TABLE I

Date		Units
June 9		0
10		0
11		0
13	Operation-Colostomy	
14		25
15		25
16		50
19		75
July 2		50
4		25
6	Operation-Gastrectomy	
7		75
9		125
10		125
11		100
12		50

excreted. We believe that the increased excretion of cortin is a manifestation of the response of the organism to a damaging stimulus by an increased secretory activity of the adrenal cortex. It has been shown that the adrenal cortex of the laboratory animal hypertrophies after damage.[3] These experiments and the present investigation suggest that an increased secretion of the adrenal cortical hormone forms part of the protective mechanism against damage.

PAUL WEIL[4]
J. S. L. BROWNE

UNIVERSITY CLINIC,
ROYAL VICTORIA HOSPITAL,
MONTREAL, CANADA

PERIODIC MITOTIC ACTIVITY IN THE EPIDERMIS OF THE ALBINO RAT

THE knowledge that mitotic activity was periodic in some plants led Fortuyn-van Leyden to investigate this phenomenon first in various tissues of young kittens,[1] later, in young mice.[2] She found periods of maximum and minimum activity. Since then Ortiz Picón,[3] working with the epidermis of young mice, and Carleton,[4] studying the epidermis and hair follicles of young mice, have corroborated her findings as to periodicity, but have not agreed as to the time of maximum and minimum activity. More recently Cooper and Schiff[5] have demonstrated periods of greater and lesser mitotic activity in the epidermis of the prepuce of human male infants. The author[6] has reported a study of mitotic activity in the renal cortex of male albino rats. The curve plotted from the findings exhibited both periodic and rhythmic features (Fig. 1, broken line). Elliott,[7] as part of a study on the growth mechanisms of articular cartilage, obtained specimens during the day and night, but found no difference in rate of cell division.

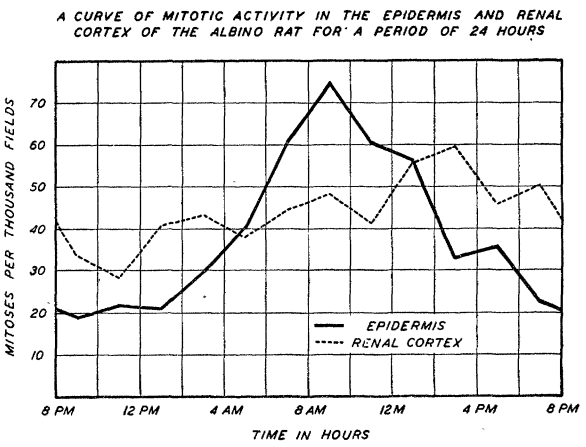

FIG. 1

The importance of such studies in the problem of normal and abnormal growth is obvious. The differences in results of various investigators may be due to the ages and orders of mammals employed, organ or region studied, inherited qualities or individual variation, character of environment or the small size of some of the samples. An addition to available data is here presented, a study of mitotic activity in the epidermis of the albino rat.

Materials and methods were as follows: from each of 96 male albino rats, 28 days old, killed in groups of 8 at intervals of 2 hours during a period of 24 hours, a square of skin was cut from the central ventral portion of the abdominal wall. The specimens were fixed in Bouin's, cross-sectioned at 8 microns, mounted serially and stained with hematoxylin and eosin Y. Every fourth section was studied to avoid counting the same mitosis twice. The number of mitoses observed in 1,000 consecutive fields was taken as an index of mitotic activity in a specimen. From the data obtained a curve was constructed and biometric studies made. To conserve space individual values are not presented.

The curve (Fig. 1, solid line) is composed of mean values for each 2-hour interval, placed at the mid-point of the interval. Each mean value is the average of 8 individual values. It will be seen that mitotic activity was greatest during the interval 8 A.M. to 10 A.M. (75 mitoses per 1,000 fields) and least during the interval 8 P.M. to 10 P.M. (19 mitoses per 1,000 fields); or, in other words, mitoses were almost 4 times as numerous in the morning interval as in the evening period. With few exceptions the skin was obtained from the same rats as were the kidneys previously studied. A

[3] Hans Selye, *Endocrinology*, 21: 169, 1937.

[4] Aided by a grant from the Banting Research Foundation.

[1] C. E. D. Fortuyn-van Leyden, *Proc. Akad. wet. Amsterdam*, 19: 38, 1917.

[2] C. E. D. Fortuyn-van Leyden, *Proc. Akad. wet. Amsterdam*, 29: 979, 1926.

[3] J. M. Ortiz Picón, *Zeitschr. f. Zellforsch. u. mikr. Anat.*, 23: 779, 1933.

[4] A. Carleton, *Jour. Anat.*, 68: 251, 1934.

[5] Z. K. Cooper and A. Schiff, *Proc. Soc. Exp. Biol. and Med.*, 39: 323, 1938.

[6] C. M. Blumenfeld, *Anat. Rec.*, 72: 435, 1938.

