life. Similar coagulation is observed when photographic plates are kept for a long time, their emulsion gradually becomes more and more coarse-grained and the plates lose their sensitivity to light.

All biological processes are characterised by life and the living cell is really a physico-chemical transformer which assimilates various substances and maintains itself in a state of dynamical equilibrium. Naturally many of the problems involving the application of colloidal physics and chemistry to protoplasma and plant physiology are but imperfectly understood. Still it has been possible to explain a large number of biological processes, at least qualitatively, by the application of Donnan equilibrium. Donnan considers an active living cell. In such a cell assimilation of substances oxidation and decomposition are taking place. The products of decomposition are excreted from the cell. In short the cell is continually changing its state. Now let us suppose that all the processes in the cell are stopped only for an instant. We are supposing that the cell is momentarily dead. To such a cell we can apply the laws of thermodynamics. Actually, however, the cell is continuously working. Our procedure in applying the laws of thermodynamics to the living cells is thus similar to the principle of virtual work.

The most essential facts about a living cell[75] are (*a*) its power of specific reproduction and repair, (*b*) its capacity for apparently purposive response and (*c*) its continual exchange of materials and energy. We know of no living organisms which remain indefinitely in a state of equilibrium without the liberation of energy. Life, in fact, is a self-perpetuating series of events : if the continuity of these events be broken by depriving them for a time of energy, their normal progress may be completely altered or prevented. We shall close this article by saying with Donnan.[76] 'Physical chemists were quite prepared to deal with stationary states—and have often done so—and would drop no tears if a rather naive thermodynamical treatment did not provide a complete explanation'.

[75] A. V. Hill, *Trans. Farad. Soc.*, 1930, **26**, 667.

[76] F. G. Donnan, *ibid.*, 1930, **26**, 675.

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An Automobile Factory in India.

AT the recent conference of the Congress Ministers for Industries held in New Delhi, Sir M. Visvesvaraya, who attended the meeting by special invitation, presented his important scheme for the manufacture of automobiles in India. India, in 1937, imported 16,036 cars and 13,046 commercial trucks, totalling 29,082 vehicles whose value is estimated at 8 crores. This is one of the 'Key' industries which would pave the way for the manufacture of aeroplanes and armaments, so essential for the country's defence.

The scheme provides for the production of 10,000 cars and 5,000 trucks when the plant attains its maximum capacity. In the early stages, however, it is considered economical to import 30 per cent. of the special parts. 18 to 24 months would be required to put the factory into operation. In the first year, the factory will devote itself to assembling imported parts, some of which will be locally manufactured in the second year, and in the third year, the factory is expected to attain its full size and to manufacture the scheduled number of cars.

150 Lakhs is the proposed capital on which a 20 per cent. return is expected. The Government of India's unstinted support by way of a high protective tariff and generous patronage, is essential for the promotion of the industry. Other progressive governments in the West have allowed similar concessions, the import tariff levied in those countries ranging from 50 to 80 per cent.

The creation of an Automobile Industry in the country necessarily leads to the establishment of several other specialised industries. The car has some 2,000 separate parts and these are provided by the special factories. The Volvo Company of Sweden which manufactured a little over 6,000 cars in 1937, had contracts with 100 Swedish firms for the supply of parts. In India, this industry will use local steel and various other raw materials. It will thus help to develop mechanical skill of the highest order among Indian workmen. It will give employment to technically skilled young men. A factory like this established in the country will develop in our engineers and experts, capacity to design and operate high class machine industries of every kind including locomotives and aeroplanes.