and four-molar a 41 per cent. In all these cases there was an increase in color value. This is probably due to an increase in a brownish color component. There was some precipitation. In many instances there was a finely divided sediment in the picrate reduction mixture. For this reason a study was made as to the effect of filtration. Ashless paper was used and in all but very few cases filtration was followed by a decreased color value. The error from such a cause ranged from 0.5 to 6 per cent. A solution passed through six 9-cm. papers had a decrease in color value amounting to 17 per cent.

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Factors involved in the quantitative reduction of the tissues in the stomach and intestine in amphibian larvæ during metamorphosis.

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According to data recorded elsewhere[1], the following changes in the digestive tube occur in Rana pipiens and Ambystoma tigrinum during metamorphosis.

	R. pipiens	*A. tigrinum*
Average reduction in length of stomach and intestine	82.5 per cent.	45.8 per cent.
Average reduction in weight of tissue in stomach and intestine	56.5 per cent.	46.9 per cent.

The rôle of autolysis and phagocytosis in the quantitative reduction of the tissues in the gills, fins, and tail of amphibian larvæ during metamorphosis has been studied repeatedly. Autolysis and phagocytosis also account for a large part of the quantitative reduction in the tissues in the stomach and intestine. The extrusion of tissue elements, especially from the mucosa and submucosa, into the lumen of the stomach and intestine

[1] Kuntz, A., Anatomical and physiological changes in the digestive system during metamorphosis in Rana pipiens and Ambystoma tigrinum. *Journal of Morphology* (not yet published).

is an additional factor which the writer has not found recorded hitherto.

As the stomach and intestine undergo reduction in length, their walls become thicker. As pointed out by Ratner[2], the increase in the thickness of the several layers in the walls of these organs is brought about not by active cell proliferation but by rearrangement and aggregation of the elements already present. During the early phases of this process many of the smaller blood vessels become obliterated or constricted; consequently autolysis of many of the tissue elements is initiated. The tissues become infiltrated with leucocytes and phagocytosis, doubtless, plays a part in the removal of tissue fragments.

During the progress of metamorphosis, the stomach and intestine become free from ingested material and masses of cellular debris, including nuclei in which a portion of the chromatin still reacts to the basic stain, occur in the lumen throughout the stomach and small intestine. The gastric and intestinal epithelium becomes increasingly irregular as metamorphic changes advance. The nuclei of all the epithelial cells no longer remain at approximately the same level, but many of them approach the free surface of the epithelium. Not infrequently the nuclei of epithelial cells protrude and the cells slough into the lumen. Both in the stomach and intestine, cells from the mucosa, including many of the invading leucocytes, also slough into the lumen. In some instances definite points may be observed at which the epithelial cells have separated to permit the extrusion of aggregates of cells from the deeper layers of the mucosa and the submucosa; in others, only sufficient separation of epithelial cells occurs to permit the displacement of individual cells from the deeper layers into the lumen. The frequency with which the extrusion of cells either singly or in aggregates from and through the epithelium occurs and the volume of the cellular debris present in the lumen of the stomach and intestine suggest that a large part of the quantitative reduction of the tissues in these organs is brought about by this process.

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[2] Ratner, T., Metamorphose des Darmes bei der Froschlarve, Dorpat, 1891.