Examination of the photographs of the electrophoresis diagrams, obtained before and after centrifuged colostrum (Fig. 1), shows clearly the changes in composition of the milk proteins. Since the visual course of the protein composition is similar in all three tests, both on the rising and descending boundaries, only the rising boundaries of test 3 are reproduced.

The results obtained from the electrophoresis diagrams, given in Table IV, show that the first and largest casein component *B* drops from 48·8% in the milk to 15·7% in serum IV. The second and smallest casein component *C*, first increases slightly from 10·0 to 12·0% and afterwards drops to 10·6, 3·6 and 3·0%. The third casein component *G* shows first a small increase from 13·2 to 14·6% and afterwards a decrease to 14·3, 11·2 and 9·9%. The concentrations of the two albumin components *D* and *E* rose from 6·3 and 4·0% in the colostrum to 17·2 and 11·7% in serum IV. With regard to the globulin, we also found two components, H_1 and H_2, which increased from 2·5 and 10·0% in the milk to 7·3 and 28·2% in serum IV.

In view of the varying course of component *F* in the three tests, its protein character is still unknown.

Conclusions. From the investigations on non-centrifuged and centrifuged milk (normal milk and colostrum) we may conclude that three casein fractions (*B*, *C* and *G*), two albumin fractions (*D* and *E*), and one or two globulin fractions (H_1 and H_2) occur in milk. Of the three casein fractions, the *B* component probably corresponds with the α-casein, which is well known in the literature while the *G* component would be identical with the β casein. This hypothesis is justified by the relationship, in concentration as well as in mobility, between the values found for α and β casein by CHERBULIEZ[1], HOSTETTLER[2], NITSCHMANN[3], and WARNER[4], and our values. From our results it appears moreover that the component *G* is more stable than component *B*. This observation is not in accordance with the results obtained by HOSTETTLER[2], who found an almost constant proportion between α and β casein in the sediments obtained by centrifugation the milk at 1,000 to 17,000× gravity.

An albumin character is attributed to the components *D* and *E* because of their increase in concentration in the sera proportional to the separated casein quantity. Recent research confirms that the albumin, found by application of the chemical fractionation contains at least two fractions, among them the well known β lactoglobulin of PALMER[5]. The mobility of this lactoglobulin is, according to DEUTSCH[6], 6·1 and according to BRIGGS and HULL[7] $6{\cdot}3 \times 10^{-5}$. We also found that the lactalbumin contains two fractions, *D* and *E*, of which the *D* component (mobility 6·2 to $6{\cdot}4 \times 10^{-5}$) should correspond with the β lactoglobulin. The results confirm the globulin character of the *H* component, indicated by the former investigation; however we notice that the fraction is sometimes divided into two components H_1 and H_2.

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Résumé

L'électrophorèse et le fractionnement chimique furent effectués sur des laits et leurs sérums obtenus en soumettant le lait à des forces centrifuges 7000 à 38000 fois supérieures à la pesanteur. De nos résultats, il ressort que dans les sérums obtenus avec des forces centrifuges croissantes, la caséine et les fractions électrophorétiques *B*, *C* et *G* diminuent, alors que l'albumine et la globuline de même que les fractions *D*, *E* et *H* augmentent. Il en résulte également que les fractions *B*, *C* et *G* correspondent à la caséine (*G* est plus stable vis-à-vis de la force centrifuge que *B*), *D* et *E* à la lactalbumine totale et *H* à la globuline. Il est possible que la fraction *A* soit identique au composant *n* de MOORE et LYNN, *B* à la caséine alpha, *D* à la bêta lactoglobuline de PALMER et *G* à la caséine bêta.

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EXPLICATIONES

Fundamentals for Prophylaxis and Therapy of Premature Ageing

By D. A. KOTSOVSKY, Munich[1]

Real understanding of natural processes can only be acquired by studying them as a *whole* and not by dividing them into independent parts. This is especially the case for research, prophylaxis and therapy of premature ageing in man. Modern antisenetics require a whole system of prophylactic measures, well founded experimentally and clinically and taking the organism and its surroundings as a *dynamic whole;* besides this, special symptomatic methods are needed against the heterochronical, heterometrical, and heterotopical signs of ageing. Such facts and observations as are known at present are very dispersed but can form the fundamentals of prophylaxis and therapy of premature ageing.

