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The Evolution of Anthromathematics (2010-2014)

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Anthromathematics was defined as the mathematics of human body sizes, forms, proportions and structures. The term was first introduced on March 22, 2010 by the speaker during *the First National Conference on Mathematical Sciences* held at University of Karachi. Third millennium challenges required that the sciences of *anthropology* (study of human being) and *anthropometry* (measurement of human being) be transformed to *anthromathematics* through ideas from mathematics, *e. g.*, mathematical equations employed to approximate human body form (*analysis* — formulae for surface area and volume of human body), discrete structures recognized in the anatomy and the physiology of human body (*algebra* — brain death defined, mathematically, through study of group structure), invariance under deformations discovered (*topology* — spinal column deformed because of scoliosis, kyphosis or lordosis, studied by static and dynamic models), properties of numbers studied (*number theory* — numbers giving height, weight and other anthropometric measures) as well as inferences analyzed (*logic* — upper limits of optimal weight-for-height). There has been a long-felt need to apply the power of mathematics to the study of structures (anatomy) and functions (physiology) of the human body. Jenkins in 2008 described kinship of anthropology and mathematics. 'Anthropology' became a quantitative science as 'anthropometry', which was given the rigor 4-*year* ago as 'anthromathematics'. Notable contributions include solutions of childhood obesity, height and mass measurements to least counts of 0.01 *cm* and 0.01 *kg*, respectively, preparation of a detailed manual for obtaining anthropometric measurements, putting forward concepts of optimal mass as well as quantitative estimates of obesity/wasting as well as tallness/stunting both of them expressed as percentage. In addition, work is in progress (expected to be published next month) to extend CDC Growth Charts and tables to include percentiles 0.01^{P}, 0.1^{P}, 1^{P}, 99^{P}, 99.9^{P}, 99.99^{P} in addition to the percentile range 3^{P} to 97^{P}, so that extreme cases could be handled. The author spent about 30 *years* in the area of modeling of the human organs and 3-D bioimaging before, formally, launching the subject in 2010. The work included modeling of global-electrocortical activity (covariant, generalized coupling, covariant-generalized coupling), modeling of the human heart as a system of standing waves, 3-D-modeling of the human spinal column (static, dynamic, crystal-structure-based). Facilities available in the SF Growth-and-Imaging Laboratory operated by Anthromathematics Group, University of Karachi include stereophotogrammtery (moiré-fringe topography, raster-stereography), video analysis, height- and weight-measurement apparatus as well as software to generate growth-and-obesity profiles of children. This lecture is dedicated to the loving memory of the author's teacher **Hussain Ahmed Bilgrami**. Son of Yamin Khan, Mr. Bilgrami was born on Friday, June 30, 1939 AC (Jumāda-ul-Awwal 12, 1358 AH) in Bilgram, District Hurdoi, U. P., British India. He completed his matriculation in 1954, intermediate in 1957 and BSc in 1960, all from Karachi. On December 4, 1961 he was appointed demonstrator in SAL (Shah Abdul Latif) Government College, Mirpurkhas, District Tharparkar, Sindh (author studied in Government Comprehensive High School, Mirpurkhas during 1966-71). On June 12, 1969, he was transferred to Government College, Hyderabad, Sindh. The post of demonstrator was upgraded to SES-II on June 1, 1970. After retirement, he shifted with his family to Karachi and resided in an apartment located at NIPA Chowrangi. The speaker met him for the last time in 2003, when the former gave the concluding talk during *the Second International Conference on Physics Education*, held at NIPA auditorium. The speaker had the honor to complete physics laboratory of first-year science under his kind supervision. The anthropometric instruments for measuring heights (least count: 0.01 *cm*) and mass (least count: 0.01 *kg*) were constructed based on an exercise given by his teacher in 1973, in which the author was required to construct Vernier scales of varying least counts.

Keywords: Estimated-adult *BMI* • Growth-and-obesity modeling • Height measurement to least count 0.01 *cm* • Mass measurement to least count 0.01 *kg* • Optimal mass
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