita glass.

Hot alcoholic extraction of 740 gm leaf tissue, as free from petioles as feasible, yielded about 12 gm of crude lipides. Determinations on separate samples of leaf blade tissue[3] indicated the presence of 1.76 per cent. chlorophylls (as potassium chlorophyllins) 0.007 per cent. carotin, and 0.053 per cent. xanthophylls in the dry tissue beneath common glass; with 1.50, 0.017 and 0.068 as the corresponding percentages under Vita glass. From the partially purified lipides precipitation of the sterols was effected as digitonides after saponification. In this form they amounted to 0.81 per cent. of the dry tissue under common glass and 0.87 under Vita glass. It is probable that alcohols of high molecular weight other than sterols and fatty acids associated with both in waxes were present, but these possibilities have not yet been investigated.

While the values here found for leaf pigments may be considered abnormal it must be recognized that the conditions of illumination, in relation to the requirements of this species, were also abnormal at the date of sampling, and had been more so during midwinter. It appears that the plane of carotinoids, and to a less extent that of sterols, has been favored by the increased radiation under Vita glass, with a corresponding decline in the content of chlorophylls. To be sure, the percentage fluctuations in lipide components here observed are of small magnitude. Their possible import would become more apparent were they converted to actual weights of constituents in equal numbers of plants under the two forms of glass. No record of plant yields were taken in this instance, but our earlier records, already mentioned, show

[6] Williams and Lewis, *J. Biol. Chem.*, 89: 275, 1930.

[7] Sure, Smith and Kik, SCIENCE, 73: 242, 1931.

[1] Published with the approval of the director of the Wisconsin Agricultural Experiment Station.

[2] W. E. Tottingham and J. G. Moore, "Some Phases of Plant Development under Vita Glass," *Jour. Agric. Research*, 43: 133–163, 1931.

[3] With the aid of E. R. Tobey, graduate student.