TABLE 1. Analyses of gas collected over the microbial fermentation of paper.

Component measured*	Concentration†	
	Dec. 5, 1951	Feb. 7, 1952
Nitrogen	21.7 mole %	3.48 mole %
Oxygen	2.0 " "	1.38 " "
Argon	0.13 " "	0.07 " "
Carbon dioxide	33.7 " "	46.9 " "
Methane	42.6 " "	49.0 " "
Ethane	3.2 ppm	7.0 ppm
Ethylene	3.9 "	4.7 "
Propane	0.14 "	0.06 "
Propylene	0.13 "	0.21 "

* Nitrogen gas was used to flush the system initially. Although the presence of oxygen and argon suggests atmospheric contamination of the samples in handling, air has been found generally to contain only a few parts per billion of gaseous hydrocarbons other than methane.
† Hydrogen-free basis.

petroliferous contamination. A portion of the inoculum was mixed with mineral salts medium and paper (Nu-wipe tissue) in a Waring Blendor; this mixture was then added to a 20-liter bottle filled almost to capacity with freshly boiled and cooled mineral salts medium. Tank nitrogen was passed through the liquid for ½ hr to flush oxygen from the system. Analysis of the gas formed as a result of microbial fermentation for several weeks is given in Table 1.

Aliquots from the digested sludge in the 20-l bottle were added to liter quantities of 1 percent ethanol, sodium acetate, sodium butyrate, and glucose, respectively, in mineral salts medium. Active fermentation ensued in all cases at a much greater rate than the digested sludge alone. The ethanol fermentation yielded the most methane, 90 percent. Gas issuing from each of the fermentation systems was collected and analyzed in five successive 500-ml increments.

Ethane was found in all gas samples. The largest quantities were produced by the ethanol fermentation where concentrations increased from 1.2 ppm in the first gas increment to 6.8 ppm in the fourth increment. Ethane concentrations in gas from the glucose fermentation also increased from 0.1 ppm in the first gas increment to 0.7 ppm in the fifth increment. All gas samples from the acetate and butyrate fermentation systems contained about 0.2 ppm ethane. Ethylene was found in the gas from the ethanol and glucose fermentations in concentrations ranging from 0.1 to 2.6 ppm. It was also present in early gas samples from the acetate and butyrate fermentation systems but disappeared in the gas samples collected later. Acetylene was present in all gas samples from both the butyrate and acetate fermentation systems in a concentration of approximately 0.2 ppm. It was also detected in gas from the glucose fermentation system at an intermediate stage of the fermentation, but no acetylene was detected in gas from the ethanol fermentation system.

There were no C_3 hydrocarbons found in gas from the acetate or ethanol fermentation systems. Propylene was present, 0.9 and 0.4 ppm, respectively, in the first gas increments from the butyrate and glucose fermentation systems, but its concentration decreased to 0.0 ppm in the fourth gas increments. The fifth gas increment from the glucose system contained 0.1 ppm of propane. Propane could not be positively identified in any of the other samples.

Using a different source of microbial inoculum, namely 100 ml of municipal sewage sludge, fermentation of paper and 1 percent ethanol in a mineral salts medium was carried out. The system used was a stainless steel 8-l tank fitted with a pressure gage. The tank was thoroughly evacuated after the addition of 4 l of the ethanol medium containing 5 g of homogenized Nu-wipe tissue. Pressure began to increase in the fermentation system after about 2 wk and was allowed to reach 45 psi above atmospheric pressure. The gas formed consisted of approximately 20 percent carbon dioxide and 80 percent methane. Ethane and acetylene were each found in a concentration of 0.3 ppm and ethylene was found in a concentration of 0.1 ppm. Propane and propylene were absent.

Penicillium digitatum A.T.C.C. No. 10030 was grown upon potato glucose agar in desiccators, and the atmosphere, which initially consisted of 20 percent tank oxygen and 80 percent tank nitrogen, was analyzed. The principal gas constituents were found by mass spectrometer analyses to be carbon dioxide and nitrogen; however, gaseous hydrocarbons were detected as in the bacterial fermentation systems. Thus, acetylene concentrations ranged from 0.0 to 0.6 ppm, ethylene, 0.2 to 1.4 ppm, propylene, 0.0 to 1.2 ppm, ethane, 0.1 to 0.6 ppm, and propane, 0.0 to 0.1 ppm, respectively. None of these components could be identified in a control system where *Penicillium digitatum* inoculum was omitted.

