What is observed to occur in connexion with the leucocytes of the blood, and with muscular fibres, stands in illustration of the two kinds of cleavage spoken of.

Glycogen, then, is to be regarded as simply a reserve of carbohydrate material, ready, as in the case of fat reserve, to be drawn upon and utilized when it becomes wasted. Its special accumulation in the liver is to be accounted for by the position in which the organ stands in relation to food supply. The main purposes to which it becomes applied are bioplasmic growth and energy production. For the latter, the chief seat of utilization is in the muscles, and here the storage amount present is found to be in a great measure dependent on rate of usage. With limb muscles deprived of activity by nerve section or tendon division, observation has shown that a larger accumulation is met with than in the muscles of the other limb left intact. Conversely, observation has likewise shown that under exercise, as, for instance, when a muscle is tetanised, a decrease of glycogen takes place.

Külz showed by his experiments on previously well-fed dogs, that under very forced exercise, glycogen might be made almost completely to disappear from the muscles and liver in about 6 to 7 hours. As far as the muscles are concerned, the glycogen is lying close at hand and has simply to be taken by the bioplasmic material that uses it up. I consider it must be assumed that, as in the case of starch in the vegetable kingdom, the glycogen molecule requires to be broken down into sugar molecules before passing into the molecular complex in which consumption takes place, and it may be reasonably inferred that, in accord with what is commonly noticeable, there is concerted enzyme action set into play to bring about what is required.

With regard to the glycogen in the liver, which, as seen, equally disappears, this is seated at a distance from where utilisation occurs, and the point now to be considered is how it becomes transported from one spot to the other and meanwhile escapes being placed in a position to show itself in the urine. We know when it happens, as after Bernard's puncture of the fourth ventricle, that the glycogen passes into the blood in the form of free sugar, the fact is revealed through the medium of the urine, but we have no disclosure recorded of any glycosuric effect having been produced by forced exercise, notwithstanding the short period within which the liver has been found to have become emptied of its glycogen.

The problem, then, now before us is how is the transport service carried on between the seat of glycogen accumulation in the liver and the seat of utilisation in the tissues, without leading to any show of its occurrence through the detectable appearance of sugar.