scientists. A boy called Keats once lived in England. He was junior salesman in a drugstore and held even this humble position for a short time only, as he died quite young. I think my earnings for one week, perhaps for one day, are greater than all the wages ever paid to Keats. But people (especially young people) learn his poetry without compulsion and when they recite it their hearts throb, their voices quaver, and their faces flush. Theses are prepared on Keats, and books are published on Keats, but not on me. If every business letter that I have dictated, and by which I gained as much money or more than all Keats' wages, had brought me as much love and admiration as Keats' writings brought to him, then. . . . And how much love and admiration did I win? None.

"Fortunately, none" would be the right expression because many moneyed men get less than nothing (in scientific language: a negative amount). During the recent preelection campaign, some candidates were accused of friendship with gambling kings. Friendship with a man who has more money than all the poets and mathematicians of the nation together appears as a crime in the eyes of the "world."

I am fed up. I strike. I quit money-making for purest scientific endeavor. Have you any suggestion as to what I should discover first?

Yours very truly,

A MONEYED MAN

(*Name supplied on request*)

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Alcohol Metabolism

BEERSTECHER has stated (*Science,* **112**, 312 [1950]) that establishment of a figure for maximal human consumption of ethyl alcohol has "many important implications in both medical and legal practice" and brought forth evidence which he felt invalidated our estimate of a quart of 100-proof liquor per day for a man of average weight (*Science,* **109**, 594 [1949]). He stated that he knew two persons who consumed substantially twice this amount over extended periods of time. One would like this sort of evidence presented in a more scientific manner before accepting it. It is quite true that a 70-kg man can consume more than the estimated amount in 24 hr; an additional 600 ml of 100-proof liquor would be required to bring his blood alcohol concentration up to 500 mg/100 ml, about the maximum tolerated by man. Thus in the first 24 hr his consumption could be close to 2 qts, but this would be cut to 1 on subsequent days.

That there may be a rare individual with an extremely efficient enzyme system for metabolizing alcohol cannot be denied, and our figures for both dogs and men show a considerable range; but even if the fastest rates of metabolism of alcohol that we have recorded are used, the quart a day remains a close approximation.

As to the concentration of alcohol our dogs were supplied with, namely 10%, being below the optimal for maximal consumption, we found that, if the concentration were raised to 20%, there was no actual increase in the amount of alcohol consumed; the dogs limited their fluid intake to avoid greater alcohol intake, with the result that their health was impaired by dehydration.

It is quite true that small animals, such as the rat and mouse, can metabolize greater amounts of alcohol per unit body weight, roughly proportional to their basal metabolic rates. Since our figures were obtained in dogs, with a higher BMR than man, this factor should tend to make our estimate too high.

As to greater loss of alcohol in breath and urine with high blood alcohol concentrations, a little simple arithmetic will make it obvious that, at a blood alcohol concentration of 500 mg/100 ml, assuming a urinary output of 2 l daily, 10 g of alcohol would be eliminated in the urine and about the same amount in the breath, or a total equivalent to less than 2 oz of liquor.

If we estimate a maximal intake of 2 quarts, as Beerstecher advocates, we run into trouble on the basis of heat production. Thus, we have 720 g of alcohol to burn, producing 4,320 cal. Work with radioactive carbon incorporated in alcohol has demonstrated that alcohol is burned promptly and fairly completely rather than being converted to other substances for storage in the body, and it is known that muscular exercise does not increase the rate of alcohol metabolism. Thus we are confronted with the phenomenon of a man at essentially basal conditions producing over 4,000 calories in 24 hr. If this were true, certainly the alcoholic would reap his reward of hell-fire prematurely.

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Ecological Use of Meteorological Temperatures

THE interesting report on "The Response of Plants to Climate," by F. W. Went (*Science,* **112**, 489 [1950]), serves to emphasize the need for a clear understanding on the part of biologists of the significance and limitations of meteorological and climatological temperatures. These temperatures, because of the peculiar needs of synoptic meteorology, are measured under protection from solar insolation and at some distance above the ground, generally about 6 ft. Both these facts seriously affect the problem of relating biologic responses to specific environmental temperatures.

First, the relationship of the temperature of plant parts and the immediately adjacent air to the meteorological air temperature clearly will depend largely on the radiative characteristics of the plant parts. Since the thermometer is never exposed to the sky, the same meteorological temperature may be accompanied by widely differing plant temperatures under natural conditions. As Went points out, the practical grower must know how temperature affects his crop

at different light intensities. From the meteorological point of view, it appears rather foolhardy to consider air temperature without reference to radiation conditions in any discussion not confined to matter with the radiative characteristics of air.