I. *Energetic Fundamentals*

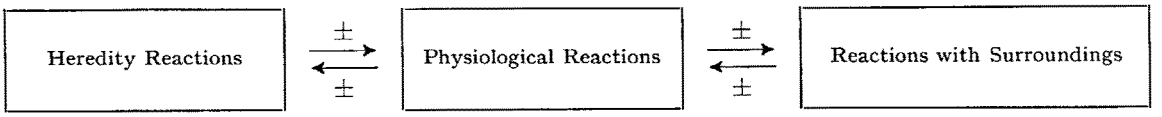
Our studies of the age-problem, extended over many years, have led us to the conclusion that ageing of an organism is a consequence of the *irreversibility* of its individual evolutional energy. Therefore the whole problem of age therapy involves energetics, and the possible reversibility of the regressive symptoms of ageing. Of course such a reversibility in man should not be understood in the sense of a direct homodrome re-metamorphosis of an old man into a child, but means a lasting conservation of life energy at the level of "useful productive" age. This can be established by the following three facts:

(1) Any organism is an *open* system and hence the process of ageing is not subject to the law of entropy. This means in practice that ageing can be retarded or accelerated from *outside*.

(2) As is well known, the human organism during its life uses only one third of its life energy. This fact is in

[1] Aus dem Forschungsinstitut für Arbeitsgestaltung für Altern und Aufbrauch e. V. München.

Scheme:



full harmony with the observation that even in high age the proliferation of cells, regeneration, growing and maturing processes are still going on. This proves that the potence of life is enormously strong and that the prophylaxis of premature ageing consists in discovering *how* to liberate the remaining two thirds of latent energy and to guide it in the required direction.

(3) Inner factors of the reversibility of regressive ageing are sleep, which we can regard as a "periodical, biological rejuvenation", and spiritual energetics generally, the "élan spirituel" (BERGSON) which forms part of the living processes. The central nervous system, and especially its subconscious activity, transforms latent life-potence into productive spiritual and physical energy.

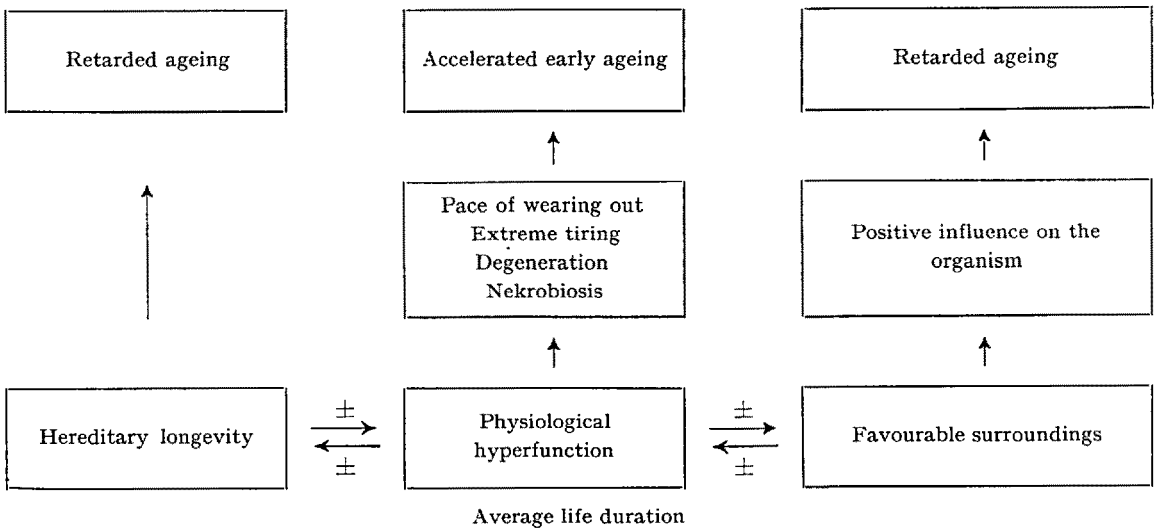
This important rôle of ideas, faith, of the influence of the psyche upon the soma, which checks the symptoms of ageing and preserves a fresh, juvenile, productive power until death should not be underestimated in constructing a modern prophylaxis for premature ageing.

