OPINION

From assoc. prof. Ivan Iliev, PhD, IEMPAM-BAS, according to № RD-15-121 from 19.07.2022 of the Director of IEMPAM – BAS.

About: the evaluation of the PhD thesis of doctor student Angeliki Nikolaos Konstantinidou, titled: „Optimization of the production of biologically active substances from bacteria and algae and evaluation of their potential action as antitumor agents in *in vitro* experiments", for the educational and scientific degree "PhD" for scientific specialty „Biochemistry" with code 01.06.10

The PhD thesis presents original scientific research on current problems related to the search for new natural products with antitumor effects and optimizing the conditions of their production. Specifically, the work covers the cultivation of microorganisms and red algae under *in vitro* conditions. Isolation, purification and characterization of biologically active glycolipids and exopolysaccharides. The obtained natural products have been tested under *in vitro* conditions to establish their antitumor activity and level of safety. The relevance of the developed scientific problem is a consequence of the increasing manifestations of unwanted side effects on human health and quality of life from the chemically synthesized cytostatics applied as standard in medical practice.

The dissertation submitted for evaluation contains 95 pages and is carefully arranged, well illustrated and structured in the standard sequence with the necessary sections for a dissertation. The literature review on the topic is 17 pages long and shows knowledge of the scientific problem. The aim is formulated briefly and clearly, which shows a high level of understanding of the problem. The set tasks were describe in 6 points and are logically formulate in relation to the purpose of the dissertation work. In the "Materials and methods" part, the used microorganisms and red algae - producers of biologically active substances, the methods, media and substrates for their cultivation were successively presented. Methods for isolation, purification and characterization of the obtained biological products were described. The system for testing biological activity, under in vitro conditions, including two tumor cell lines and a healthy tissue model (control, non-tumorigenic cell line) was also well described. All described methods and

modern equipment are correctly selected for the performance of the assigned tasks. In the "Results and discussion" section, which is on 40 pages, the obtained results are well described and appropriately illustrated with graphs, diagrams and photomicrographs. The discussion follows the presented data and is in good agreement with the results described and the literature sources used (total 124). The obtained results were summarized in 13 conclusions. Seven contributions were also formulated. As a result of the scientific work on the dissertation, two articles were published in journals indexed in the world databases SCOPUS and Web of Science. The results were presented at 3 scientific events in the country.

The dissertation is indicative of precision, mastery of a wide range of biochemical, microbiological and cytological methods and the ability to work in a team. These are prerequisites for building a promising, young scientist.

My recommendation is to increase the quality of figures 2 and 9.

The summary of the thesis (Abstract) in a volume of 56 pages is a short version of the dissertation and covers the main sections without the literature review and meets the requirements.

In conclusion, it can be summarized that the presented dissertation work is a valuable scientific study. The set experimental tasks were correctly performed, which is evident from the obtained results. The two published scientific articles on the subject of the dissertation are proof of the high level of the scientific research carried out.

I do believe that all the requirements of the law and the rules in the Institute IEMPAM, Bulgarian Academy of Sciences where the thesis is realized, are covered. My vote to the presented PhD thesis „Optimization of the production of biologically active substances from bacteria and algae and evaluation of their potential action as antitumor agents in *in vitro* experiments“ is positive or "YES" to be given the educational and scientific degree "PhD" to the doctoral student Angeliki Nikolaos Konstantinidou.

26.07.2022

Signed: 

/Assoc. Prof. Ivan Iliev, PhD/