Second, and probably less widely recognized, is the significance of the elevation of the thermometer. Under natural conditions, vertical temperature gradients in the lowest few feet of the atmosphere are tremendous. It has been pointed out, for example (Baum, W. A. *Ecology,* **30,** 104 [1949]), that the difference in summer mean monthly temperatures between 6 ft and 3 in. above the ground at Burlington, Vt., is the equivalent of a horizontal north-south difference of about 380 miles at the standard level of meteorological observations. Many plants, spending much of or all their lives very close to the earth's surface, are therefore subject to environmental temperature conditions appreciably different from those represented by ordinary climatic data. Caution must therefore be exercised in the comparison of laboratory results, based on a thermally homogeneous atmosphere, with meteorological temperatures.

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Photographic Reproduction of Laboratory Records Directly on Printing Paper[1]

FREQUENTLY in research or classroom work it is desirable to make a number of prints of kymograph or other records. The use of a lens system in the photographic procedure produces side-to-side reversal of the image and prevents direct printing on photographic paper, thus requiring an intermediate picture on a photographic plate before the print can be made. If, however, a concave mirror is used in forming the image, the print can be made directly from the kymograph record to the photographic paper. There is then no side-to-side reversal of the image but only a reversal from black to white, a change which, in many cases, is not important.

The arrangement we have used successfully in this laboratory is illustrated in Fig. 1. The kymograph record is clipped onto rack *A,* the photographic paper onto rack *B,* with its emulsion facing the concave mirror, *M.* Haloid paper of 6 cm width, cut from rolls

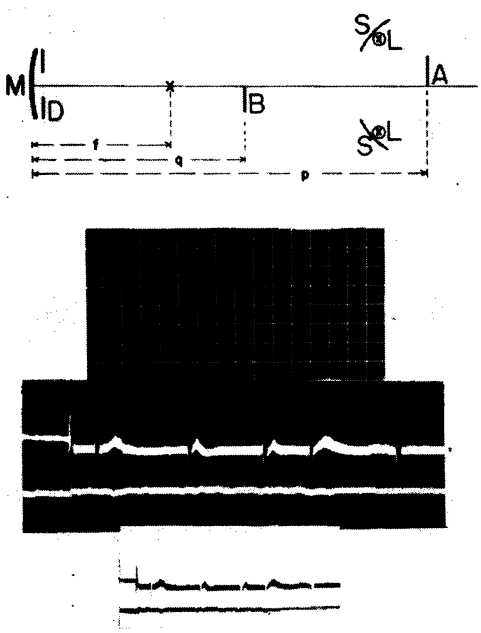

FIG. 1.

of 175-ft length, was used. A few seconds' exposure by the shielded flood lights (*S, L*) is sufficient, and subsequent development and fixing are rapid. This system can be mounted along the wall of the darkroom, and considerable red safelight illumination is permissible. The mirror used was front-surfaced and had a focal length of 3 ft. The object and image distances were chosen for convenient reduction (usually about ¼) of the object size. The usual formula relating object distance (p), image distance (q), and focal length (f)—namely, $\frac{1}{p}+\frac{1}{q}=\frac{1}{f}$—gives the relative positions of the elements of the system.

A typical kymograph record and the photographic image of it are also shown in Fig. 1. Some distortion of the image might be expected, since the focal planes in this system are curved surfaces. However, examination of the photograph of a rectangular grid (Fig. 1) shows that the distortion has been minimized in this setup by using a long focal length lens and by locating the object and image areas close to the optical axis.

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Lewis H. Sarett, of Merck & Co., Inc., who synthesized the antiarthritis drug cortisone, has been chosen to receive the Leo Hendrik Baekeland Award of the American Chemical Society's North Jersey Section for 1951. Dr. Sarett was cited for his "outstanding achievement in creative chemistry." The Baekeland Award, which consists of a gold medal and $1,000, is sponsored by the Bakelite Division, Union Carbide and Carbon Corporation, and is conferred biennially upon an American chemist under 40 in recognition of accomplishments in pure or industrial chemistry. Presentation of the 1951 award will be made at a dinner meeting of the North Jersey Section in Newark on April 23.