II. *Genetical Fundamentals*

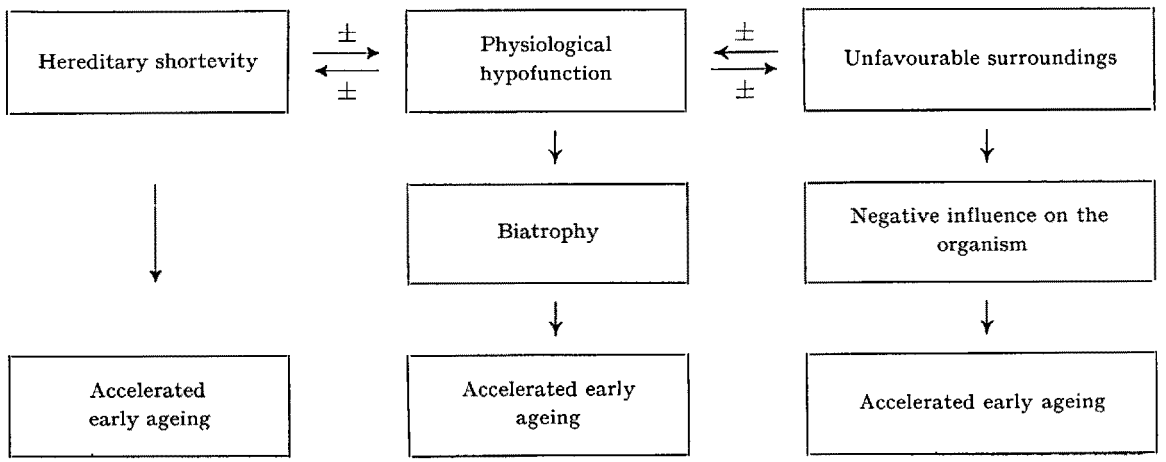
The possibility of working from *outside* upon the organism as an *open* system leads logically to a revision of our conservative theories about the relations between the organism (as regards its genetical constitution) and its surroundings (its "Umwelt") as a biological *whole*. From a holistic point of view, we may regard the organism as a function of its surroundings, reacting permanently with it and transforming its energy into its own.

Heredity is an attribute of life. Heredity factors are also localized in the plasma. Twin research has not as yet been able to prove mainly hereditary conditionality. From this follows, that the gene *alone* cannot be looked upon as the absolute dictator of life. On the other hand, also the surroundings alone do not play the decisive rôle in the development of the organism.

This means that the whole individual development represents a tension of energies between the power field



Average life duration



of the organism and the power field of its surroundings, i.e. between their two potentials of energy, in which assimilation plays the leading and decisive part. The organism and its surroundings therefore constitute a *dynamic whole;* in this the prospective potency of hereditary energy *reacts* with the surroundings (physiological functions).

Maturing and ageing are consequences of this permanent collaboration of endogene (genetically conditioned) and exogene (conditioned by the surroundings) factors of life. Corresponding to these, we can discern primary (genotypical) and secondary (phenotypical) symptoms of ageing, though it is impossible to find a sharp division between them. In this permanent chain reaction between organism and surroundings, there are *three* complexes: Heredity, physiological functions and reactions between organism and surroundings (*vide* p. 321, above).

In these relationships the neuro-endocrine system plays the leading part, preserving the biological balance between the organism and its surroundings. Ectogenesis and prophylaxis of the future must find the way to change the genotypus of the duration of human life.

