The vasculature of the stomach of man and mammals is well documented [1]. While morphology and histology of the larval stomach [2], the development of the arterial and venous system [3,4], and histology, gross arterial supply and venous drainage of the model organism Xenopus laevis Daudin are described [5,6] there is still a lack of knowledge of the stomach microvasculature [7]. In this study we use scanning electron microscopy (SEM) of vascular corrosion casts to demonstrate the changes the microvascular bed of the stomach of tadpoles of Xenopus laevis Daudin undergoes during metamorphosis when the herbivorous tadpole becomes a carnivorous juvenile.

Tadpoles of the South African Clawed Toad, Xenopus laevis Daudin, from stages 55 to 64 (for staging see [8]) were casted via the conus arteriosus with Mercox-Cl-2B (Ladd Res. Inc., Burlington, VT; flow rate: 3ml/h), diluted 4:1 (v/v) with monomeric methylmetacrylate (Fluka Chemicals, Basle, CH). After hardening specimens were tempered (H2O, 60°C), macerated (7,5% KOH, 40°C), cleared with 5% formic acid and at least freeze-dried (Lyovac). Subsequently specimens were mounted onto stubs, evaporated, sputtered examined under the ESEM at an acceleration voltage of 10kV. In adult Xenopus the resin injection was via ventricle-conus arteriosus using manual pressure.

The larval as well as the adult stomach are supplied by a left and a right gastric artery, which approach the stomach at its medial aspect while a anterior, a medial and a posterior gastric vein drain. In early metamorphic climax (stage 55) the muscular layer of the stomach is not yet vascularized and hence a view at the serosal aspect of the stomach reveals the vascular bed of the lamina propria. Vessels appear immature and show many signs of intussusceptive microvascular growth (= IMG). Casts sectioned transversely at the level of the stomach body the wall reveals folds at the
luminal aspect due to the varying thickness of the gastric mucosa. At stage 57 vascularization of the muscular layer of the stomach starts. Veins and arteries already show cell nuclei imprints, however venules, arterioles and capillaries are distinguished due to their shape, branching patterns and dimensions. At stage 64 vessels show a clear hierarchy and in transversally sectioned specimens arterioles and venules of the wall of the stomach can still be distinguished because of their shape. In this developmental stage the entire supplying and draining system of the stomach wall can be followed (Fig 1).

In the stomach of adult Xenopus the circular and longitudinal muscle layer reveal a well developed capillary bed. Capillaries parallel smooth muscle cell layers and thus form a rectangular meshwork. The gastric mucosa forms longitudinal folds of varying height. The microangioarchitecture of these folds is made up of a dense, polygonal meshwork of capillaries which enclose gastric glands (Fig. 2). Capillaries drain into venules which descend between tubular glands and merge within the lamina propria to finally form the draining gastric veins.

References:
[9] This work was supported by the Fonds zur Förderung der Wissenschaftlichen Forschung, Project P-19050. The assistance of S. Tholo and Dr. W.D. Krautgartner is acknowledged.

FIG.1. Microvascular anatomy of the wall of the stomach at stage 64. SE serosal aspect, LU lumen, aa arteriole, v vein, vv venule, c capillary.

FIG.2. Luminal view at the capillary bed of the gastric mucosa in adult Xenopus. Note the subepithelial capillary bed with openings of gastric glands (dashed circles) and a draining venule (arrow).