to be of physiologic significance in the prevention of edema of the feet on assuming the erect position. Repeated determinations showed comparable results from day to day.

Forty-three determinations have been made on 21 patients with the following states: scleroderma 4, occupational atrophy 3, ascites 4, peritonitis 2, edema 8 (cardiac 6, venous obstruction 1, pernicious anemia 1). Comparison of the mean values in the patients with those in the normal subjects is illustrated in Figure 1. In scleroderma a diminution in distensibility was found to parallel the severity of the disease. Values for the dorsum of the hand ranged from 0.47 to 0.55 (mean 0.50), contrasting with the normal range of 0.66 to 2.04 (mean 1.34). This method is being used to follow quantitatively the progress of the disease and to evaluate therapeutic procedures.

In congestive heart failure the distensibility was found to decrease as the edema increased, reaching, in one patient, the limit of distensibility. Similar findings occurred in other types of edema.

Summary. A simple method has been devised for the measurement of skin distensibility. Its application to the study of the physiology of the skin in edema and abdominal swellings is being made. Its importance as an objective method in following, quantitatively, the progress of scleroderma and other skin changes, as well as objectively evaluating the therapeutic procedures applied to these diseases is evident.

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The Ammonia Mechanism in Alkalosis Due to Overventilation.

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It has been taught[1] that production of ammonia by the kidneys is increased for excretion of acid which would otherwise carry off essential basic elements; and that ammonia formation is suppressed in states of alkalosis when it is desirable for the body to be rid of excess fixed base. My own observations[2,3,4] have convinced me that

[1] Peters, J. P., and Van Slyke, D. D., Quantitative Clinical Chemistry, Vol. I, Interpretations, Williams and Wilkins, Baltimore, 1931, p. 372.

[2] Briggs, A. P., *Arch. Int. Med.*, 1932, **49**, 56.

[3] Briggs, A. P., *J. Biol. Chem.*, 1934, **104**, 231.

[4] Briggs, A. P., *Arch. Int. Med.*, 1937, **60**, 193.

the ammonia mechanism is not concerned with conservation of fixed base, but that it does serve to protect the urinary passages from the acid secretion formed within the renal tubules.

In the present contribution data associated with the development and recession of alkalosis from forced breathing are presented for inspection from the two viewpoints.

Respiration was accelerated sufficiently so as to maintain slight sensations of giddiness and numbness of the lips: just a low grade alkalosis. Urines were collected before, during and after the alkalosis period. Acids and bases were determined by familiar methods used in a previous publication.[4] Since a diuresis develops with overventilation and because a diuresis tends to waste fixed base, water was taken during the fore and after periods in sufficient quantities so that urine volumes were similar.

TABLE I.
Effect of Overventilation on Excretion of Ammonia and Excess Fixed Base.

Exp. I	Duration hr	Vol. urine cc	Cl. m.Eq.	SO_4 m.Eq.	PO_4 m.Eq.	Total acid m.Eq.	Total fixed base m.Eq.	Fixed base excess m.Eq.	NH_3 m. Eq.	pH
Before	1.0	135	13.78	1.65	0.79	16.22	17.60	1.38	1.67	5.8
During	1.0	102	14.76	1.16	0.70	16.62	27.50	10.88	0.35	7.5
After	1.0	220	8.04	1.15	0.59	9.78	14.26	4.48	0.62	6.6
II										
Before	1.0	365	6.66	0.50	1.87	9.03	10.94	1.91	0.72	6.4
During	1.0	305	5.57	0.88	1.80	8.25	15.25	7.00	0.62	7.3
After	1.0	185	5.66	0.84	1.33	7.73	9.35	1.62	1.30	6.5
III										
Before	2.0	508	23.08	0.96	1.72	25.76	27.52	1.76	2.50	6.5
During	2.0	620	19.10	0.63	1.67	21.40	41.90	20.50	1.06	7.5
After	2.0	470	10.84	0.89	1.26	12.99	14.37	1.38	4.12	5.9
IV										
Before	1.5	276	17.88	1.71	0.38	19.97	21.32	1.35	1.54	6.1
After	1.5	320	16.40	1.21	0.56	18.17	26.13	7.96	0.60	7.2

The results, in the accompanying table, show ammonia production to be at a low level in the control periods. Since there is little change in the excretion of ammonia with forced breathing the ammonia mechanism is not an important factor in expulsion of the conspicuous increment of excess fixed base, which is to be seen for this period. Comparing the alkalosis periods with the preperiods, the average increase in excess fixed base is 9.91 m.Eq. to a drop of 0.48 m.Eq. for ammonia.