III. *Biological Fundamentals*

Based upon our present knowledge of 40 endogene and exogene positive and negative factors of individual development, we can discern several hundreds of age variations. This polymorphism forms a broad basis for the prophylaxis of senium praecox, i.e. early reduction and elimination of the negative internal and external influences on the organism. It is obvious that the positive and negative character of these three reaction complexes (heredity, function, surroundings) can influence a balancing compensatory adaptation of the organism to its surroundings, producing earlier or later onset of ageing. The scheme (*vide* p. 321, below) shows this.

The internal prophylaxis, on the one hand, requires neutralization and abolition of the cholesteral contents of blood and tissue growing with advancing age, of all insoluble albumen and the general toxicity of tissue; and, on the other hand, compensation and roburation of the debilitated physiological functions.

IV. *Experimental Fundamentals*

These are founded on the following experimental facts:

(1) The base of ageing is principally *identical* in protists, tissue cultures and multicellular organisms, but manifests itself in different ways. The causal genesis of ageing is therefore not found in the cells only but in the character of internal and external reactions of the individual development, which influences the whole polymorphism of ageing, of vitality, morbidity, mortality, and finally the duration of life of the biological system in question.

(2) With lower animals and plants it has been possible to achieve a remarkable prolongation of life by suitable changes of the surroundings, "limitation (reduction) of the biological system" and avoidance of propagation.

(3) Isolated tissues and organs are able to survive the death of the whole. These facts can be used for the purpose of prophylactic transplantation of young and healthy organs to replace old and defect parts.

(4) The problem of the "artificial" heart and kidney is almost solved, and they may be used for prophylactic purposes.

(5) By suitable nourishment some age symptoms as, e.g. arteriosclerosis, artherosclerosis, arcus senilis and cirrhosis hepatis can be provoked artificially and/or regulated.

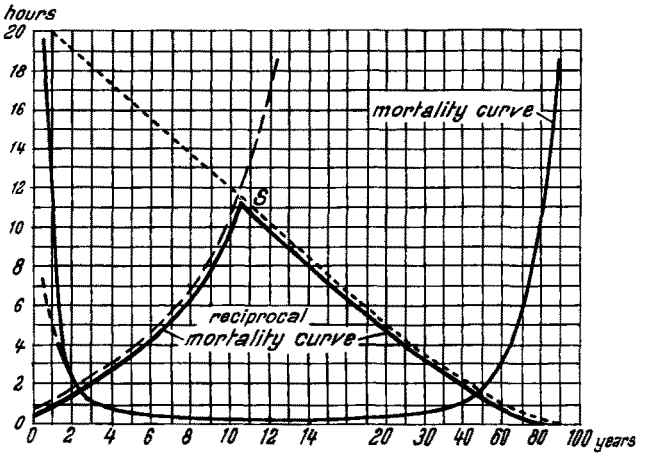
(6) The biological therapy of treating sick organs by injection of living young cells shows new possibilities for prophylaxis against premature ageing.

V. *Thanatological Fundamentals*

Some of these are:–

(1) The duration of life of organism can, as is known, be very variable, between a few hours and several thousand years.

(2) The vitality of man, as seen in the lower frequency of death (mortality), reaches its maximum during the tenth to the twelfth year of life.



Mortality and adaptation shring the life-span (after PFAUNDLER).

(3) The duration of life in man can be subject to large variations in accordance with internal and external influences. All this shows that on the life curve of the organism there are several points which can serve as the start of prophylaxis against ageing symptoms. Minimal mortality between the 12th and 15th year of life indicates that this prophylaxis must begin during early childhood, because during this period of life the balancing, compensatory and reversible qualities are strongest. In this way gerontology and pediatrics form a logical cycle.

VI. *Clinical Fundamentals*

These are the following:—

(1) Every pathological state is formed by the collaboration of the constitutional disposition of the organism and its surroundings.

(2) The pathological mutations do not multiply as fast as the states of sickness caused by the surroundings, i.e. civilization.

(3) Clinical symptoms of ageing are not specific and can be observed also in other states of sickness.

(4) It is impossible to divide physiological from pathological ageing.

(5) Some pathological processes, e.g. arteriosclerosis, are reversible during childhood.

