

the chemical laboratory by processes which were like or unlike those going on in the organism itself. But such stable compounds are not the bearers, they are merely the collateral products, the accompaniments, of the living process. The artificial production of organic compounds, beginning with Wöhler's production of urea, and ending with the production of albumen, do not approach the problem of the production of living matter. Could the chemist produce protoplasm, it would not be living; or were he fortunate enough to hit upon one of its many metamorphoses, it would die the next moment, not having the inner structure or the external and internal environment necessary for its self-conservation and activity. Nor do we seem to get any nearer the real secret by analysing more closely the chemical and physical changes, the metabolism, the rhythmical processes which constitute this activity. We call it nutrition or respiration, assimilation and disassimilation, oxidation and reduction—storing up and letting loose of energy. We picture to ourselves the building up of more and more complicated chemical molecules, containing thousands of atoms, in a temporary and easily disturbed equilibrium, and the subsequent breaking down again of these complex structures by gradual decomposition or by sudden explosions due to external stimuli, or by the still more mysterious directive action of conscious will: we liken them to the pulling of a trigger, or the gathering up and letting loose of a destructive avalanche by the motion of a flake of snow on the top of a peak. We see how this metabolism, this "Stoff- und Kraft-wechsel," goes on in the smallest amœba in rhythmical movements, and how, in higher