This observed lack of proportionality might have been predicted from previous work on alkalosis of overventilation: similar slight changes in production of ammonia were observed by Grant and

Goldman[5] with the development of severe alkalosis; and the relatively large increment of excess fixed base which may be excreted in this state, up to 30 m.Eq. per hr, was shown in the study of McCance and Widdowson.[6]

It is of some interest to observe that the excretion of excess base is not due to diminished excretion of chloride. McCance and Widdowson similarly observed no drop in excretion of chloride with the development of alkalosis. The prompt excretion of a strongly alkaline urine with alkalosis may however be very readily accounted for by assuming that a state of alkalosis inhibits tubular resorption of base bicarbonate, a suggestion implied by Davies, Haldane and Kennaway.[7]

In the after periods, with removal of the inhibition of alkalosis, resorption of fixed base is more nearly complete; the urine again becomes slightly acid, and production of ammonia is slightly accelerated. The average increment of ammonia, however, is only 1.34 m.Eq. compared with a decrement of 10.31 m.Eq. for fixed base. Thus we have another instance showing lack of proportionality between ammonia production and conservation of fixed base. The comparison of fluctuations of ammonia production with fluctuations of excess fixed base is most favorable to the base regulatory theory; it would perhaps be more proper to compare ammonia excretion with total fixed base resorption. When we stop to calculate that something like a thousand m.Eq. of fixed base per hr appears to be resorbed by the tubules, the 2 or 3 m.Eq. of ammonia per hr produced under ordinary circumstances at once becomes insignificant; the diminished production with alkalosis scarcely less so, and the 5 or 10 m.Eq. per hr, produced with administration of strong acid, scarcely more so.

From my viewpoint, ammonia secretion in the different periods is accounted for as follows: the small quantities found for the alkalosis periods may be derived in part from the glomerular filtrate and in part from unremoved urine of the preperiod. The slightly greater quantities of ammonia for the control periods presumably results from the stimulation of undetermined organic acid, which the pH values indicate to be present in quantities greater than those calculated for excess fixed base.

Summary. A comparison has been made of fluctuations of am-

5 Grant, S. B., and Goldman, Alfred, *Am. J. Physiol.*, 1920, **52**, 209.

6 McCance, R. A., and Widdowson, E. M., *Proc. Roy. Soc.*, Series (B), 1936, **120**, 228.

7 Davies, H. W., Haldane, J. B. S., and Kennaway, D. M., *J. Physiol.*, 1920, **54**, 32.

monia secretion and fixed base excretion associated with the development and recession of alkalosis from forced breathing. The results appear to be out of harmony with the base regulatory theory of ammonia production.

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Automaticity of Central Neurones After Nicotine Block of Synapses.

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The discovery that central neurones manifest a rhythmic electrical potential in the absence of deliberate sensory stimulation suggested that these cells possess an automatic beat homologous to that of the cardiac nodal cells. The possibility of nerve impulses, either from receptors or injured nerves or from closed circuits of interneurones* with long maintained activity, had not, however, been excluded. The persistence of a marked potential rhythm in the frog's olfactory bulb for hours after its complete removal and at a time when its only neural connections—the olfactory nerves and cerebral hemispheres—were electrically dead[1] seemed to eliminate any action of impulses from receptors or injured neurones. Since, however, stimulation of the olfactory nerves of such a preparation increases the bulb potentials or even reinitiates them after they have stopped and since this enhancement may persist for many minutes or hours following a brief stimulation[2] the existence of trapped impulses in closed circuits remained a definite possibility. This has been urged especially by Lorente de No.[3] In the present experiments it is shown that when synaptic conduction is blocked by nicotine the rhythmic slow potential waves of the isolated bulb are increased rather than abolished. It may be concluded, therefore, that the activity rhythm originates in single neurones and is immediately independent of any maintained or recurrent bombardment by conducted nerve impulses.

Nicotine has long been used to block synaptic transmission in

* This word is suggested as a condensation of "internuncial neurones" parallel to Sherrington's use of "motoneurone."

1 Gerard, R. W., and Young, J. Z., *Proc. Roy. Soc. B*, 1937, **122**, 343.

2 Libet, B., and Gerard, R. W., *Am. J. Physiol.*, 1938, **122**, 128 (P) and unpublished.

3 Lorente de No, R., *Am. J. Physiol.*, 1935, **113**, 505.