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This Week's Citation Classic

Sonneborn T M. Methods in the general biology and genetics of *Paramecium aurelia*. *J. Exp. Zool.* **113**:87-147, 1950. [Department of Zoology, Indiana University, Bloomington, IN]

Methods given include those for: collection from nature and identification; isolation; sterilization; culture; mutagenesis; cytology; genetics; control of growth rate, autogamy, conjugation, cytoplasmic transfer between mates, macronuclear regeneration, and inbreeding and cross-breeding; and work with mating types, killers and kappa, and surface antigens. [The *SCI*® indicates that this paper has been cited over 215 times since 1961.]

Tracy M. Sonneborn
Department of Biology
Indiana University
Bloomington, IN 47401

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"Inspired by H.S. Jennings's vision of Paramecium as potential material for genetic research, and goaded by his abandonment of this vision because Paramecium methods were inadequate for genetic work, I resolved in 1932 to put this organism into condition for genetic studies. The obvious obstacle was that crosses could not be made. Several years of effort culminated the night of February 28,1937 with a single observation and an obvious follow-up: many clonal isolates did not conjugate but a mass mixture of them did; so samples of these clones were mixed in all possible combinations of two. Some, but not all, of the mixtures immediately agglutinated into masses which later broke up into conjugating pairs. It was immediately obvious that there were two kinds of clones for which I later coined the unimaginative term, mating types. Agglutination and pairing occurred only when clones of different mating type were brought together. By the time all this was worked out, it was long after midnight and no one was in Gilman Hall at Johns Hopkins except a night janitor and me. I dragged him to my lab to see that immediate agglutination which no one had ever seen before. Unaccustomed to a microscope, he probably saw nothing of the reaction of the cells, but he saw mine and said, 'It sure must be wonderful, because you are mighty excited.' I was. I knew I had achieved my first major goal: anyone could now do real genetics with Paramecium.

"During the next two years at Johns Hopkins and the following 10 at Indiana, new methods and results came so fast that time was not taken to publish much in detail, but Salvatore-Luria and Ernest Caspari independently pressured me to publish the methods lest they be lost if I were to die prematurely. Sobered by their entreaties, I wrote this paper. It also included methods devised by my associates (M. L Austin, G. H. Beale, P. K. Chao, R. V. Dippell, R. P. Geckler, R. F. Kimball, C. B. Metz, E. L. Powers, J. R. Preer, Jr., and W. J. van Wagtendonk). The paper was intended to appear, by Luria's request, in a book he was editing on microbial genetic methods, but I finished it too late for inclusion.

"Obviously the paper has been cited often because it is the source reference for many methods basic in research on Paramecium and because many of these same methods have been useful, with little or no modification, in research on other ciliates such as Tetrahymena and even for some small aquatic multicellular organisms such as rotifers. Many additional methods have subsequently been developed and summarized."[1,2]

1. **Sonneborn T M.** Methods in *Paramecium* research. *Meth. Cell Physiol.* **4**:242-339, 1970.
2. **Hanson E D.** Methods in the cellular and molecular biology of *Paramecium*. *Meth. Cell Biol.* **8**:319-63, 1974.