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Facing Facts – Development and Anatomy

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Biomechanical embryology offers insights into the normal development of the human face that are unsurpassed for clarity and clinical relevance. By providing a spatiotemporal framework for the early growth movements of the cells and cellular ensembles that contribute to facial anatomy, biomechanics can complement other approaches to human ontogeny such as studies in molecular biology and evolution. Errors based on scientific fraud, such as Haeckel's 'law' that ontogeny recapitulates phylogeny or the notion that human pharyngeal folds are somehow related to the gills (branchia) of fishes, can be avoided. The presentation will concentrate on the development of the middle third of the face. The formation of craniofacial components is partly the result of an interplay between the growing brain and nerves on the one hand, and the heart and vessels on the other. From a biomechanical view, it will be shown that no single facial structure can be understood in isolation, but only as an element in a whole, growing, moving embryo. It will also be shown: (i) that new structures and organs arise in a conceptus as a consequence of the reaction of cellular metabolism to otherwise disruptive influences (from both external environment and the growth of the conceptus itself), (ii) that these reactions in metabolism cause further growth-movements that lead to the formation of new structures and organs, (iii) that there is no need to invoke the concept of independent cell 'migration' to account for the massive displacements of cells that occur in embryological development, (iv) that all adult functions must be preceded by normal growth-movements, and (v) that frequently there is a reversal between the embryological growth function and the normal adult function. The embryo (as a part of the conceptus) is a dynamic system of mobile equilibrium: some aspects of the embryo's behaviour are shared by the dynamic physicochemical systems that were described by Le Châtelier in 1884.