To the Editor,

The Symposium recently held in Paris–Bicetre under the chairmanship of Drs. Bessis, Dameshek and Fliedner on cellular ecology showed the growing importance that this new type of study is assuming. Cellular ecology or "cytoecology" was defined as "the study of the interactions of cells and cell systems with one another and their environment," or more precisely, "the application to the cell and cell systems of the general methods of ecology."

The cells of the whole body are of the order of magnitude of $10^{13}$; the components of each type of cell are often of the order of hundred milliards; in a 70-Kg. man, the number of the various types of the bone marrow cells has been estimated to be about $2.57 \times 10^{11}$ for the erythropoietic cells and about $6.58 \times 10^{11}$ for the granulopoietic cells.

Since the numbers of the cells of an human organ or system is so great, it seems reasonable to apply to the cell populations the general principles of the study of the populations. So, the relations among the cell populations of different cytological categories which are present in the same organ (e.g., bone marrow), are worthy of investigation in accord with the laws of comparative demography and of the ecology of the various coexistent species; i.e., one must begin to speak of "cytoecology" (the name which was proposed in 1964).

Many concepts of ecology seem worthy of consideration at the cellular level. Thus, the laws of natural selection are probably transposable to oncogenesis and to the defense of "self" (homeocytostasis).

It seems also very useful to transpose at the cellular level the general concept of the "ecological niches." Often the mitotic compartments which are characteristic of renewal tissues with a fast turnover time are in particular and well-protected places (bone marrow in the case of the blood, crypts in the case of the intestine, etc.) as in true nests. This phenomenon must be of considerable biological significance so that these nests might be considered as corresponding to protected "ecological niches" in the language of zooecology.

Examples of protected niches of reproduction in the human are the localization deep in the bones of the precursors of the blood cells; the localization of the mitotic renewal system in the crypts of the intestinal epithelium; the localization in the deepest layers of the skin of the mitoses necessary for renewal of the epidermis; the hematothymic barrier (epithelial layer) which isolates the reproduction sites of the thymic lymphocytes, etc.

In these niches the reproduction of the cells goes on under the same circumstances as the reproduction of the animals in the small protected areas that are considered niches by the ecologists: i.e., the mutations are scanty, but if they happen, can easily persist. The transposition of the concepts of the ecological niches to the cellular pathology may be fruitful.

One of the fundamental laws of ecology is the Volterra–Gause’s law "in an equilibrium community no two species occupy the same ecological niches"; from that law springs Hardin’s competitive exclusion principle. Gorman and Chandler have already shown that it is possible to explain on this ground the replacement of an immunocompetent lymphocytic population with an immunoincompetent one in the course of some hemopathies.

This principle may eventually also explain how uncommonly two tumors may develop at the same time and how frequently a leukemic process in a relative equilibrium is characterized by a cellular monomorphism (i.e., only one abnormal clone will prevail). In the acute leukemias we can occasionally find many clones characterized by different marker-chromos...
somes, but if the course of leukemia is not so fulminating, we usually find only one abnormal chromosomal marker; i.e., only one abnormal clone.

These are only some theoretical considerations, but the transposition to cytology of the ecological conceptions of the “reproduction niches” will be stimulating both for the cellular biologists and pathologists.

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REFERENCES


ATYPICAL IMMUNE TOLERANCE IN A HUMAN BLOOD GROUP CHIMERA

To the Editor,

Having been occupied for some time in the investigation of a Finnish case of persistent mixed field polyagglutinability due to the antigen Tn or to an antigen, at present indistinguishable from Tn, we were particularly interested in the recent paper (33: 507–526, 1969) by Sturgeon, McQuiston, Sparkes, Solomon and Barnett, which describes O and A cells in a circulation containing anti-A.

Dr. Phillip Sturgeon very generously provided us with a sample of blood from their propositus, Mr. R.M., which we find gives serological reactions identical with those of our group O propositus, Mr. O.S. (Myllylä et al., in preparation). In our opinion the apparent A cells in Mr. R.M.’s circulation are not really A cells but reflect the fact that polyagglutinable cells, at least of the type we are dealing with, have an A-like character which can be distinguished in several ways from true A.

Therefore we do not think that brains should be too teased by the tolerance problems apparently raised by Mr. R.M. until the anti-A affinity of these polyagglutinable cells is better understood.

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