

Review

Prepared by:

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Concerning:

A competition for the academic position "Docent" (Associate Professor) in Scientific field 4. "Natural sciences, Mathematics and Informatics", Professional field 4.3. "Biological Sciences" and Scientific specialty "Anthropology" (01.06.01) for the needs of the Section of Anthropology and Anatomy at the Institute of Experimental Morphology, Pathology and Anthropology with Museum, BAS (IEMPAM-BAS), announced in the State Gazette no. 43/10.06.2022 and by the order of the Director of IEMPAM-BAS No. RD-09-34/28.06.2022.

Participant who submitted documents for the competition: **Diana Hristova Toneva, PhD** - Chief Assistant Professor in the Section of Anthropology and Anatomy at IEMPAM-BAS.

The review was prepared in accordance with the Law for the Development of the Academic Staff in the Republic of Bulgaria (LDASRB), the Rules for the Implementation of LDASRB and the Rules for the Terms and Conditions for Acquiring Scientific Degrees and Academic Positions at IEMPAM-BAS.

Biography and career development

Dr. Diana Hristova Toneva has a Master's degree in General Anthropology, majoring in Biology at Sofia University "St. Kliment Ohridski". The degree was obtained after a successfully defended diploma thesis on the topic "Paleoanthropological study of a series of postcranial skeletons from the medieval necropolis of the city of Druster /IX-XV centuries/" in 2003. In 2006, Dr. Toneva enrolled as a full-time doctoral student at IEMAM. In 2009 she was appointed as a specialist biologist at the same institute. In 2010, Dr. Diana Toneva obtained the educational and scientific degree "Doctor" in the scientific specialty "Anthropology" after a successfully defended dissertation (PhD thesis) on the topic "Anthropological characteristics of the sternum, clavicle, scapula and the proximal end of the humerus and evaluation of their sex differences". In 2011 Dr. Toneva was appointed to the position of Assistant Professor in IEMPAM, and in 2012, after a competition, she obtained the position of Chief Assistant Professor at the same institution.

Dr. Diana Toneva is a member of the Bulgarian Anatomical Society and the European Anthropological Association.

Research activity evaluation

Dr. Diana Toneva has 13 years of experience in the specialty, certified by a document from the institute, of which 10 years as a Chief Assistant Professor. According to the submitted documents, Dr. Toneva is the author of a total of 68 publications in Bulgarian and foreign journals and 71 participations with posters and oral presentations at scientific events in this country and abroad. The analysis of the scientometric indicators of Dr. Diana Toneva's publications shows the following: total impact factor (IF) of the publications - 28.528, individual IF - 6.706, SJR - 12.633. According to data from the Scopus, Dr. Toneva's scientific publications were cited 85 times in international journal. The citation index (h-index) of Dr. Toneva is 5 according to data from Scopus and 7 according to data from Web of Science.

For the current competition according to the groups of indicators for minimum requirements of IEMPAM, Dr. Toneva submitted an abstract for the acquisition of the ONS Doctor (2010), a list of 19 publications after the acquisition of the ONS Doctor (2012-2022), a published book chapter (2018), a list of 71 participations in scientific forums, a list of 40 citations of publications, and a list of participations in 6 projects.

Dr. Toneva's research interests are in the field of forensic anthropology, virtual anthropology and macroscopic anatomy of the human cranial bones and soft tissues of the face. Through the application of classical and modern imaging techniques, she has conducted numerous studies of a theoretical and applied significance. Much of the research has been carried out on images obtained via diagnostic and industrial computed tomography, as well as by surface laser scanning. A major focus of the publications on cranial bones has been the development of methods for sex determination. Through the use of computed tomography images, methods for determining biological sex based on metrical features of the skull have been developed for the use in forensic practice in the identification of skeletal remains. The methodologies were developed by applying both classical statistical analyzes and approaches from the field of machine learning. For the first time in Bulgaria, a study was conducted in which subsymbolic algorithms were applied for the development of methods for determining the biological sex of bony remains [1]. The resulting gender classification models reach an extremely high accuracy of over 95%. Models have been developed to determine the gender according to the size of the so-called "mastoid triangle" [2], as well as the size and shape of the foramen magnum [3]. A new approach has been proposed to calculate the area of the foramen magnum based on 3D coordinates of a series of intermediate points [3]. In the study

