This, together with the lack of physiological and psychological action of 3-O-methyl catechol amines observed by others with normetanephrine (*8*) and by us with metanephrine, points to catechol-O-methyl transferase as the principal enzyme for the inactivation of epinephrine.

Note added in proof: Since this communication was submitted for publication, a paper by Kirshner *et al.* (*9*) has appeared which reports that 47 percent of the radioactivity in the urine is "3-methyl-O-adrenaline" (metanephrine), free and conjugated, following the administration of *d,l*-adrenaline-2-C^{14} to man. This finding differs from that reported previously by these workers (*4*).

ELWOOD H. LABROSSE
JULIUS AXELROD
SEYMOUR S. KETY

Laboratory of Clinical Science, National Institute of Mental Health, Bethesda, Maryland

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16 July 1958

Evidence That the Mammalian Nephron Functions as a Countercurrent Multiplier System

Abstract. Fluid collected by micropuncture from the bend of the loop of Henle in the concentrating hamster kidney had the same osmotic pressure as fluid from a collecting duct at the same level, while that from the distal convolution was more dilute. This indicates that the tubular fluid is first concentrated, then diluted, before its final concentration.

Hargitay and Kuhn (*1*), in 1951, introduced a new and revolutionary concept for the mechanism of urine concentration in the mammalian kidney based on the premise that the loop of Henle acts as a countercurrent multiplier system. The loop of Henle mechanism was thought to make the interstitium of the medulla hyperosmotic, which in turn caused diffusion of water out of the collecting ducts and concentration of the urine. The great theoretical advantage of this mechanism is that at no level in the kidney need there be large osmotic gradients maintained by tubular structures only one cell layer thick.

The original experimental observations in support of this theory were those of Wirz, Hargitay, and Kuhn (*2*), who concluded from cryoscopic studies of slices from concentrating rat kidneys that the osmotic pressure was identical for all adjacent tubular structures at any level in the kidney, and that there was a steadily increasing osmotic gradient from the cortex, which was isosmotic with plasma, to the tip of the papilla. Recent analyses of distal tubular fluid by Wirz (*3*) and ourselves (*4*) demonstrate that fluid in all adjacent tubules does not have the same osmolality, invalidating this aspect of the original data which presumably was due to postmortem diffusion. This does not, however, invalidate the theory of increasing osmotic gradient from cortex to papilla. This report (*5*) presents the results of osmolality determinations on fluid collected directly from the loops of Henle of hamsters.

The papilla of the hamster's kidney, which extends into the upper portion of the ureter, was exposed in anesthetized animals. When observed microscopically, vasa recta and collecting ducts were readily apparent. Under proper illumination, segments of narrow tubular structures filled with clear fluid were sometimes visible. When punctured with a micropipette and filled with large amounts of dye, they were seen to form typical hairpin loops without anastomosis. On occasion it was subsequently possible to macerate the kidney and to follow the injected loop by microdissection to the proximal and distal convolutions of a juxtamedullary nephron, proving beyond doubt that the structure punctured in the papilla was a loop of Henle. In order to exclude the possibility that the sample was plasma from a vas rectum without red cells or anastomosis, it was sufficient to demonstrate that the sample contained little or no protein by qualitatively testing it with heat or trichloroacetic acid. Fluid was also collected from adjacent collecting ducts at the same level. Osmolality was determined by the microcryoscopic method of Ramsay and Brown (*6*).

The results of four typical analyses of fluid from the bends of the loops and collecting ducts are shown in Table 1. The osmolalities were the same or nearly so and were much higher than the osmolality of plasma from the inferior vena cava. Fluid from cortical segments of proximal tubules and late distal convolutions was isosmotic and from early distal convolutions, hypo-osmotic to plasma.

Table 1. Osmolality of fluid from the loops of Henle and collecting ducts and of plasma from the inferior vena cava.

Hamster No.	Osmolality (milliosmoles per kilogram of water)		
	Loop of Henle	Collecting duct	Plasma
1	1391	1402	308
2	725	720	336
3	1270	1206	325
4	453	453	

These results are highly consistent with the hypothesis of Hargitay and Kuhn (*1*) that the mammalian nephron functions as a countercurrent multiplier system to concentrate the urine. The details of the mechanism appear to be somewhat different from those first proposed (*7*).

CARL W. GOTTSCHALK
MARGARET MYLLE

Department of Medicine, University of North Carolina, School of Medicine, Chapel Hill

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5. This work was supported by grants from the American Heart Association and the U.S. Public Health Service (H-2334-C). This work was done during the tenure by one of us (C.W.G.) of an established investigatorship of the American Heart Association.
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7. A detailed account of these and other studies is in preparation.

12 June 1958

A System of Names for Binary Numbers

Abstract. A nomenclature is proposed for the binary number system to permit expression of binary numbers in words and to encourage visualization of magnitudes expressed in binary notation without recourse to decimal translation.

Our everyday lives impinge increasingly on systems in which binary numerical notation is encountered—for example, computers, data-processing systems, accounting systems, counting devices, logical circuitry, communication, and instrument systems generally. Familiarity with binary notation and some ability to think in terms of binary arithmetic are necessary for all scientists and engineers and are desirable for any well-informed