

Successful Treatment of 'Scaly Leg' with 'Gammexane'

IN a mixed flock of 147 poultry, 101 birds were infested with *Cnemidocoptes mutans*. Of these, sixteen were very severely affected. A series of preparations containing the gamma isomer of benzene hexachloride in dilutions of 0.1 and 0.5 per cent in various vehicles were used. Mild and moderate cases were freed from the infestation after one treatment, while after two treatments at an interval of a week only two birds continued to harbour living mites. The poultry houses were sprayed with benzene hexachloride in miscible oil, giving a deposit of 200 mgm. gamma isomer per sq. ft. A fuller account of the experiment will be published elsewhere.

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Problems of Organic Growth

IN a recent article¹, Von Bertalanffy developed a complete theory relating growth to metabolism, sex, etc. The basic formula "which contains no hypothetical elements" on which the theory rests is given as

$$\frac{dy}{dt} = \gamma y^n - \alpha y^m,$$

with the explanation "In words: the change in body weight y is given by the difference between synthesis and destruction of building materials; according to general physiological experience, these processes will be proportional to some powers, n , m , respectively, of the body weight; γ and α are constants of anabolism and catabolism".

I should like to point out:

(1) Growth, increase of body weight, and increase of energy content are implicitly taken to be equivalent from a metabolic point of view. I recently stated² that a given increase in body weight may have widely different thermochemical meanings; an increase by 5 gm. of a very young animal (properly 'growth') represents approximately 1 gm. of protein and 4 gm. of water and mineral salts, or an energy content of 4-5 calories. An increase by 5 gm. of an older animal represents 5 gm. of fat or 45-50 calories.

(2) In fact, in an older animal, one can have an increase in the energy content of an animal, that is, a *caloric* difference between synthesis and destruction without concomitant increase in weight but due to replacement of protein tissue by fat depots.

Thus, even admitting that the rates of anabolism and catabolism can be taken as constantly proportional to a given power of the body weight, their difference would represent not the rate of increase of the body weight, but of the energy content of the organism. Outside of very early growth, these quantities are not equivalent.

I have also recently shown³ that ageing—as opposed to growth—is characterized by a shift in direction from protein to fat synthesis, rather than by a drastic and sudden decrease at puberty of the efficiency of productive processes; this change of direction is to a certain extent reversible under special conditions, as under the influence of injections of growth pituitary hormone, malignant growth, etc. The "constants of anabolism and catabolism" are therefore meaningless in terms of body weight, although they may possibly retain a certain significance in terms of energy content of the body. Even in these terms, however, they are subject to variation if one or the other of the dietary essentials becomes a limiting factor⁴.

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¹ Von Bertalanffy, L., *Nature*, **163**, 156 (1949).

² Mayer, J., *Growth*, **12**, 341 (1949).

³ Mayer, J., *Growth* (in the press).

⁴ Mayer, J., and Krehl, W. A., *Yale J. Biol. Med.*, **40**, 403 (1948).

Production of Meson Showers

It was noticed long ago that the special type of interaction between the nucleons and the particles responsible for nuclear forces leads to the possibility of production of many such mesons in one single act^{1,2}. This result has later been disputed, especially by Heitler and his co-workers³, with the argument that the same interaction could possibly produce a strong damping effect as well, which might prevent any multiple production of particles. Jánossy⁴ then put forward the view that some cascade process inside a nucleus may be responsible for showers consisting of several mesons. The recent admirable progress in photographic technique achieved by Powell and his group⁵, however, has resulted in most beautiful pictures of the creation of many mesons (very probably π -mesons) in one single act. At the same time, the experiments on local penetrating showers show that these showers are produced in light material, probably also hydrogen, even more frequently than in heavy material⁶. Therefore it seems natural to analyse the recent experimental data with the help of the old theory.

This theory started from the assumption that in a very energetic collision of two nucleons a large part of the kinetic energy available in that frame of reference in which the centre of gravity is at rest (' c -system') will be turned over to the meson field. In the meson field a turbulent process will then go on, in which this energy is dissipated with the production of many mesons. The emission of these mesons should therefore be isotropic in the c -system for the same reasons that the distribution of small eddies in a turbulent motion is isotropic. Furthermore, it was suggested as a plausible assumption (ref. 1, equat. 38-40) that the mesons are produced in a spectrum of the type

$$dI = adk_0/k_0, \quad (1)$$

where k_0 is energy, k is wave number, α is rest-mass of the mesons, dI/dk_0 is differential intensity ($\hbar = c = 1$). If the total energy available in the c -system is called ϵ , then the upper limit for k_0 is, roughly, $k_0 \sim \epsilon$, and for the constant a one gets: