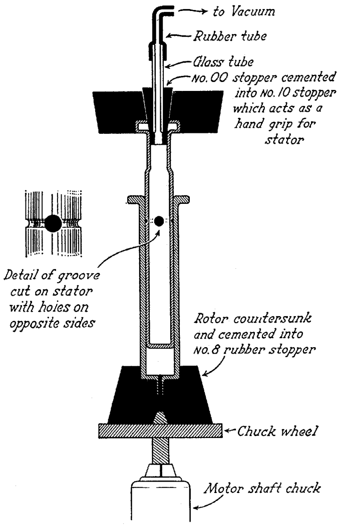

FIG. 1. Micromacerator.

so as to allow a period of about 1 min to elapse for the total displacement of the tissue by the descending piston.

The tissue is thus slowly forced between the two closely opposing ground glass surfaces of the stator and the rapidly rotating rotor. As it creeps up in this limited space, it becomes totally emulsified. When it reaches the groove cut on the surface of the stator, it is drawn through the holes and into the inner chamber by means of the applied vacuum. When all the tissue has been ground, the motor is stopped, the headpiece is removed from the stator, and the ground tissue is emptied into a centrifuge tube for separation or further treatment.

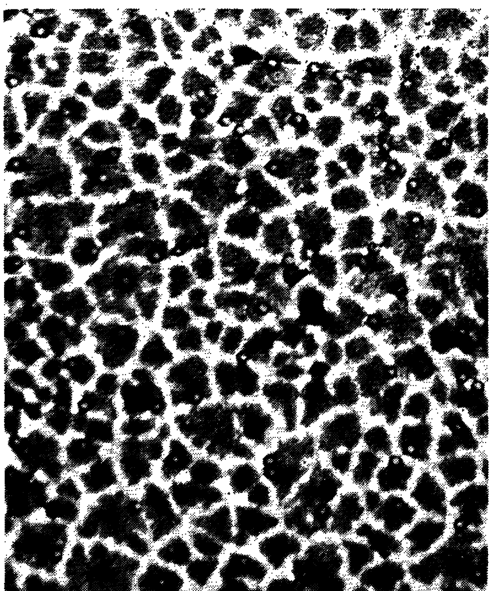

FIG. 2. Smear of macerated spleen stained with Wrights' stain. Suspension of red blood cells superimposed on preparation for comparison. ×315.

The macerator is easily cleaned and sterilized by autoclaving. No perceptible heat is produced by friction during the grinding process, and no instrument has broken during operation. Caution must be exercised to make certain that the base is well centered, and that it will rotate in line with the central axis of the motor shaft so that no eccentric motion occurs. This model may be constructed in any size, depending upon the volume of work that is required of it. For larger models employing this principle, however, it is preferable to machine the grinding surfaces from stainless steel.

Fig. 2 shows a stained smear of spleen tissue ground in this apparatus. The red blood corpuscles were added to the emulsion after grinding to help make a comparison of the size of the particles produced.

Relationship Between Glomerular Filtration Rate and Urine Flow in the Rabbit

S. E. Dicker and H. Heller

Department of Pharmacology, University of Bristol, England

Administration of water to rabbits is followed by a marked increase in glomerular filtration rate (GFR) (*11, 12*). Dicker and Heller (*7*), and Forster (*10*), have shown that this rise of GFR is accompanied by an increase in effective renal plasma flow (RPF). Such a participation of the glomeruli in the regulation of the urine volume of normal adult animals has so far not been found in any other mammalian species. It cannot be said to be characteristic for either rodents or herbivores, as neither adult rats (*7*) nor adult guinea pigs (*8*) show a correlation between GFR and urine flow. Such a relationship has, however, been found in amphibians (*9, 13*), young and newborn rats (*5, 6*), and newborn guinea pigs (*7*). It has also been claimed to occur in newborn infants (*1, 4*), but see Barnett *et al.* (*2*).

The phenomenon has been interpreted (*14*) as a physiological response of glomerular function to an increased body-water load. However, this interpretation has recently been questioned by Brod and Sirota (*3*), who believe that "the parallel variation in urine flow and filtration rate . . . is attributable to a reduction in renal blood flow occasioned by the experimental procedures." They assume that injections and administration of water preceding clearance estimations in rabbits are stimuli sufficiently noxious to produce a decrease in urine flow, RPF, and GFR, so that the rising GFR values observed are due to recovery from the oliguric phase. Brod and Sirota's interpretation, if substantiated, would be of considerable interest. In our experiments on rabbits, however, the urine-collecting period started 3 hr after the injection of inulin and diodone and 1 hr after the last administration of water. It is difficult to believe that such harmless procedures would give rise to emotional disturbance in rabbits for any prolonged period. But, even on Brod and Sirota's assumption, disturbing effects of experimental procedures should have passed by the time the rabbit reached the peak of the diuresis. It seemed, therefore, of interest to investigate the relationship between GFR and urine volume, when the urine output was falling after full diuretic values had been reached.

