CC/NUMBER 48
DECEMBER 1,1980

# This Week's Citation Classic

**Quastler H & Sherman F G**. Cell population kinetics in the intestinal epithelium of the mouse. *Exp. Cell Res.* **17**:420-38, 1959.
[Biology Dept., Brookhaven Natl. Lab., Upton, NY and Biology Dept., Brown Univ., Providence, RI]

**Analysis of data obtained from autoradiographs of mouse intestinal epithelial cells labeled with tritiated thymidine led to a description of the kinetics of cell proliferation. The precise localization of the exposed emulsion allows cells synthesizing DNA to be identified. [The *SCI*® indicates that this paper has been cited over 1,025 times since 1961.]**

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October 20, 1980

"The work of Leblond, Stevens, and Bogoroch[1]

and other investigations published during the next decade stimulated the late Henry Quastler and me to explore methods for studying the dynamic equilibria of cell populations. The first attempts were made by analyzing autoradiographs of tissues which had been labeled with inorganic $^{32}P$. Technical advances soon became available which markedly improved the quality of the autoradiographs and also enabled us to identify cells which were synthesizing DNA. One was the availability of liquid film emulsions; another, of great importance, was the successful preparation of tritiated thymidine by Walter L. Hughes who was then a staff scientist at the Brookhaven National Laboratory.[2] It was through his generosity and the cooperation of the Schwarz Laboratories that Quastler and I had access, almost from the first, to a portion of the meager supply of tritiated thymidine then available.

"The importance of this label for our investigation lay in the fact that administered thymidine is readily incorporated into those cells which are synthesizing DNA. The energy of the electrons emitted by tritium is so low that only those silver grains in the emulsion which lie directly over the labeled nuclei are exposed. The autoradiographs which result from this procedure enable the observer to identify precisely the cells which were synthesizing DNA at the time the labeled thymidine was administered.

"The data reported in this paper allow estimates to be made of the average time cells remain in the various compartments, the number of cells per compartment, and the number of cells per unit time in transit from one compartment to another. Additionally, it was found that in order for the transition from a proliferative to a 'functional' cell to occur, the cell must not only be in a certain neighborhood, but it must also be in a certain phase of its generative cycle.

"It is gratifying that our work has received the recognition that it has. Quastler's incisive analytical abilities and insights into the implications of the data expedited the development of a conceptual framework which not only enabled us to analyze the kinetics of intestinal epithelium but is also applicable to the analysis of other proliferating cell systems."

1. **Leblond C P, Stevens C E & Bogoroch R.** Hisiological localization of newly-formed desoxyribonucleic acid. *Science* **108**:531-3,1948.

2. **Hughes W L., Bond V P. Breeder G, Cronkite E. P, Painter R B, Quastler H & Sherman F G.** Cellular prolileration in the mouse as revealed by autoradiography with tritiated thymidine. *Proc. Nat. Acaid. Sci. US* **44**:476-83,1958.