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"On some of the Variations observed in the Rabbit's Liver under certain Physiological and Pathological Circumstances." By T. LAUDER BRUNTON, M.D., B.Sc., F.R.S., and SHERIDAN DELÉPINE, M.B., B.Sc. Received October 22, 1891.

(Abstract.)

Under the influence of the natural stimulus of digestion, numerous changes are observable in liver cells. In this we partly confirm and partly complete (and add to) the observations of previous investigators.

1. Some of them indicate the existence of a peculiar kinetic state, manifested by *irritability and contractility, giving rise to variations in the distribution of the mitoma of the cells.*

The alternate enlargement and shrinking of the nuclei seem to point in the same direction.

The correlation between these phenomena and certain alternations in the contractility of the sphincter pupillæ still further strengthens this view.

2. During digestion, in addition to the dynamic state just alluded to, glycogen accumulates in the cells, and gradually fills up all the meshes of the mitoma. This begins in the hepatic zone almost immediately after the beginning of a meal, attains its maximum from the third to the eighth hour, and gradually diminishes, till at the twelfth hour only a few granules are left in the *hepatic zone, which is thus the first and the last to be infiltrated with glycogen.*

Another evidence of chemical activity is given by the accumulation of a ferruginous pigment in the cells of the liver. This begins to be well marked five hours after a meal; it gradually increases, until at the twelfth hour it has attained its maximum,* after which it rapidly diminishes. It is to be noted that the *first effect of taking a meal is to cause a diminution of this iron-containing pigment in the liver cells.*

There is, therefore, evidence that the signs of activity of liver cells occur in the following order:—

(a.) *Alterations in the Size of the Meshes and in the Distribution of the Mitoma.*—This occurs very early, and continues till the eighth hour at least.

(b.) Accumulation of some products which have been separated from the food and absorbed, but yet not assimilated† (or utilised in the production of energy) (*glycogen*). This becomes marked also early after the taking of a meal, and attains its maximum between the third and eighth hours.

(c.) Accumulation of some products which have been separated in the cell as a result of its special functional activity, but as yet not expelled from it (*iron-containing pigment*). This attains its maximum at the twelfth hour.

It is evident that the first and the last of these signs are not necessarily under the dependence of the absorption of food. On the contrary, the second is apparently one of the results of absorption. It is, therefore, probable that, whilst the first and the third may be brought about by various stimulating agents, the second, being con-

* As demonstrated by microchemical reactions. (It is, however, possible that part of the iron compounds set free by the splitting up of hæmoglobin may not be revealed by this method.)

† This is said with reference to the body taken as a whole.

nected with the taking of food, is hardly to be expected to be among the results of stimulation of starving cells.

In studying the effects of drugs it will be useful to consider the relation of these various effects in order to understand the special mode of action of the agent employed.

By these observations we have also obtained indications of the ways in which cells can be placed in different states of activity, so that, by the administration of drugs at various times after a meal, we can study more accurately what accelerating, restraining, or otherwise modifying, influences the drug may have.

We have been driven to consider, incidentally, some other problems, such as the relations which exist between contractility and secretory activity, but such things cannot be considered fully in this communication.

