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The Rate of Living

What a man does, how much of it he does, how regularly or irregularly he does it, and how he reacts to it after the deed are all palpable indications of his deeper personality. Hence the importance of our understanding his rate of living and what determines it. Everyone who has watched people for many years will probably agree that the mere speed at which a man thinks, works, talks, plays, and—I am tempted to suggest—sleeps shows him up as clearly as any other single characteristic. So plainly is velocity a basic trait that psychologists have, in some cases unintentionally, used it as the measure of comparison in intelligence and efficiency tests. Most so-called intelligence tests turn out to be largely tests in quickness. But quickness is so closely bound up with effective thinking and dexterity that it easily passes for “brain power.”

All the things you do and the speed at which you do all you can in the course of your life reveal your total rate of living. This rate of living is the general working average of all a man's molecular processes, as they interlock in

his life pattern. It can be measured with much accuracy by the rate at which he burns himself up; and this rate includes all the special metabolic rates, such as digesting food, breathing, moving muscles, using sense organs, thinking, feeling, and so on.

The rate is measured either directly or indirectly. If directly, the person studied is put in an insulated box or room equipped with instruments which record the heat given off by his body by conduction, radiation, and evaporation. If indirectly, then the amount and character of the food he eats are measured and compared with his excreta. The chemist knows the heat liberated by each gram of food as it is oxidized; so that he merely has to discover the amount of food and the thoroughness of the oxidation.

Out of hundreds of investigations along these lines, the following facts are the most significant of those which have emerged:

1. Every person has his own basal metabolism, or natural rate of living. The average is about 25 calories per kilogram of body weight per day. But in the extensive array of individual cases studied by Benedict, we find some persons consuming as little as 18.1 calories while others run as high as 32.3. This means that the latter live nearly 80% faster than the former.

2. In general, a person of light weight has a faster metabolism rate than a person of heavy weight; and, of two persons having the

same weight, the taller shows a faster rate than the shorter.

3. The basal metabolism in any given person is extraordinarily stable. It shows the same high elasticity and low plasticity exhibited by protoplasm in general. When interfered with in any manner, the rate tends to return to normal with great violence.

4. In general, the rate of living can be slowed down somewhat more readily than it can be accelerated, without serious consequences. And, in lower organisms at least, if not in man, life can be greatly prolonged by such retardation.⁴

5. The rate of living increases normally up to about the sixth year of life. Then it declines very slowly until around the twentieth year. Thenceforth it remains virtually constant, in the average, until the mid-thirties, and from then on it slows down steadily into old age. But this average tendency is not uniformly reflected in individuals; for here we find remarkable personal differences. The extremes show the maximum rate around the fourth year and a very high level between fifteen and twenty, while the minimum rate appears to reach its peak as late as the early thirties (though it is possible that such cases are pathological). Relatively slight variations, however, are the rule.

6. Of all the common internal influences which affect the metabolic rate, muscular effort speeds it up the most. The vegetative system uses

most of the energies which are generated, but it is so nicely regulated that changes in its condition do not alter the general rate of living nearly so much as the muscles do.

7. Emotional responses involving the endocrine glands influence the metabolic rate considerably, in the main through their enriching the blood.

8. The total energy which a person can generate and use during his entire life is fixed within very narrow limits. Thus the rate at which he consumes this energy determines his length of life more than any other factor in the total life pattern.

9. From birth to death, the amount of energy transformed is nearly constant in relation to protoplasmic weight, for all living creatures, when measured statistically. Individual differences here are slight as to absolute quantity; but, as we have seen, very small amounts of energy, if properly patterned, may result in stupendous differences as to final behavior.

10. The gross amount of energy developed in a given species or individual is determined almost entirely by the native characteristics of the specific protoplasms; but the speed and the manner in which that energy is used up is determined largely by all sorts of environmental influences, notably those which shape infancy habits.

11. The energy used by the central nervous system in making connections and build-

ing up integrative patterns is infinitesimal. A single nerve impulse causes an initial rise of about 10^7 degrees Centigrade, followed by a recovery phase in which nine times as much heat is given out as at first.*

* These eleven points have been drawn from sources too numerous to list here. They include such researches as F. G. Benedict's studies in the *Journal of Biological Chemistry*, Vol. 20, p. 263, and in the *Journal of the American Medical Association*, 1921, Vol. 77, p. 247; G. Lusk's essay on "Fundamental Ideas Regarding Basal Metabolism" in the same periodical and volume, p. 250; E. F. DuBois' "Clinical Calorimetry" in the *Archives of Internal Medicine*, 1916, Vol. 17, p. 915; Max Rubner's work, "Das Problem der Lebensdauer und seine Beziehung zu Wachstum und Ernaehrung," Munich, 1908; Raymond Pearl's "The Biology of Death," Philadelphia, 1923; A. W. Hewlett's "Pathological Physiology of Internal Diseases," Philadelphia, 1923; the studies of A. V. Hill, and many others.