(6) Mortality in high age is caused in most cases by maladies of the brain, circulation, respiration and excretion system, and therefore a physiological death by age cannot be observed.

All the above-mentioned facts give us the right to look upon pathological ageing as irreversibility of the physiological ageing as a consequence of the radical changes of

the whole organic and functional situation. From this point of view, the pathology of our time enters a new epoch which can be called *individual reaction pathology of the ages.*

VII. *Psycho-somatic Fundamentals*

The importance of the psyche (especially emotional moments) in diverse pathological states, and especially in the beginning of premature ageing in states of fear, give us the task of desensitizing the higher brain centres before starting prophylaxis of senium praecox. This can be attempted by rational education, construction of an optimistic out-look on the world, spiritual discipline and avoidance especially of the fear of death. Finally the high rate of suicides in high age proves, that also the fear "to remain alone and useless" plays an important psycho-social role and calls for corresponding social measures. The psycho-somatic of the future ought to solve the question of the psychic hygiene of premature ageing.

VIII. *Social Fundamentals*

These are based on five fundamental facts, which are:

(1) The intellectual activity starts ageing last.

(2) A healthy and active age is indispensable for society and culture.

(3) The average expectation of life has been doubled during the last 100 years as a consequence of the progress of preventive medicine.

(4) The number of old people is growing steadily in modern society.

(5) Modern "technisated culture" requires from man new often impossible efforts of his vitality, and especially his nervous system, by enlarging the struggle for life and the danger of death.

All this requires a broad international preparation of the suitable prophylactic measures for all strata of society, as these exist already against tuberculosis, cancer, infantile paralysis, etc. The first international gerontological congress (1950) proved very successfully that first steps of great importance are being made in this direction.

Zusammenfassung

Grundlagen der Prophylaxe des vorzeitigen Alterns: 1. Der Organismus ist ein «Offenes System», deshalb ist er dem Gesetz der Entropie nicht unterworfen. 2. Experimentelle Verlängerung des Lebens ist prinzipiell möglich. 3. Einige genetisch bedingte Alterserscheinungen können durch Umweltfaktoren modifiziert werden. 4. Der Mensch nützt zwei Drittel seiner Lebensenergie während seiner individuellen Entwicklung nicht aus. 5. Die Prophylaxe des vorzeitigen Alterns muss im früheren Kindesalter begonnen werden, wenn die Vitalität und die Reversibilität der Alterserscheinungen am stärksten ausgedrückt sind.

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IN MEMORIAM

Kurt-H. Meyer †

29 septembre 1883–14 avril 1952

La mort de Kurt-H. Meyer, professeur de chimie minérale et organique à l'Université de Genève, décédé le 14 avril 1952 de manière tout à fait inattendue à Menton, pendant un séjour de vacances, constitue une lourde perte pour la chimie organique et biologique.

Esprit très original et doué d'une remarquable puissance de travail, Kurt-H. Meyer laisse derrière lui une riche moisson dans des champs très divers de la chimie organique. Dès le début de sa carrière scientifique, qui l'avait conduit en 1907 à Munich après des études de chimie couronnées par une thèse de doctorat faite à Leipzig sous la direction de Hantzsch, il se consacra d'abord à la chimie organique «classique» qui s'occupe avant tout de corps à petites molécules et qu'on peut distiller ou cristalliser facilement. C'est à cette époque que remontent ses travaux fondamentaux sur la desmotropie cétoénolique: il montra dans une douzaine de publications que les formes énolique et cétonique d'un corps sont deux substances distinctes qu'on peut souvent obtenir à l'état pur, et il mit au point un procédé expérimental remarquablement simple, permettant de doser la proportion de forme énolique présente dans un mélange desmotropique des deux formes. Il publia également des études fort intéressantes sur la copulation des dérivés diazoïques.

De Munich où il fut successivement privat-docent à l'Université (dès 1911), directeur adjoint du laboratoire de chimie physique (1913) et professeur extraordinaire (1917), sa réputation grandissant rapidement lui valut