

Attitude of Reviewer

by Professor Nina Atanassova, PhD, DSc,
Corresponding Member of Bulgarian Academy of Sciences
Institute of Experimental Morphology, Pathology and Anthropology with Museum, Bulgarian
Academy of Sciences

Re: competition for the academic position „ASSOCIATED PROFESSOR“ in the Professional field 4.3. Biological Sciences, specialty "Anthropology" in the Department "Anthropology and Anatomy" of the Institute of Experimental Morphology, Pathology and Anthropology with Museum, Bulgarian Academy of Sciences, announced in the Newspaper of State no. 43/10.06.2022

Assistant Professor Diana Toneva is the only candidate in the announced competition for the occupation of the academic position "Associated Professor" in the Department "Anthropology and Anatomy" of the Institute of Experimental Morphology, Pathology and Anthropology with Museum, Bulgarian Academy of Sciences. She presents detailed documentation of an active and promising scientists with indisputable indicators for academic promotion.

Diana Toneva graduated from the Faculty of Biology of the Sofia University "St. Kliment Ohridski" with a master's degree in general anthropology in 2005. She started her carrier in the Institute of Experimental Morphology and Anthropology of the Bulgarian Academy of Sciences as a PhD student in 2006. She defended a dissertation for the acquisition of PhD degree in 2010 on the topic "Anthropological characterization of the sternum, clavicle, scapula, and proximal end of the humerus and assessment of their sexual differences" in the specialty of the announced competition. In 2011, she was appointed to the academic position "assistant" at IEMPAM-BAN, and in 2012, she was promoted in Assistant Professor.

Dr. Toneva's scientific production includes 68 publications, of which 26 were published in international journals with Impact Factor (IF) and/or Impact Rank (SJR); 20 are in journals indexed in Web of Science (WoS) and SCOPUS without IF/SJR; 17 are in publications not indexed in these databases and 5 are in proceedings of national scientific forums. Three of the articles are included in her PhD thesis.

The candidate participated in the current competition with 19 scientific articles, of which 18 were published in journals with quartiles according to the Web of Science and SCOPUS metrics (with IF/SJR), and 1 book chapter of international publisher. The total IF is 17.305. According to Web of Science and SCOPUS metrics, the articles are distributed in the following quartiles: 4 articles with Q1; 8 articles with Q2; 5 articles with Q3; 1 article with Q4. Dr. Toneva has published her data in prestigious international journals in the field of anthropology and macroscopic anatomy: HOMO - Journal of Comparative Human Biology, Anthropological Science, Anthropologischer Anzeiger, Annals of Anatomy, Anatomical Record, Anatomical Science International, Legal Medicine, International Journal of Legal Medicine, Journal of Craniofacial Surgery. In the 19 articles presented in the competition, the candidate is the first or second author (in 8 of them she is the first author), that demonstrates her significant personal contribution. Her ability to work in an interdisciplinary team with physicians and specialists in informatics and computer technology is evident.

Dr. Toneva has 71 participations in 41 scientific forums, of which 18 in international events.

The candidate's citation reference includes 168 citations of 38 publications and an h-index of 5 according to SCOPUS. Forty citations are included in the current competition.

The scientometric analysis of the research activity clearly indicates that she meets the criteria/requirements of the Regulations on the terms and conditions for obtaining scientific degrees and for academic positions in IEMPAM. According to indicators "G" and "D", Dr. Toneva exceeds the required minimum according to the regulations of IEMPAM-BAN. For example, according to "G7" (*Scientific publications in journals referred and indexed in Web of Science and Scopus, that are not included in the habilitation thesis*), which requires at least 200 points, she has 262 points; according to indicator D (*citations, requiring minimum of 60 points*) she has got 80 points.

Dr. Toneva's main scientific contributions are in the field of forensic anthropology, virtual anthropology and gross anatomy. They are result of in-depth innovative research of the candidate on human bones and soft tissues of the face. She has developed original interdisciplinary approaches using biomedical methods, modern statistics, computer technology/artificial intelligence to generate 2D and 3D images. Dr. Toneva has presented her scientific contributions in three groups:

1. *Development of methods of identification based on human bone remains - determination of biological sex based on the skull and soft tissues of the face.*

Determination of the biological sex based on metric characteristics of the skull was carried out using classical statistical analyzes and the most modern approaches from the field of machine learning: support vector machines (SVM) and artificial neural networks (ANN). These are the first studies in Bulgaria in which subsymbolic algorithms are applied to develop methods for determining the biological sex of bone remains. The images of the modern Bulgarian population generated from the computer tomography are of particular use for the forensic medical practice in the identification of bone remains. The resulting classification models for sex determination based on the metric characteristics of the whole skull reach an extremely high accuracy of over 95%. The author investigates the sexual dimorphism in the size and shape of the large occipital opening by applying a new approach for calculating its area based on 3D coordinates of a series of semilandmarks with derivation of discriminant functions and logistic regression models.

