marked increase in tissue production by the tomato under Vita glass. In view of the rôle of lipides, and particularly their fatty acid and sterol components, as carriers of energy, even small variations within this compositional fraction of plant tissue merit attention. Yet variation of its proportions in tissue might bear little relation to the potency of a growth promoting factor. One must admit that such a factor might either induce a growth rate parallel to its own accumulation or become activated to a special function without increase in amount. In the former case there would be no difference in percentage of the compound concerned as radiation treatment varied, while in the latter case it would decline in proportion as the tissue developed. In the present instance the increased content of carotinoids and sterols is merely suggestive of a causal relation of these lipides to increased vegetative development.

The observations here briefly presented increase the desirability of further investigation of the influences of solar radiation in plant growth. As suggested in our earlier paper, it will be desirable to isolate the effects of ultra-violet from those of infra-red radiations, as may be accomplished by the use of a water cell to absorb the latter spectral region.

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EFFECT OF DISSOLVED CO_2 ON THE pH OF WATER

THE recent letter in SCIENCE by Mr. Emil Truog concerning the hydrogen-ion concentration of water in which carbon dioxide is dissolved, prompts me to present the following calculations which were made several years ago in connection with some calculations on the lead carbonate equilibrium, and which, I think, have not appeared elsewhere.

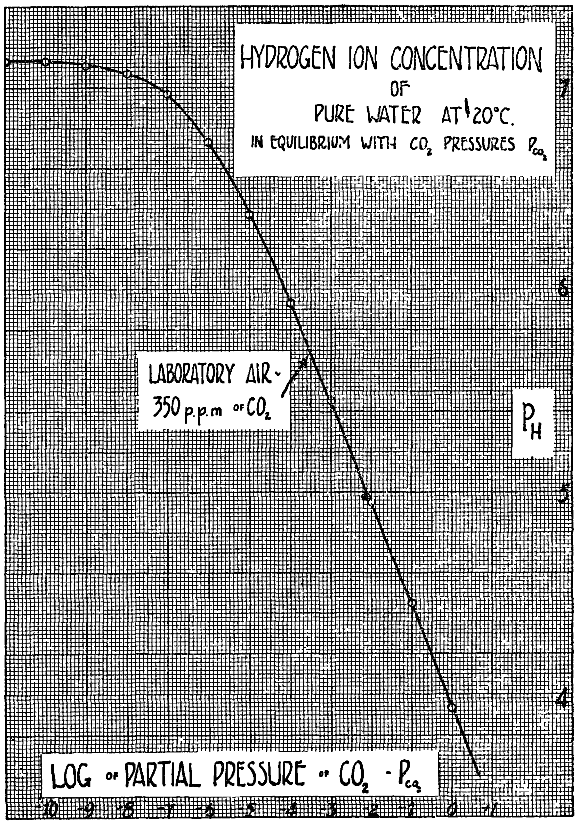
Setting up the familiar equations of carbonate equilibria with values of the constants indicated,

(1) $[H^+]\ [OH'] = K_w = 0.54 \times 10^{-14}$ (20° C.)
(2) $[H^+]\ [HCO_3']/[H_2CO_3] = k_1 = 3.18 \times 10^{-7}$ (20°)
(3) $[H^+]\ [CO_3'']/[HCO_3'] = k_2 = 3.54 \times 10^{-11}$ (20°)
(4) $[H_2CO_3] = ncP \quad nc = .0393$ (20°)
(4) $[H_2CO_3] = ncP \qquad\qquad nc = .0393$ (20°)
(5) $[H^+] = 2\,[CO_3''] + [HCO_3'] + [OH']$

we arrive at the following equation containing only constants and the two unknowns, $[H^+]$ and P

$$(6)\quad [H^+] = \frac{2k_1 k_2 ncP}{[H^+]^2} + \frac{k_1 ncP}{[H^+]} + \frac{K_w}{[H^+]}$$

This equation (6) is solved for $[H^+]$ by substituting values of P, the partial pressure of CO_2 with which the pure water is in equilibrium.



The curve of pH plotted against log of the partial pressure of CO_2 is practically linear from one atmosphere of CO_2 to about 10^{-6} atmospheres (which includes the range usually encountered) and for a pressure of CO_2, corresponding to 350 parts per million in air—an average value—gives a calculated pH of 5.68 which agrees well with the value given by Truog. From 10^{-6} of an atmosphere of CO_2 to zero pressure of CO_2, the curve rapidly approaches the dissociation constant of pure water as asymptote. The curve shows these results graphically.

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