Hydraulic Ram Action of Kidney Glomerulus

IT HAS been brought to my attention by Professor Swann, of Galveston, that a suggestion communicated by me (SCIENCE, **114**, 505 [1951]) regarding the possible hydraulic ram action of the kidney glomerulus is antedated by an elegant article in the *New Orleans Medical and Surgical Journal* of May 1880, by J. G., attributing the concept to Andrew Smyth. Smyth based the ram action on occlusion of the efferent arteriole by the afferent pulsation and used it to deny Bowman's claims regarding filtration.

A later suggestion of intrinsic contractile power of the glomerular tuft (*J. physiol.* [Paris], **7**, 660 [1906]) does not seem to fit the histology, although any one of them would serve to produce the missing component of the secretory pressure of the nephron. Only more adequate analysis of the orders of magnitude of the theoretical effects can validate their importance.

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Cosmic Cloud Hypotheses of the Origin of the Solar System

The public is being played upon and utterly misled by the dreamery of the rival mathematical astronomers and physicists.

THIS statement by Henry E. Armstrong (*1*) quoted by Van Anda (*2*) in SCIENCE 21 years ago in his "Unsolved Riddle of the Solar System," seems equally pertinent today, for if it was fair to reject all previous hypotheses because they could not account for angular momentum and other data of the solar system, it is equally fair to reject all present-day hypotheses for the same reasons.

The dictum of Russell, Dugan, and Stewart (*3*) written in 1926 is still true; namely, that no one has ever imagined a process for accounting for angular momentum of the solar system in evolutionary hypotheses. Ter Haar (*4*), in 1948, referring to von Weizsäcker's dust-cloud hypothesis, wrote: "It is, however, difficult to see why this separation of the cloud according to angular momentum and atomic weight should take place. Also, this process cannot decelerate the sun sufficiently; there is a discrepancy factor of 100,000." Again, in 1951, ter Haar (*5*) wrote: "I would like to stress . . . the difficulty is the slow rotation of the sun. One has to find a mechanism which slows down solar rotation."

Whipple (*6*) wrote in 1952: "The general tendency at present . . . is to ignore the whole problem . . . of angular momentum."

Another problem that seems to present insuperable difficulties is the loss of material from the condensing earth. For example, if the earth contains a ton of hydrogen, obviously the protoplanet contained at least a ton of hydrogen; and if the protoplanet contained more than a ton, there must have been some process by which the excess hydrogen was lost during the formation of the earth. Likewise, similar processes must have existed for every element and isotope in the earth. Computations indicate that such processes are nonexistent, especially for elements with large atomic weights. To illustrate: Urey (*7*) specifically states that there was a loss of Hg during the formation of the earth; however, since the thermal dissipation of Hg requires temperatures that exist only in stellar depths, it follows that the loss of Hg did not occur.

Computations on the excess mass in the protoplanets are based on Kuiper's dust-cloud hypothesis (*8*). Appropriate modifications should be made in numerical values if another dust-cloud hypothesis is used. The excess mass in the protoplanets varies from 14,000 times the mass of the present planet in the case of Mars to 9 times in the case of Jupiter; and the total excess mass in the protoplanets is 50–60 times the mass of the planets.

The loss of 1200 times the mass of the earth from the terrestrial protoplanet with velocities ranging from an original 0 to ~ 30 km sec^{-1} seems impossible, particularly in the case of Ne. To prevent the forming earth from acquiring more than its very small concentration of Ne from a cloud of "cosmic" composition requires that the earth condensed at a temperature of more than 6000° K. At this temperature all compounds are dissociated. and, consequently, all elements with an atomic weight of 20.2 or less, as well as a large proportion of elements with somewhat greater atomic weights, would be lost from the forming earth. Hence, the chemical retention of terrestrial elements suggested by Brown and Patterson (*9*) could not have occurred. There seems, moreover, to be no process with sufficient energy to have kept the forming earth at 6000° K during the time interval required for condensation. There must therefore have been some mechanism to prevent contact of the forming earth with Ne, for it is unthinkable that any sorption of the cosmically abundant Ne could be so inefficient as to result in the meager terrestrial concentration of Ne.

If the planetary bodies condensed from a cosmic cloud, their observed variation in the direction of rotation and revolution seems preposterous. This variation is from 0 to 98°. Imagine, if you can, the mud from a rear bicycle wheel missing the back of the small boy riding through the mire!

The existence of satellites presents another difficulty. The diversity in composition of the mantle of the earth, especially the existence of continents, seems incompatible with any condensation process. But why extend the list? For, obviously, if the condensation of the planets is an imaginary event, most observational data will necessarily be contrary to conclusions drawn from that fantasy. Mass, composition of planetary bodies, energy, momentum, and angular momentum are too real to be derived from folk tales, and