TABLE 1

Increasing rates of urine flow				Decreasing rates of urine flow			
Urine flow (ml/100 g/min)		GFR (ml/100 g/min)		Urine flow (ml/100 g/min)		GFR (ml/100 g/min)	
From	To	From	To	From	To	From	To
0.0226	0.0510	0.52	0.60	0.0510	0.0029	**0.52**	**0.04**
.0143	.0502	.41	1.08	.0474	.0200	0.29	.18
.0057	.0389	.18	0.54	.1040	.0100	1.25	.23
.0093	.0316	.18	0.35	.0316	.0017	0.35	.19
.0009	.0811	.10	1.03	.0100	.0015	0.23	.08
.0423	.0687	.37	1.08	.0420	.0095	0.52	.10
.0420	.0965	.42	1.28	.0818	.0020	1.03	.12
.0220	.1060	.37	1.63	.0222	.0023	0.37	.15
.0365	.1080	.30	1.72	.0605	.0200	0.93	.43
.0180	.0960	.10	0.99	.0100	.0055	0.20	.05
.0220	.0570	.18	0.78	.1050	.0320	1.37	.56
.0140	.0552	.25	0.61	.0547	.0183	0.63	.31
.0457	.0920	.32	0.89	.0286	.0077	0.35	.06
.0085	.0990	.05	1.09	.0816	.0316	0.83	.45
.0057	.0389	.18	0.54	.0316	.0275	0.40	.33
0.0075	0.0275	0.05	0.35	0.0547	0.0115	**0.60**	**0.15**

On looking through the experimental results on which our report on renal function in the rabbit was based (*7*), it was found that 16 pairs of GFR estimations had been done at decreasing rates of urine flow. It will be seen from Table 1 that much the same relation between GFR and urine flow obtains at falling, as at rising, rates of diuresis. This may be exemplified by the results on an animal in which three consecutive clearance estimations had been performed: when urine output increased from 0.0093 to 0.0316 ml/100 g/min, GFR rose from 0.18 to 0.35 ml/100 g/min; when, in the same animal, urine flow decreased from 0.0316 to 0.0017 ml/100 g/min, GFR fell from 0.35 to 0.19 ml/100 g/min. On the other hand, no significant changes were observed in those animals whose rate of urine excretion happened to remain steady over an extended period (*A*, Table 2), though it will be noted that in these animals, also, the level of glomerular filtration corresponded to that of the urine flow. In two animals, correlation between GFR and urine flow was found to be lacking (*B*, Table 2).

TABLE 2

Rates of urine flow (ml/100 g/min)	Corresponding rates of GFR (ml/100 g/min)
A	
0.0501—0.0532—0.0510—0.0541	0.49—0.50—0.54—0.48
.0907— .0888—0.0932	.99—1.08—0.97
0.0055—0.0055	0.08—0.09
B	
0.0350—0.0212—0.0283	0.39—0.28—0.47
0.0300—0.0105—0.0054	0.31—0.33—0.30

It would seem from these findings that the regulation of urine volume in most adult rabbits is of a twofold nature, comprising (*a*) a tubular regulatory factor, in common with all other mammalian species, and (*b*) a glomerular component, which perhaps comes into play when the body-water load is substantially raised. The observation that GFR rises with increased, and falls with decreased, urine flow inclines us to think that these variations are a physiological rather than a pathological response. The fact that glomerular filtration rate and urine volume are similarly related in the newborn of other mammalian species supports this conclusion.

References

1. BARNETT, H. L. *Proc. Soc. Exp. Biol. Med.*, 1940, **44**, 654.
2. BARNETT, H. L., *et al. J. clin. Invest.*, 1948, **27**, 691.
3. BROD, J., and SIROTA, J. H. *Amer. J. Physiol.*, 1949, **157**, 31.
4. DEAN, R. F. A., and MCCANCE, R. A. *J. Physiol.*, 1947, **106**, 431.
5. DICKER, S. E. *J. Physiol.*, 1949, **108**, 197.
6. ———. Unpublished.
7. DICKER, S. E., and HELLER, H. *J. Physiol.*, 1945, **103**, 449.
8. *Ibid.*, 1950, in press.
9. FORSTER, R. P. *J. cell. comp. Physiol.*, 1938, **12**, 213.
10. ———. *Amer. J. Physiol.*, 1947, **150**, 573.
11. KAPLAN, B. I., and SMITH, H. W. *Amer. J. Physiol.*, 1935, **113**, 354.
12. MCCANCE, R. A., and WILKINSON, B. M. *Quart. J. exp. Physiol.*, 1940, **30**, 249.
13. SAWYER, W. H. Private communication, 1950.
14. SMITH, H. W. *Bull. N. Y. Acad. Med.*, 1947, **23**, 177.

Electrometric Correlates of the Hypnotic State

Leonard J. Ravitz[1]

Section of Neuro-anatomy, Yale University School of Medicine, New Haven, Connecticut

Because of repeated failure to detect electrometric correlations with EEG from trance states (*1, 4, 6–8*), no completely objective criteria of hypnosis have yet been formulated beyond empiric observation. Using a Burr-Lane-Nims microvoltmeter (*2, 3, 5*), 60 standing potential records of 20 subjects were taken. Although results of spot determinations were sometimes equivocal, continuous emf tracings, using the combined microvoltmeter and General Electric photoelectric recorder (*5*) at a speed of 1 in./min, with one electrode on the forehead and the other on the palm of either hand, seem to provide a reliable quantitative index of trance depth. During hypnosis, the emf tracing becomes more regular, and potential difference either gradually increases or decreases in magnitude. At trance termination, there is usually a dramatic voltage shift, and the tracing eventually returns to that of the normal waking state (Fig. 1).

Whenever possible, induction was linked up with motor

[1] Now at the Department of Neuro-psychiatry, Duke University School of Medicine, Durham, N. C.