The first metric data on the thicknesses of the soft tissues of the face in the Bulgarian population were collected. For this purpose, head images generated by medical computed tomography were used, allowing measurements to be made digitally between the bone and the skin at specific anatomical points. With this new approach, extremely detailed data on soft tissue thicknesses in different areas of the face are obtained. Body weight and gender were found to influence soft tissue thickness. Normal and overweight groups were compared, which is relevant to medical anthropology.

2. *Evaluation of the reliability and accuracy of digital methods for data collection of osteological studies.*

The reliability and accuracy of measurements performed on 3D skull models generated by laser scanning, as well as measurements performed on digital radiography images generated with an industrial CT scanner, were investigated. The assessment of the reliability and accuracy of metric measurements is a key factor for reliability of the obtained results when conducting morphometric studies on digital bone images. The influence of the resolution and texture of 3D models generated by laser scanning on the reading accuracy of standard craniometric points was evaluated. Through digital morphometric analysis, the influence of skull position on the dimensions of the frontal sinus in digital radiography was investigated and the range in which reliable measurements were obtained was established.

3. *Study of anatomical variations.*

Different anatomic variations of the skull were investigated, and for each variation the etiology and possible clinical consequences were discussed. Through measurements on a series of skulls with persistent metopic suture, a number of original data were obtained with statistically significant differences in skull size and shape compared to controls. The relationship between the presence of a metopic suture and other anatomical variations in adult individuals was investigated using data mining methods, with metopic skulls showing more frequent extra bones.

Project funding is a strong point in Dr. Toneva's scientific research activity. She is the coordinator of 1 project and a participant in 3 projects funded by the National Research Institute for which more than BGN 600,000 was allocated. These projects are in the field of virtual anthropology and are characterized by high innovative potential, such as creating a virtual anatomical collection. She was a young scientist-leader of a project under the Program to Support Young Scientists at the BAS and a participant in the target group of a project funded by the OP "Development of Human Resources."

The candidate showed strong expert activity - she has reviewed 22 articles, 16 of which are for international publications indexed in WoS and SCOPUS. She is a member of the European Anthropological Association and the Bulgarian Anatomical Society.

Dr. Toneva is a winner of the prestigious award "Prof. Dimitar Kadanov" of the Bulgarian Anatomical Society (BAS). She was awarded the best poster at the XXV National Congress of BAD in Pleven, 2021.

Conclusion: Based on the materials presented in the competition, I find that assistant professor Diana Hristova Toneva, PhD is a talented scientist, a specialist in the field of anthropology and human anatomy. As a results of her research, fundamental and applied scientific contributions have been generated that are of significant importance to biomedicine and forensic medicine. The candidate conducts interdisciplinary scientific research with medical doctors, mathematicians and specialists in computer technologies, which corresponds to the most modern trends in the development of anthropology. With the use of artificial intelligence, she developed a new trend in IEMPAM - virtual anthropology and was the winner of a prestigious BAD award. Dr Tonevs has high scientometric indicators that exceed the criteria in the Regulations of IEMPAM-BAS for obtaining the academic position "Associate Professor". The candidate has a significant contribution to the project financing. It is also distinguished by active expert activity. I believe that Assistant Professor Dr. Diana Toneva fully meets the requirements of the National Academy of Medical Sciences and the resulting regulations (of BAS and IEMPAM) for holding the academic position of "Associate Professor" in the specialty "Anthropology" in the Department "Anthropology and Anatomy" at IEMPAM-BAS. All this gives me sufficient grounds to convincingly recommend to the Scientific Jury to vote positively for the proposal to the Scientific Council of IEMPAM, Assistant Professor Dr. Diana Hristova Toneva to be promoted into "Associate Professor" in the scientific specialty "Anthropology" (01.06.01), Professional Field 4.3. Biological Sciences.

26.09.2022

Sign: 

(Prof. Nina Atanassova, DSc)