

**SOFIA UNIVERSITY "St. KLIMENT OHRIDSKI"**  
**FACULTY OF CHEMISTRY AND PHARMACY**

**OPINION**

By Prof. Ilya Simeonov Prokopov, Ph.D., D.Sc.

on the habilitation work of Boyka Kuncheva Zlateva based on archeometry analysis of metals - belt accessories and coin hoards from different eras reflected in 5 publications in the held competition announced on the basis of art. 4 of the Law on the Development of the Academic Staff in the Republic of Bulgaria and Competition, SG No. 100 dated 16.12.2022 for the occupation of an academic position of half-time associate professor in professional direction 4.2. Chemical Sciences (Analytical Chemistry – Archaeometry).

In the competition for a docent, only one candidate applies - chief assistant Boyka Zlateva, Ph.D., lecturer at the Faculty of Chemistry, SU "St. Kliment Ohridki", Department of Analytical Chemistry. The candidate is a co-author in 44 scientific publications, and for holding the academic position of "associate professor" he participate in 18 publications, mostly dedicated to archeometry analysis of archaeological finds of different types and time distribution.

The habilitation work provided for opinion covers five publications dedicated to archeometry analysis of archaeological objects. Two of the articles reflect analyzes of belt accessories from Late Antiquity and three of the coins from three different eras. A detailed historiographic review was prepared and the specifics of the specific archaeological materials were reflected. To carry out the archeometry analyses, the author has prepared a specialized work methodology in accordance with the characteristics of the materials. In order to comply with the legal requirements regarding the admissibility of destruction, an appropriate research method was also chosen. All activities are coordinated with partner archaeologists and numismatists.

Given the interdisciplinary nature of the habilitation work, in my opinion, I will reflect on the part relating to archeology and numismatics. The classic methods of researching archaeological and numismatic objects allow extracting information up to a certain optimum or maximum depending on a specific case. In the archeometry analysis carried out and published by the author Boyka Zlateva, the following additional information obtained above the threshold of traditional methods of scientific research can be ascertained:

- Precise elemental composition of the object;
- Chemical composition of the patina and mechanical heterogeneous decals;

- Composition of elements of the detection medium (ceramics, mortars, metal residues, slags, etc.);
- Picture of the original composition based on comparisons of the studied materials;
- Statistical and cluster analysis and levels of deviation and eligibility are understandable to humanities specialists.

In the first group A: articles No. 1 and No. 7 are devoted to analyzes of belt accessories from the period III-VII centuries. They have a good territorial scope of archaeological artifacts. They cover almost the entire territory of the country except for the southwestern part. The data obtained from the archeometry analyses create prerequisites for building an information bank to support the work of archaeologists and conservator-restorers. This will allow them to have criteria for the exact composition of the artifact and the patina. For archaeologists to understand and consider the type of original alloy of the article, the manufacturing technology, and the burial time. Boyka Zlateva's work also provides direct support to conservators-restorers for making the most correct decision for conducting the CR activities, taking into account the natural conditions of the environment such as temperature, humidity, acidity, presence of microorganisms, groundwater, and a number of others reportable and definable. The materials studied are utilitarian, and the elements of non-ferrous metals, especially massive and decorated, were expensive and were kept and used for a long time. For archaeologists and historians, the results of archeometry analyses play the role of important landmarks and arguments for probable centers of production and duration of use.

The second group C: articles No. 2, No. 4, and No. 42. Chronologically they cover two eras. The first is 6-4 centuries BC. and is reflected in article No. 4. There are a number of disputes in world science on important questions about technological achievements in early epochs. One of these particular issues of discussion is associated with the earliest coinage and bullion based on the mixture of gold and silver known as electron (electric). The author lays the foundation for the research in us of the elemental composition of a large group of electronic coins of Cyzicus, Mytilene, and Eritras, which have important importance for the history of Thrace and the South-Eastern Mediterranean for the period 6-4 centuries BC. The results are reflected in a publication in an international publication. (B-Coins, No. 4). The work on this topic continues under an international project ("Ancient Thrace in numbers: a reassessment of Antiquity in the digital age", at the National Institute of Scientific Research, contract No. p. Yu. Tsvetkova) with analyzes of coins and objects with a clarified archaeological context or place of discovery. Through Boyka Zlateva's research, Bulgarian scientists are included in this discussion. The results of RFA of electronic coins and objects provide grounds for

