

Twin Studies and Chronogenetics

TWINS AS A NATURAL TEST OF CHRONOGENETICS

L. GEDDA, G. BRENCI

The Gregor Mendel Institute of Medical Genetics and Twin Research, Rome, Italy

MZ twins are the best witnesses of the existence of a hereditary biological time, because they would not be identical if they had not also inherited the times of appearance and duration of the hereditary information that they have in common. Based on this, the authors gave the name Chronogenetics to this branch of genetics which concerns the temporal dimension of the gene and the mechanisms which assure transmission and manifestation of the temporal characteristics. The Ergon/Chronon system is shown as a model suggested by the authors to explain chronological heredity in terms of molecular genetics.

Furthermore, the authors offer the example of a chronogenetic analysis of male and female puberty based on the study of 783 twin couples (371 F, 412 M). The study of puberty times allows the selection and interpretation of hereditary causality of numerous chronogenetic parameters, the extrapolation of conclusions concerning the phenomenon of puberty, and the establishment in this regard of a borderline between times of hereditary origin and physical time.

Returning to the general problems of Chronogenetics, the authors draw a picture exemplifying Normal Hereditary Times (Gametic Times, Auxological Times, Omeostatic Times, Physiological Recessive Times) and Pathological Hereditary Times (Auxological Recession Times, Immunitary Recession Times, Cardiovascular Recession Times, Metabolic Recession Times, Neoplastic Recession Times, Antitoxic Recession Times). Provisional chronogenetic developments are indicated and a possible advancement toward the recycling of the gene is hoped for.

Prof. L. Gedda, Istituto Mendel, Piazza Galeno 5, 00161 Roma, Italy

RECENT ADVANCES IN CHRONOBIOLOGY

ALAIN REINBERG

Laboratory of Physiology, Rothschild Foundation, Paris, France

Chronobiology is the study of the temporal characteristics of biologic phenomena, leading to an objective description of biologic time structure.

Biologic time structure, in turn, can be defined as the sum of nonrandom, and thus predictable, temporal aspects of organismic behavior including among others bioperiodicity and developmental changes; it characterizes species, groups of organisms, and individuals, as well as their subdivisions: organ systems, organs, tissues, cells, and intracellular elements (including ultramicroscopic structures). Rhythmic changes can be demonstrated at all these levels of organization and can be considered objectively as a fundamental property of living matter.

Chronobiology includes the following "specialties" among others:

1. *Chronopharmacology*: investigation of drug effects upon rhythm characteristics, on the one hand, and as a function of biologic timing on the other hand.
2. *Chronotoxicology*: investigation of undesired or harmful effects from chemical, physical, or other agents including poisons, pollutants, and overdoses of drugs upon rhythm characteristics and as a function of biologic timing.
3. *Chronophysiology*: investigation of temporal features in physiologic behavior and of physiologic factor underlying biologic temporal characteristics.
4. *Chronopathology*: investigation of alterations in biologic temporal characteristics as a function of disease and as determinants of disease.

Prof. Alain Reinberg, 78 avenue de Versailles, Paris XVI, France