II Human biography and its genetic instrument

MICHAELA GLOCKLER
Physician
Medical Section at the Goetheanum
PO Box 134, CH-4143 Dornach

Abstract
The aim of this paper is to demonstrate the significance of some of the results of Rudolf Steiner's research for modern developments in genetics. The key concepts are: the etheric organism as the bearer of the laws and processes of inheritance; the metamorphosis of growth forces into those of thinking; the human 'I' (self) as controller and modifier of genetic material and self-organisation (molecular-Darwinism) seen anew in the light of anthroposophy.

Introduction
Human biography goes through characteristic stages in body, soul and spirit. At the physical level, active growth and development up to age 20 or 25 is followed by physiological functions continuing at the level reached until about 40 or 45, and then progressive involution and the physiological deterioration of old age to the end of life. Apart from this there are characteristic pathological processes, with acute febrile infectious diseases at their highest level in childhood, chronic diseases in old age, and psychosomatic conditions in mid-life. Compared to this, the human biography in soul and spirit shows remarkable differentiation. Childhood and youth show considerable differences depending on where a person grows up, what kind of schooling he or she has and where his or her interests lie. Choice of occupation and working life, the circumstances of private life – with or without family – all provide highly differentiated opportunities for learning and experience to further individual development.

Inheritance, environment and individuality
One of the most interesting questions to have arisen – once the theories of evolution and heredity gained general acceptance in the 19th century – is how far human development and hence also biography are predetermined by genetic or environmental factors and by 'personality' – a rather vague term – or the human "I" or ego. In their
book ‘Separate lives. Why siblings are so different’ (Dunn and Plomin, 1990), developmental psychologist Judy Dunn and behavioural geneticist Robert Plomin discuss that question in the light of their extensive researches. They analysed research findings made in developmental psychology and behavioural genetics in recent decades and a large number of studies and surveys to come closer to an answer. A remarkable discovery they made is that similarity in terms of size, weight and disposition to diseases, for instance, is rarely greater than 50% and generally well below this. Thus differences between siblings concerning distance between eyes, length and width of nose and length of ears is at around 30%. About 80% of all siblings have distinctly different eye colours; 90% differ in the colour and structure of their hair. The disposition for diseases such as gastric ulcer, hypertension, breast cancer, diabetes, childhood eczema and for asthma and hayfever is at less than 20%. These findings are not in accord with modern concepts of heredity, for it has been shown that surprisingly few behaviour patterns can be ascribed to a single gene. It is generally the case that several genes are responsible for a particular characteristic, and it may be a case of hundreds of genes each making a minor contribution to variability between individuals. The resulting genetic effects are called ‘additive effects’. Non-additive effects arise when the influence of genes changes due to their particular position or even their mere presence, creating new characteristics that have not existed before.

Dunn and Plomin made use of the term ‘epistasis’, originally introduced by biologist William Bateson in 1907 for such non-additive gene effects leading to the appearance of new, unexpected characteristics in individuals. They use the term for genetic effects which, being part of the interaction of genes, result in spontaneous, unpredictable interrelationships in the highly complex dynamic network of genes. In their view it is also due to these effects of a higher order that even first degree relatives show less than half the similarities of identical twins. According to these theories, therefore, similarities between offspring is due to additive summation of numerous individual genetic effects, whereas differences between offspring are the result of epistasis, i.e. those effects of a higher order, causing non-additive and therefore unpredictable new characteristics.

Environmental factors, often difficult to define but needing to be differentiated, also come into this. They, too, can mutually enhance, weaken or balance one another. Depending on their degree and quality they can change the genetic material of plants, animals and humans, and this means a further vast range of additions, interactions and potential enhancement, weakening or balancing out that cannot be individually predicted or indeed assessed. In a seemingly ‘chance’ way, additive and epistatic effects in the genome combine with those due to environmental factors, proving ‘lucky’ or ‘unlucky’ in the spectrum of the individual’s gifts and limitations.

The question is, however, whether the terms ‘chance’, ‘luck’ or ‘bad luck’ adequately define the principle according to which a combination of genes is selected when ovum and sperm fuse, then to be influenced by environmental factors with their innumerable additive and epistatic effects.