OSD Symp.WORKSHOP 1 (V9): **Sonntag, 07.12.2014,** 09:30–12:45 (B. Freeman)

Asymmetry and mass transfer in the development of organs
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Mass transfer occurs in inorganic and natural environments. In living organisms mass transfer can involve, among other processes, the displacement of fluids and solids due to polarized or differential metabolism, i.e., metabolism that is changing spatiotemporally. Striking examples of mass transfer occur throughout life but particularly during the growth phases of an organism.

One type of mass transfer in organic forms is metabolic movement. Metabolic movements are subject to physical and chemical influences from the surrounding environment. From a biodynamic perspective, spatially ordered metabolic movements constitute the submicroscopic basis for the more obvious growth movements seen in the embryo. These movements occur against resistances and therefore represent the performance of work by the embryo and its cellular ensembles or organs.

Metabolic movements are associated with asymmetry of an organism. The workshop considers different degrees of oscillating asymmetry during development of the human conceptus: from the fertilized ovum, to 2-blastomere stage, to local changes in the thickness of limiting tissue, as well as the manifest head–rump and left–right asymmetries of the whole embryo. At different times metabolic assimilation (anabolism) predominates in some regions and dissimilation (catabolism) in others. The oscillatory nature of metabolic movement is the basis for the circulation of fluid; the pathways for circulation may be intracellular and/or extracellular.

Some examples of mass transfer of intra- and extracellular metabolites that will be considered are:

- the poles of the blastocyst
- tube formation, e.g., neural tube, nasolacrimal duct
- development of reflexes, e.g., monosynaptic reflex arc, blinking
- development of so-called circulatory organs, e.g., heart, lymphangion
- development of so-called excretory organs, e.g., allantois, kidney

The workshop will review the concept of cell migration, which is sometimes invoked to account for mass transfer in the development of certain tissues and organs, e.g., spinal ganglia, autonomic ganglia, gonads.

The workshop will emphasize the similarities in the developmental biodynamics of the major visceral organs of the body: lung, liver, and kidney.