

trituration, furnished, not merely with a hard cuticle, as in birds, but also with numerous rows of teeth, of various forms, answering most effectually the purpose of dividing, or grinding into the minutest fragments, all the harder parts of the food, and thus supplying any deficiency of power in the jaws for accomplishing the same object. Thence the aliment, properly prepared, passes into the cavity appropriated for its digestion, which constitutes the true stomach.\* In the lower part of this organ a peculiar fluid secretion is often intermixed with it, which has been supposed to be analogous to the bile of the higher animals. It is prepared by the coats of slender tubes, termed hepatic vessels, which are often of great length, and sometimes branched or tufted, or beset, like the fibres of a feather, with lateral rows of filaments, and which float loosely in the general cavity of the body, attached only at their termination, where they open into the alimentary canal.† In some insects, these tubes are of larger diameter than in others; and in many of the orthoptera, as we shall presently see, they open into large receptacles, sometimes more capacious than the stomach itself, which have been supposed to serve the purpose of reservoirs of the biliary secretion, pouring it into the stomach on those occasions only when it is particularly wanted for the completion of the digestive process.‡

\* It is often difficult to distinguish the portions of the canal, which correspond in their functions to the stomach; and to the first division of the intestines, or *duodenum*; so that different naturalists, according to the views they have taken of the peculiar office of these parts, have applied to the same cavity the term of *chyliferous stomach*, or of *duodenum*. See the memoir of Léon Dufour, in the *Annales des Sciences Naturelles*, ii. 473.

† The first trace of a secreting structure, corresponding to hepatic vessels, is met with in the *Asterias*, where the double row of minute lobes attached to the cæcal stomachs of those animals, and discharging their fluid into these cavities, are considered by Carus, as performing a similar office. The flocculent tissue which surrounds the intestine of the *Holothuria*, is probably, also, an hepatic apparatus.

‡ A doubt is suggested, by Léon Dufour, whether the liquid found in those pouches is real bile, or merely aliment in the progress of assimilation. *Ann. Sc. Nat.* ii. 478.