rejecting the traditional thesis about the natural nature of the alloy of gold and silver mined around the city of Sarti in Asia Minor. Boyka Zlateva's results show large deviations in the proportion of metals in the coins, and in some cases, additional enrichment with a higher sample of gold only on the surface layer. This archeometry study of electronic objects is, in my opinion, an important contribution.

The two articles under No. 2 and No. 42 deal with coin hoards and coins of the Roman era. Similar to the topic reflected in the articles from the "first group A" here, too, we are talking about voluminous material. Coinage in the Roman era was brought to a perfect organization involving the use of water- and animal-powered machines. It should also be noted the huge market for metals, which allowed them to be supplied from all parts of the empire. After the mines of the Iberian Peninsula were exhausted, Thrace became one of the new main mining centers. This takes place during the Severian Dynasty. Obtaining new information of primary importance not only for national history is a serious scientific contribution. The creation of benchmarks for orientation and an effective methodology for conducting the archeometry analyses is a task that Boyka Zlateva has handled excellently. An excellent foundation has been laid in this complex area as well, where thousands of silver coins are expected to be analyzed. Scientific contribution!

Another particularly important topic in international archaeological and numismatic research is related to the counterfeiting of archaeological objects and ancient coins. The danger of contamination of the historical environment is of high importance and hinders the scientific activity and the work of all museums in the world. By participating in a workshop with students and doctoral students and with the assistance of leading world scientists conducted in connection with an international research project (ACCS Network\_26-11-2020 at the Alexander von Humboldt Foundation with scientific supervisor Prof. D. Boteva, Ph.D.) Boyka Zlateva contributed to defining important criteria when authenticating coins. The RFA carried out by her categorically allowed them to determine fakes of very high quality by differences in the metal alloy.

The problem of confirming the elemental composition is becoming more and more relevant in the work of numismatic offices in Bulgarian museums. Bulgaria is a world leader in the number of counterfeiting workshops and methods of counterfeiting coins

and expensive objects. Especially from gold and gold alloys. In addition to the application of the usual methods such as attribution, stylistic analysis, metric data, and visualization, it is urgently necessary to include categorical data from archeometry analyses showing the elemental composition. Boyka Zlateva performed the first analysis of one of the largest treasures of gold staters stored in the Plovdiv Regional Archaeological Museum (According to the above-cited project at the FNI).

**Conclusion:**

Regarding the scientometric data (group A 50 points, group B 110 points, group D 244 points, group D 230 points, group G 180 points, the last indicator being part of the additional requirements of the Faculty of Chemistry and Pharmacy) the candidate meets and exceeds the minimum requirements of the law on the development of the academic staff in the Republic of Bulgaria (ZRASRB) for acquiring the academic position "docent" in the Faculty of Chemistry and Pharmacy at SU "St. Kliment Ohridski".

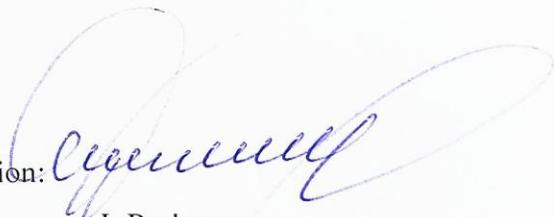
After I got acquainted with the presented habilitation work, the overall scientific production, and the participation in international and national scientific projects, as well as with the finding that the candidate meets the minimum national requirements and those recommended in the PHCHF at SU "Kliment Ohridski", I confidently and convinced state:

all the requirements of the Chief Assistant, Dr. Boyka Kuncheva Zlateva, to be awarded the academic position of "docent" in professional direction 4.2. Chemical Sciences (Analytical Chemistry – Archeometry) are met.

Sofia

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Prepared the opinion:

  
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