[7] H. C. Elliott, *Am. Jour. Anat.*, 58: 127, 1936.

comparison of the curve of mitotic activity in the epidermis with that of the renal cortex shows coincidence of the periods of minimum activity but an interval of 6 hours between periods of maximum activity. Nor does the curve for the epidermis have the rhythmic character of that for the renal cortex.

For biometric studies the 24-hour period was subdivided thus: first half of day, 8 A.M. to 2 P.M.; second half of day, 2 P.M. to 8 P.M.; first half of night, 8 P.M. to 2 A.M.; and second half of night, 2 A.M. to 8 A.M. Mitotic activity was found to be significantly greater during the first half of the day and significantly lower during the first half of the night than during the rest of the 24-hour period.

No explanation of these findings can be given as yet. If factors external to the cells have a part in determining periods of maximum and minimum mitotic activity they did not, in these animals, exert their influence in all parts of the body at the same time. A most valuable lead is furnished by the work of Huggins and Noonan[8] on the relation of temperature to red bone marrow activity and of Fay and Henny[9] and Smith and Fay[10] on the relation of temperature differences to normal and abnormal growth. This is one direction in which the present work is being continued.

C. M. BLUMENFELD

UNIVERSITY OF UTAH

SCIENTIFIC APPARATUS AND LABORATORY METHODS

A DEVICE FOR RAPID RINSING OF ABSORPTION TOWERS USED IN GAS ANALYSIS STUDIES[1]

WHERE an assembly of several glass absorption towers are employed for carbon dioxide or other gas determinations as, for example, in case of the Heinicke and Hoffman[2] photosynthesis apparatus, there is a special need for rapid and efficient rinsing of the towers after each determination. The simple device described below has these two advantages.[3] The whole system can be made from standard glassware in about a half day. The time necessary for each rinsing of the towers is reduced by more than one-half.

Details of this device, which has been used successfully for several months, are clearly shown in Fig. 1. The rinse water can be made to flow under pressure by connecting a blower pump or air-pressure line at A and applying pressure in the 10-gallon carboy, B, until the mercury in the manometer, C, indicates a level differential of about 12 inches. The pinch clamp, F, is a safety clamp employed between rinsings. It aids also in directing distilled water to the stationary stock water bottle, D, from the portable bottle, N. The same source of air pressure used at A can be attached at M, to force the water from bottle, N, to bottle D.

To rinse the towers after a determination, clamp F is released first (clamp G is open only during the filling of bottle D),[4] then clamp H is released with the left hand and clamp I (to another pair of towers) is released with the right hand. This allows the distilled water under pressure to squirt through the syringe-like bulbs at K and L as well as through the bulbs in another set of towers which is connected to the system at I. Thus, a set of four towers can be washed at one time. The water will flow evenly down the sides of the towers, provided they have been thoroughly cleaned in the beginning with a strong cleaning solu-

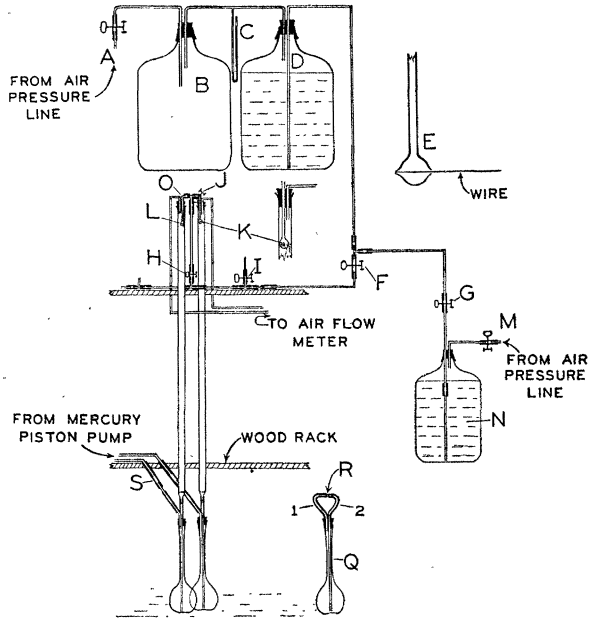

FIG. 1. Diagram showing system employed for rapid rinsing of gas-absorption towers.

[1] The authors are indebted to the Sherwin-Williams Paint Company, under whose fellowship part of this information has developed, and to F. W. Southwick, graduate assistant in horticulture, for helpful suggestions.

[2] A. J. Heinicke and M. B. Hoffman, SCIENCE, 77: 55–58, 1933.

[3] The removal and replacement of stoppers at the top of towers before and after rinsing is not necessary. They may be securely set and sealed about the edges with a mixture of grafting and sealing wax to obviate possible leakage of air at this point.

[8] C. Huggins and W. J. Noonan, *Jour. Exp. Med.*, 64: 275, 1936.

[9] T. Fay and G. C. Henny, *Surg., Gynec. and Obstet.*, 66: 512 (no. 2A), 1938.

[10] L. W. Smith and T. Fay, *Jour. Am. Med. Asn.*, 113: 653, 1939.

[4] Clamp J should be closed when air-flow records are taken. This prevents back-pressure from one tower to another of a pair.