of head images obtained by diagnostic computed tomography, the first metric data on the thicknesses of the soft tissues of the face in the Bulgarian population were obtained. These data may just as well find a practical application in cranial soft tissue reconstruction techniques. Differences between individuals of both sexes have been found in certain areas of the face [4]. An approach has been proposed to calculate soft tissue thicknesses by using polygonal models obtained by segmentation of cranial bone tissue and facial skin [5]. Morphological changes in the structure of cranial sutures in the process of age-related obliteration were studied on high-resolution three-dimensional images of sagittal suture fragments obtained by micro-computed tomography [6].

An important part of Dr. Toneva's research is aimed at the comparative analysis of the accuracy of measurements performed on 3D skull models generated by surface laser scanning [7, 8]. Through digital morphometric analysis, the influence of the position of the skull on the dimensions of the frontal sinus in digital radiography was investigated and the range for the most reliable measurements was established [9].

Along with the determination of a number of metric indicators, Dr. Toneva has conducted numerous studies on different anatomical varieties of the skull such as the absence of foramen spinosum [10], the presence of additional bones in the occipital squama [11], the bipartite condyle of the mandible [12], metopic skulls with the presence of multiple Wormian bones organized in a mosaic pattern [13], the presence of a bregmatic Wormian bone [14], and cases of prematurely closed squamous suture [15]. Interesting and original results were obtained by studies of a series of skulls with a persistent metopic suture [16, 17, 18, 19]. The relationship between the presence of a metopic suture and other anatomical variations has been investigated by applying data mining methods [16].

For her significant scientific achievements and publication activity in the period 2019-2021, Dr. Toneva was awarded the "Prof. Dimiter Kadanov" award of the Bulgarian Anatomical Society. She also received an award for the best poster presentation at the XXV National Congress of BAS - Pleven in 2021.

Project and expert activity

Dr. Diana Toneva has provided a list of participations in 6 scientific projects - 4 at the Bulgarian National Science Fund of the Ministry of Education and Culture, 1 project at the BAS and 1 project under the Operational Program "Development of Human Resources". In two of the projects, Dr. Toneva is the leading researcher.

The active expert activity of Dr. Toneva is evident in the significant amount of prepared reviews for a number of Bulgarian and foreign journals: Acta Morphologica et Anthropologica, BMC Musculoskeletal Disorders, Journal of Forensic Radiology and Imaging, Legal Medicine, Forensic Imaging, Journal of Forensic and Legal Medicine, Computational and Mathematical Methods in Medicine.

CONCLUSION

From the analysis of the presented documents, it is clear that Dr. Diana Toneva meets the mandatory requirements for the academic position "Docent" (Associate Professor) according to the LDASRB and the Rules for the Terms and Conditions for Acquiring Scientific Degrees and Academic Positions at IEMPAM-BAS.


Groups of indicators	Content	Docent, IEMPAM	Diana Toneva, PhD
A	Indicator 1	50	50
B	Indicator 2	-	-
B	Indicator 3 or 4	100	100
Г	Sum of indicators 5-10	220	262
Д	Indicator 11	60	80
E	Sum of indicators 12-20		
Total points		430	492

The high scientific activity of Dr. Diana Toneva is evident from the documents submitted for the competition. She is the first author in a significant number of the presented publications and conference papers. Dr. Toneva shows consistency in his career growth, covers the necessary scientometric indicators and the years of experience in the specialty.

Based on all the above, I confidently give my **positive assessment** and recommend to the members of the Scientific Jury to vote **positively** and award the **Academic position "Docent"** (Associate Professor) to **Diana Hristova Toneva, PhD** - Chief Assistant Professor in the Section of Anthropology and Anatomy at IEMPAM-BAS.

29.09.2022 год.

Sofia

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