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The Quantification of Hostility in Dreams with Reference to Essential Hypertension

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In investigating methods for the measurement of emotional forces, a preliminary hostility scale was derived from a content analysis of 500 manifest dreams obtained from 200 subjects presenting wide variation in personality structure (*1*). This scale was found to differentiate hypertensive from nonhypertensive subjects.

Although most of the studies using dream material

have been chiefly concerned with uncovering the latent dream thoughts, the highly characteristic nature of the manifest dream for each person was observed by Freud (*2*) and corroborated by others, for example, Hall (*3*) and French (*4*). Although unique for each individual, the manifest dream seems to reveal similarities in those suffering from certain disease processes (*5*).

Hostility scale. In our material, hostility seemed present in greater intensity in the manifest dreams of hypertensives than in those of normotensives, and its presence in this degree can be used to distinguish the former from the latter. A 6-point scale to measure hostility has been constructed, demarcating three major categories in the intensity of its expression. The determination of the degree of hostility was arrived at on the basis of clinical experience. Each dream is broken up into what Freud has termed "conceptual elements" (similar to the independent clauses of sentences) which are scored individually and then totaled to give the hostility rating for the dream—any dream element that represents the actual or threatened: death of persons, receives a rating of 6; destruction of objects, 5. Such acts or scenes fall within the maximum category. In the medium category fall any elements that represent actual or threatened injury or damage —to persons, rated as 4; to objects, 3. The minimum category includes all elements that represent discomfort or minor impairment—to persons, rated as 2; to objects, 1.

Testing the scale. The scale was tested on 78 dreams obtained from 33 subjects, 17 of whom were chronic hypertensive patients from the Hypertensive Clinic of the Hospital of the University of Pennsylvania, and 16 of whom were normotensive summer school college students. Each subject provided at least two dreams of at least 30 words. The average length of the dreams was about 65 words, and there was no significant difference in length between the patients and the controls. The dreams of patients had to be collected by interviews with an experienced social worker, whereas control dreams were written out by the subjects on a standard questionnaire form. All dreams were dreamed within a period of 2 mo from the time of collection. Neither patients nor controls were aware of the purpose of the work.

Three judges were trained in the use of the scale. All three were second-year medical students at the University and were unaware of the purpose of the study. Hostility scores for each dream were computed by each judge and the rank difference correlations between the three were .83, .84, and .85, all significant at better than the .001 level.

Hostility scores for each dreamer were then computed as a mean score taken from the averaged scores given each dream by the three judges. The difference between the means of the hypertensive group and the control group was significant at better than the .001 level by the t-test appropriate for two samples where F is also significant.

Discussion. This series is limited by the fact that the control and experimental groups are not adequately random or well matched. The uncontrolled variables that merit further study include age, race, health, and socio-economic status. It is also recognized that hostility is significant in other psychosomatic illnesses. It is felt that this pilot work is encouraging and that further refinement and use of the hostility scale, plus measures of other emotional forces, now in varying stages of development, may contribute: a method for the quantitative study of emotional forces; further understanding of essential hypertension and other psychosomatic illnesses; possible applications to diagnosis, therapy, and prevention.

References and Notes

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The Effectiveness of 2,4,5-Trichlorophenoxyacetic Acid in Reducing Drop and Promoting Growth of Frosted Apricot Fruits[1]

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A marked increase in resistance of apricot fruits to low-temperature injury was obtained by the application of an aqueous solution of 2,4,5-trichlorophenoxyacetic acid (2,4,5-T) about 15 hr before the occurrence of a frost. In addition, severely frosted fruits, in which the ovules were killed and, in some cases, the endocarp tissue was injured, were induced to grow to normal size by a single application of 2,4,5-T, made either before or 2 days after the frost occurred.

As a continuation of a research program regarding the effects of 2,4,5-T on fruit size and maturity (*1, 2*), six trees each of the Royal and Derby varieties were sprayed with a 100-ppm solution of the trialkylamine salt of 2,4,5-T at Winters, Calif., the afternoon of April 8, 1953. At the time of spraying, approximately 40 days after full bloom, the pit apices in the fruits were just beginning to harden, and endosperm development had progressed to about 1 mm in length.

The morning of April 9, a radiation frost occurred in the Winters area, and the temperature, as recorded in a standard weather shelter, was 32° F for 3 hr and 31° F for 1 hr. An examination of both sprayed and unsprayed fruits a few hours after the frost revealed considerable blistering of the skin, particularly

[1] Appreciation is expressed to the Dow Chemical Company for supplying the 2,4,5-T used in this investigation.