

[Editorial]

The Origin of the Biomechanics and Morphology of the Viscerocranium

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Abstract

At the symposium for the establishment of the Association of Oro-maxillofacial Biomechanics, emeritus prof. H. Kawahara, the president of this association, reported in the original issue as follows: "The most important factor at the initial stage in the development of life as well as cell differentiation could be reactions of material interface between different substances made of various oxidized chemical complexes. Between them by mechanical and photochemical stresses there had evoked vast kinds of so-called biomechanical reactions, i.e., physico-chemical interaction, for example, chemical reaction, bioelectricity, mechanoelectricity, and photo electricity, thermodynamics. In the behavior of these organisms, interface reactions could be understood as integrated biochemical interactions concomitant with bioelectricities. The famous embryologist Roux proposed establishing Biomechanics to solve the origins of life and the mechanisms of the morphological evolution from the viewpoint of close relations between the phylogeny and ontogeny.

Preceding Roux's proposal, the famous poet Goethe, who was an earnest researcher of osteology and investigated Urbild, i.e., ground shape of organisms (archetype), originated a research category of morphology. During his research life, he concluded that the cranial skeleton should be a specific, differentiated vertebral bone. This aspect was denounced in modern science; however, the late Prof. S Miki (anatomy, Tokyo Artistic Univ.) proved it to be so through comparative anatomy.

Goethe discovered also through comparative anatomy interstitial maxillary bone in fetuses of humans, which can ordinarily exist in all kinds of apes and monkeys but not in adult human viscerocranium. Later in life, Goethe's morphological interest changed to plants instead of animals.

The philosophy of ground shape, that is basic morphology of vertebrates was passed on to Heackel. This world-famous researcher, who was Roux's mentor, had not only proposed the concept of phylogeny and ontogeny, but estab-

lished the famous but later on notorious Biogenetic Law (1866) at the young age of 36. The original nomination of the Theory is Recapitulation, namely, in ontogeny the part of caput, i.e., the viscerocranium, could be seen as a repetition of a phylogenical change of the face.

From the history of these biomechanics and embryology established by Heackel and Roux, researchers who investigate studies on the viscerocranium can be seen as orthodox successors of the life sciences through the epoch-making their discovery of morphology in the late nineteenth century.

The twentieth century was said to be technological, or the industrial age, based on mechanical science. Concerning life phenomena, however, the mechanical conception of the world have not always turned out as Roux had expected. Biomechanics can easily deviate, as was so in modern genetics. If we forget problems of cell differentiation and genetic regulation of mesenchymal cells, biomechanical influence upon living organisms cannot be detected or solved scientifically.....

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Biomechanical influence on the tissue cannot be detected in conventional methods of histopathology in medical and life science. These factors can react just at the site of chromosome substantially through physico-chemical stimulation at the latest stage.

Therefore, interdisciplinary research among genetics, molecular biology, and electrochemical biomechanics is essential for vast progress of life science in the coming 21st century. The landmarks to solve vertebrate-life-charactericity are now in our hands in this association.

Prof. Emeritus Kawahara proposed another important issue in which this association should demonstrate leadership all over the world from Japan. So, internationalization as well as interdisciplinaryization of the association are inevitable as early as possible. Because in Japan only we are aware of the importance of the viscerocranial morphology in vertebrate creatures.

Nowadays, the most important issue of stomatology in the 20th century was proved from the standpoint of phylogeny and biomechanics: What is a tooth? The next important problem in this region to be solved is: What is the face, biologically?

This is the most important and urgent question of vertebrate life in the 21st century from the medical, biological, and philosophical aspects.

From June 29 to July 4, the 8th World Congress of Ceramics was held in the old Renaissance town of Florence. After that, the Second Congress of Biomechanics was held in Amsterdam by Huisjes. Both congresses were based on Biomechanics as well as Bioengineering.

Most presented papers concerned proof of the fundamental remodeling of osseous tissue. A clinician, J. Wolff, who organized orthopedics in Humboldt University of Berlin, proposed through clinical experience the empirical the-

ory "Das Gesetz des Funktionelle Adaptation des Knochens", i.e., functional adaptation theory, 1892.

This empirical theory is as important as the principle of the "correlation between organs" of Cuiver in 1795 which was proposed from the aspects of comparative anatomy and paleontology.

Empirical theory can be quite important in life science just like logical dogma. Therefore, clinicians should apply these theories and principles, even if they have not been proved mathematically. Most diseases in humans can be prevented by application of these biomechanical empirical theories.

Moreover, mechanisms of life can be fundamentally understood through combined and integrated research on biomechanics, molecular biology, and genetics. After that, "What is life?" the famous subject of Schroedinger's publication, can be solved.

During the medieval age in Europe as well as in Japan, it was said that religious concept covered all human life throughout the world. Throughout the renaissance, not only were humans active, but scientific interests were encouraged just as among the ancients.

In fact, in Japan, throughout the Kamakura, Muromachi, and Momoyama periods, humanism and scientific progress were extraordinarily seen. However, in the Edo period, domestic peace had been preferred as the initial choice instead of progressive human life and science.

After the Meiji period, we absorbed European culture directly. Through over 100 years of cultivation in Japan, now we have to have leading opinions as well as the new culture of the 21st century in science. We can have this through research on oromaxillofacial biomechanics.

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