

186. *Calcium Absorption by the Midgut of the Blowfly*. C. W. TAYLOR, Department of Zoology, Downing Street, Cambridge, England.

The isolated midgut of adult *Calliphora vicina* can be maintained under internal perfusion for many hours, and calcium absorption can be measured by including ^{45}Ca in the perfusing saline with $[^3\text{H}]$ inulin as a volume marker. The midgut has a considerable capacity for Ca transport from lumen (L) to bathing saline (BS). Several lines of evidence indicate that this flux occurs via a wholly transcellular route: (1) lumen-to-bathing saline flux (L-BS) shows saturation kinetics; (2) backflux (BS-L) is negligible, and (3) absorption (L-BS) is totally and reversibly inhibited by metabolic inhibitors. When fed excess Ca, the Ca content of flies rapidly rises to a plateau although the rate of absorption is unaltered, indicating that excretion and not absorption is regulated. Midguts isolated from flies fed excess Ca for several days have the same transport capacity as those isolated from flies fed water. It is concluded that the midgut is a major site of Ca uptake but not of regulation.

187. *Endocrine Responses to Changes in Environmental Calcium in Rainbow Trout, Salmo gairdneri*. M. E. HAYES, T. F. C. BATTEN, P. M. INGLETON, D. GUILLAND-CUMMING, I. W. HENDERSON, W. MOSLEY, AND R. G. G. RUSSELL, Departments of Zoology, Human Metabolism, and Clinical Biochemistry, Sheffield S10 2TN, U.K.

Ultrastructural changes were sought in the corpuscles of Stannius and the pituitary of trout adapted to varying environmental calcium concentrations, in an attempt to correlate these to changes in plasma ion composition and 25-hydroxyvitamin D₃. Trout were adapted to fresh water (FW) containing less than 0.2 mM Ca^{2+} and up to 50 mM Ca^{2+} and to full sea water (SW; 10 mM Ca^{2+}) for a period of 6 weeks. Addition of calcium to FW produced no change in plasma Na^+ , Ca^{2+} , inorganic PO_4^- , or 25-OH-D₃ concentrations. However, plasma Mg^{2+} was significantly lower in 50 mM Ca^{2+} FW. In SW plasma Na^+ , Ca^{2+} , Mg^{2+} , and 25-OH-D₃ were elevated significantly. In the pituitary, nuclear and cellular areas were measured at LM level in pars intermedia—lead haematoxylin (PIpH) cells, which secrete MSH; PI chromophobes, probably homologous to PAS+ cells of other teleosts which in some are Ca^{2+} sensitive; and prolactin (PRL) cells. No significant differences were found which could be related to Ca^{2+} concentrations. EM examination revealed no ultrastructural changes in any of the three cell types. Thus it seems unlikely that PRL or PI cells are involved in Ca^{2+} homeostasis in this species. In FW and DW, C1 cells of the corpuscles of Stannius were inactive with numerous large granules, but increasing concentrations of Ca^{2+} caused degranulation, almost completely in 50 mM Ca^{2+} and SW, accompanied by increased RER and Golgi. C2 cells showed no significant response to increasing ambient Ca^{2+} but were relatively less active in SW. Thus, C1 cells of the corpuscles of Stannius appear to play a significant role in adaptation of trout to higher environmental Ca^{2+} concentrations.

188. *Prolactin and Calcium Metabolism in the Teleost Fish Sarotherodon mossambicus*. S. E. WENDELAAR BONGA, G. FLIK, J. C. VAN DER MEIJ, Z. KOLAR,* AND J. C. FENWICK,† Department of Zoology, University of Nijmegen, The Netherlands;* Interuniversity Reactor Institute, Delft, The Netherlands; and †Department of Zoology, University of Ottawa, Ottawa, Canada.

Prolactin cell activity, as estimated by morphometry or by determination of the incorporation rate of labeled amino acids by prolactin cells *in vitro*, is inversely related to the calcium concentration of the ambient water. Administration of ovine or tilapia prolactin to intact, freshwater tilapia induced a slight hypercalcemia due to an increase in both the free and protein-bound plasma calcium fractions. Injection of ovine prolactin for several days stimulated calcium uptake from the water, as was concluded from whole-body counting during exposure to ^{47}Ca , and from the observed increase in total body calcium. The calcium concentration in scales and skeletal bones increased significantly and in a dose-related fashion. Bone density, but not bone formation, was influenced by prolactin. Tilapia adapted to low-calcium freshwater—this treatment stimulates prolactin secretion—showed increased calcium uptake from the water, and increased calcium turnover. The increased uptake is interpreted as a prolactin-mediated response to the increased losses of calcium from the body that occur under low-calcium stress. It concluded that prolactin controls the active uptake of calcium from the water in tilapia. This is possibly effected by stimulation of branchial calcium-uptake mechanisms. It has been shown that in American eels prolactin stimulates a specific, high-affinity ($\text{Ca}^{2+} + \text{Mg}^{2+}$)-ATPase, an enzyme that may be closely connected with active calcium uptake.

189. *Effects of Ambient Ca^{2+} and Prolactin on High-Affinity ($\text{Ca}^{2+} + \text{Mg}^{2+}$)-ATPase and Nonspecific Phosphatase Activity in Gills of American Eel (*Anguilla rostrata*)*. G. FLIK, J. H. VAN RIJS, J. C. FENWICK,* AND S. E. WENDELAAR BONGA, Department of Animal Physiology, University of Nijmegen, 6525 ED