Table I shows the individual figures (gm. of hemoglobin in 100 cc. of blood) for each child for each month that he was under observation. The age given is that at the time the first determination was made.

Williamson[3] using the spectrophotometric method showed that the sex difference at this age was not significant, and in obtaining the averages shown in Table II the 2 sexes were used together. The same author also showed the small difference between the values in the second and third and fourth years, so that in this paper all ages were used together.

TABLE II.

	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
Average	14.4	11.9	12.0	11.5	12.8	12.8	12.6

It will be seen that, without exception, the February figures are all below those of November and that there is a rise in May but not to the November point, suggesting that the peak is probably during the summer months. The low point corresponds to the time of greatest incidence of upper respiratory tract infections[4] and to that of slowest growth[4] suggesting some common factor at work, probably to be found in environmental conditions to which city children are subjected during the winter months.

4916

The Stimulating Efficiency of the Normal Primary Alcohols.*

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As reported recently,[1] the rhythmic movements of the cirri of barnacles are sensitive indicators of environmental stimulation. A study has been made of the stimulating efficiencies of the first 4 normal primary aliphatic alcohols on *Balanus tintinabulum.*† The

[3] Williamson, *Arch. Int. Med.*, 1916, xviii, 505.

[4] Emerson, H., *J. Am. Med. Assn.*, 1927, lxxxix, 1326.

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[1] Cole, W. H., *J. Gen. Physiol.*, 1929, xii, 599.

† The experiments on *Balanus* were done at the Hopkins Marine Station, Pacific Grove, Calif., to the director of which the senior author is indebted for many courtesies.

TABLE I.
Minimum stimulating concentrations of alcohols for *Balanus*—Temp. 18.0±0.5°C.

Alcohol	Threshold Concentration	Concentration calculated according to Traube's rule.
Methanol	0.06 M	(0.06)
Ethanol	0.017	0.02
Propanol	0.0067	0.0066
Butanol	0.0027	0.0022

threshold concentration of each alcohol was determined under constant conditions of illumination, temperature and rate of flow, and in the absence of mechanical stimulation. Under such conditions it may be assumed that the stimulating agent is furnishing the minimum amount of energy necessary to activate the receptor. The effects of any secondary processes initiated by excessive stimulation are thus avoided, and the interpretation of the stimulating process is less likely to be erroneous. From the data in Table I it is clear that the stimulating efficiencies of the alcohols increase about 3 fold as each CH_2 group is added, beginning with methanol. This result is similar to that found by previous investigators in studying narcosis, toxicity and related effects. A review of the work and the theories on narcosis has been recently presented by Traube.[2]

We have made similar studies on the frog, *Rana pipiens*. Protecting the animal from all external stimuli, except the alcohol being studied, it has been possible to determine equally stimulating concentrations of the first 5 members of the normal primary aliphatic alcohols. Constancy of reaction time was the criterion for judging equally stimulating solutions. The data, presented in Table II,

TABLE II.
Reaction times of frog stimulated by alcohols at concentrations which are not excessive. Temp. 18.0±0.5°C.

Alcohol	Concentration	Reaction Time (sec.)
Methanol	1.8 M	22.3
Ethanol	0.6	26.5
Propanol	0.2	25.9
Butanol	0.066	32.5
Pentanol	0.022	32.4

show that the stimulating efficiencies increase with the number of CH_2 groups. The agreement of these 2 sets of data with the so-called Traube's rule is striking, but we would like to point out that interpretations of stimulation based on surface tension effects alone are probably incomplete. A more satisfactory account is possible by

[2] Traube, J., *Arch. f. Physiol.*, 1927, ccxviii, 749.

applying Langmuir's[3] "principle of independent surface action," according to which the distribution and orientation of polar organic molecules at an interface are determined by the character and number of the more active and the less active portions of the molecules. Throughout the alcohol series the potential of the polar group remains practically constant; *i. e.*, the effect of the OH group is constant, so that the increasing stimulating effect is determined by the non-polar group. The non-polar groups in the alcohol series differ in the number of CH_2 units, or in the length of the carbon chain. It is assumed that each additional CH_2 unit exerts an exponentially increasing effect on the shift of molecular equilibria at the receptive surface. This disturbance of the previously existing equilibria is the initial process of a catenary series of events which culminates in the discharge of a nervous impulse. Details as to the nature of the first effect are as yet unknown.

From our point of view it should be possible to secure data on the stimulating efficiency of the members of various homologous series of compounds, and by a study of the data from the different series, to formulate a generalized statement concerning the nature of the initial process in chemical stimulation.

Studies are now in progress on the effects of normal primary aliphatic aldehyde and acid series. A complete report of the whole work will be presented later.

4917

Hemorrhagic Reactions in Tuberculous Lesions and Skin Tests During Protracted Anaphylactic Shock.

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The method which gives the best result for reproducing the observations which we will describe is as follows: Guinea pigs are injected intraperitoneally with a large dose (10-20 mgm.) of the slightly virulent tubercle bacillus strain R.1, or with killed tubercle bacilli. The infection is followed 3 to 8 days later by the intraperitoneal injection of 0.1 to 1.0 mgm. egg white (dry weight). After this treatment the guinea pigs usually develop a strong skin sensitiveness to egg white,[1] often giving large necrotic skin reactions with 0.01 mgm. egg white.

[3] Langmuir, I., *Chem. Reviews*, 1929, vi, 451.

[1] Dienes, L., *J. Immunol.*, 1929, xvii, 531.