

The reverse occurs in the green plant cells. In a word, of the two movements, that of descent is preponderant in the animal, that of ascent in the vegetable." No one has done greater service to the fixing of our ideas on this subject than Dr Gaskell when he analysed the whole process, called "Metabolism" by Professor Michael Foster after Schwann, into the two complementary processes of Anabolism the upward, and Catabolism the downward, movement—the winding up and running down of the clock, the preparation and loading of the explosive and the discharge of the gun.¹

42.
Anabolism
and Cata-
bolism.

¹ The introduction of these terms is, however, connected with a special view—differing somewhat from that suggested by the formula of Claude Bernard—which is now very generally adopted in textbooks of physiology. Prof. Burdon Sanderson has given a lucid statement of this difference in his Address, entitled "Elementary Problems of Physiology," before the Brit. Assoc. in 1889 ('Report,' p. 613). He there says: "A characteristic of living process . . . is that it is a constantly recurring alternation of opposite and complementary states, that of activity or discharge, that of rest or restitution. Is it so or is it not? In the minds of most physiologists the distinction between the phenomena of discharge and the phenomena of restitution (*Erholung*) is fundamental, but beyond this unanimity ceases. Two distinguished men—Prof. Hering and Dr Gaskell—have taken, upon independent grounds, a different view to the one above suggested, according to which life consists not of alternations between rest and activity, charge and discharge, loading and exploding, but between two kinds of activity, two kinds of explosion,

which differ only in the direction in which they act, in the circumstance that they are antagonistic to each other. Now, when we compare the two processes of rest . . . and discharge . . . with each other, they may further be distinguished in this respect, that whereas restitution is automatic, the other is occasional—*i.e.*, takes place only at the suggestion of external influences. . . . It is in accordance with the analogy between the alternation of waking and sleeping of the whole organism, and the corresponding alternation of restitution and discharge, of every kind of living substance, that physiologists by common consent use the word stimulus (*Reiz*), meaning thereby nothing more than that it is by external disturbing or interfering influence of some kind that energies stored in living material are discharged. Now, if I were to maintain that restitution is not automatic, but determined, as waking is, by an external stimulus, that it differed from waking only in the direction in which the stimulus acts—*i.e.*, in the tendency towards construction on the one hand, towards destruction on the other—I should fairly and as clearly as