

The Ever-Changing Face of Anatomy

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*Many of the genes we carry have been conserved throughout the evolution of the animal kingdom, so that we see common patterns of development in such diverse forms as the fruit fly *Drosophila* and the human embryo which largely determine the mature human form. These approaches, we feel, are justified, and indeed are essential if we are ever to gain any real understanding of the human body's nature in all its complexities, and begin to answer the questions 'Who are we, and from whence did we come?'*

Gray's Anatomy

Preface to 38th edition.

Anatomy, for long viewed as an uninteresting catalogue of structures is changing. As the 37th edition of *Gray's Anatomy* admitted in its preface the science of anatomy is leaning towards philosophy "which takes it a little beyond what we commonly regard as Science." From scalp to sole, every anatomical structure demands philosophical respect that, in the long run, serves medical science for the better.

The *homeobox theory* is a sweeping zoological generalization that synonymies the "embryogenesis" of a worm with that of a whale, of *drosophila* with a dinosaur. The 3-layered embryogenic disc folds on itself to create the embryonic cylinder that by a mix of *invaginations* and *evaginations* fashions a complete individual. Were the embryonic cylinder to be viewed as a single cell, each evagination - say, one that forms a limb- will be akin to a cell's cilium or pseudopodium. An invagination - stomodeal or proctodeal - will appear as a cellular vacuole. In line with homeobox concept, one can realize that all morphogenetic processes during embryogenesis are variants of the behaviour of a single cell.

During embryogenesis, joints, muscles, tendons, ligaments appear first, and bones, much later. Therefore, if at all, it is the humerus that seeks attachment to deltoid. In reality, what has been found is that bone is attached to nothing, nothing is attached to bone. Bones are inlaid as islands of scleral tissue that provides a certain shape, certain inflexibility to a region. It's not that the mandibular nerve passes through foramen ovale. Rather the foramen ovale forms round the mandibular nerve. The articular cartilage is continuous with soft tissues, contiguous with bone. Future textbooks of anatomy will have to jettison not only the concept of a origin / insertion of a

muscle, but also the concept of “attachment” of a tendon. The principles and the parlance of descriptive anatomy will change.

Chaos is the current buzzword in science. It implies the sheer unpredictability of what the next event / person / cancer will be. The assured uniqueness of a person to be born next, combined with the utter unpredictability of what his facial pattern, fingerprints, DNA-prints will be like, leads one to appreciate the fact that every single event, cell, person is governed by the interplay of chaos of cosmos. The most detailed description of the embryogenesis of face never tells you what the face will be like. Every embryogenesis thus acquires a cosmic dimension, to express itself, strangely as chaos.

Nuclear transplantation experiments have indicated that hierarchically, the cytoplasm is superior to the nucleus. The cancerousness of a cell or the embryogenetic faculty of an ovum, are primarily located in the cytoplasm. Hence the unreliability of nuclear features as a guide to the diagnosis of cancer. No wonder, Dr. Borges, chief of histopathology at the Tata Memorial Centre, declared that histopathology is the science of study of the constancy of tissue artifacts. Many a cytologist sees a cancer cell as but a form of cellular differentiation. Cancer cell is thus a *normal* cell, which explains why chemotherapy, radiotherapy and vaccines fail to work selectively against cancer cell.

A human being is a binary unit comprising a cell representing 0, and fibre standing from 1, worm to whale and shrub to sequoia tree, it is a study of live-computers constituted by and working through the binary code. Modern medicine is loftily ignorant about the cell, the entire cytologic edifice crumbling on the nucleus being dethroned by the demonstrated supremacy of the nebulous, and hence not subject to the ease with which the nucleus could be studied so far. Cytology as of now is dead. Ditto for genetics for the gene is yet to be described, genetics has been plagued by “romantic pessimism” and heredity is questionable. Burnet, the Australian Nobelist, is on record that molecular biology has so far, not helped ailing humanity.

The offshoot of the above waterloos is that gross anatomy palpable as nerves and tendons, muscles and glands is once again coming into its own, an evolution – or rather, revolution – clearing ways for yet safer surgery, and clearer imaging. We dare suggest that the curricular time devoted hands-on dissection be restored to its old-time glory, so that once again in the words of Jean Fernal, the dead start teaching the living.

The philosophization of anatomy has just begun. The new millenium will usher in many more changes. Anatomy will truly turn into a celestial song to be sung.

The above musings have been inspired by the challenge that a leading university of Europe poses before its students:

***“You are here
NOT to WORSHIP what is known
but to QUESTION it.”***