



REVIEW

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member of the Scientific Jury on the basis of Order № 311C-202/13.04.2024 to the Rector of Forestry University, Sofia, regarding participation in:

competition for the academic position "Docent" in "Animal Pathology", field of higher education 6. Agricultural sciences and veterinary medicine, professional direction 6.4. Veterinary medicine, announced in the State Gazette, No. 18 of March 1, 2024. Code of the procedure: VM-AsP-0224-126.

A candidate in the announced competition is Ch. assistant Dr. Georgi Stoichev Popov, from the "Internal non-infectious diseases, pathology and pharmacology" department of the Faculty of Veterinary Medicine at the Forestry University, Sofia.

• **Brief biographical data.** The candidate in the announced competition for associate professor in the scientific specialty "Animal Pathology", chief assistant Georgi Stoichev Popov was born on August 3, 1990 in Gotse Delchev. He completed his secondary education at a natural and mathematical high school in 2009 in his hometown, with a profile in natural and mathematical sciences. He received his higher education at FVM, Forestry University, Sofia, majoring in Veterinary Medicine in 2015. After successfully passing the competitive exam in 2016, Dr. Popov started working as a full-time assistant in the Department of "Internal Non-Communicable Diseases, Pathology and Pharmacology", at the Faculty of Veterinary Medicine of the university where he graduated.

In 2018, he was enrolled in a doctoral course of self-study in the doctoral program "Animal Pathology", professional direction "Veterinary Medicine". After completing the individual study plan, he was awarded the right to defense by a decision of the FS of the FVM

from 2019. In the same year, he successfully defended a dissertation on the topic "Pathomorphological and pharmacological studies on the protective effect of biologically active substances from medicinal plants", for which he is awarded Educational and Scientific Degree "Doctor". Conducts practical classes in the disciplines "General Pathology" and "Special Pathological Anatomy".

• **Description of the materials for participation in the contest.** According to the rules for the development of the academic staff of the Forestry University, Sofia, the documents and materials I received for preparing a review fully correspond to the requirements. For participation in the announced competition, Dr. Popov submits a list and copies of materials certifying the existence of a total of 14 scientific publications after being awarded the title of "Doctor" and holding the title of "Chief Assistant".

He is the author of 1 published book based on a protected dissertation work for ONS "Doctor" - "Pathomorphological and pharmacological studies on the protective effect of biologically active substances of species of the genus *Astragalus*" (ISBN 978-619-92707-0-7) and a monographic work "Pathoanatomical Characterization of Poisonings in Domestic Animals" (ISBN 978-619-90789-9-0). Of course, all the normative documents according to the requirements are also attached to the set of materials (diplomas for a completed higher education, for a scientific degree, information on pedagogic and academic teaching activities, etc.).

• **General description of the applicant's activity.**

Research activity. Dr. Popov applied for the academic position "Associate Professor" with 16 scientific works, one of which, as mentioned, is a book derived from a protected dissertation work, one monograph and 14 scientific publications in publications that are referenced and indexed in world-renowned databases data with scientific information (Scopus and Web of Science).

The monograph "Pathologoanatomic characteristics of poisonings in domestic animals" summarizes data on the pathogenesis, clinical appearance, pathological findings and diagnosis of some poisonings in domestic animals. It is based on 177 scientific sources and nearly ten years of scientific experience of the author in this field. Known and new data concerning some aspects of toxicological effects at the cellular, tissue and organ level are interpreted. The focus of this work is the macroscopic and microscopic pathological changes in the investigated manifestations of various intoxications.

In the book "Pathomorphological and pharmacological studies on the protective effect of biologically active substances of species of the genus *Astragalus*" and some established and widely used models of intoxication in various *in vitro* and *in vivo* experimental setups are presented. Based on the pharmacological and pathomorphological effects in the state of intoxication, the protective properties of two flavonoids isolated from *Astragalus monspessulanus*, purified saponin fraction and a mixture obtained from *Astragalus glycyphyllos* and *Astragalus glycyphylloides* were characterized. 62 author's photographs at the macro- and microscopic level were used for visualization.

The predominant part of the scientific publications are grouped in the direction of patho-anatomical and pharmacological studies on the action of various plant substances. In an *in vivo* model of experimentally induced type 2 diabetes on spontaneously hypertensive rats, a purified saponin mixture (PSC) from *A. glycyphylloides* has been shown to improve the glycemic, hepatic and antioxidant status of the animals. Through *in silico* methods, it is established that PSCs can be a source of potential lead structures for PPAR γ -mediated prevention and treatment of metabolic syndrome [Publ. №2: Al Sharif et al., 2019].

Neuroprotective and antioxidant effects *in vitro* of a purified saponin mixture obtained from *Astragalus glycyphylloides*, comparable to that of silybin, were found in a 6-OHDA intoxication model [Pub. №3: Kondeva-Burdina et al., 2019].

The *in vitro/in vivo* antiproliferative/antitumor activity of a purified saponin mixture (PSM) obtained from *Astragalus glycyphyllos* was evaluated. The viability and proliferative activity of Graffi myeloid tumor cells was assessed by MTT assay. Morphological changes were analyzed by fluorescence microscopy after double intravital staining. An *in vivo* hamster model, with induced Graffi tumor, was used to study the influence of PSM on transplantability, tumor growth, survival and mortality, as well as to follow pathomorphological changes. Treatment with PSM was shown to induce a statistically significant decrease in the viability/proliferation of Graffi tumor cells, with these effects being concentration- and time-dependent. The fluorescence microscopy used demonstrated antiproliferative effects that were associated with the induction of apoptosis. It is concluded that PSM exhibits *in vitro/in vivo* antiproliferative/antitumor effects [Publ. №4: Georgieva et al., 2021].

In another study, *Sophora japonica* fruit extract (FSE) was shown to potentiate the repair of affected bones in a manner similar to zoledronic acid (ZA) in New Zealand white rabbits in a state of experimentally induced osteoporosis by ovariectomy. FSE has been found to stimulate osteoblastogenesis and bone formation by maintaining calcium-

phosphorus homeostasis and by increasing bone mineralization. Based on the results of an in silico study, it is suggested that the binding affinity of the FSE constituents, genistin and daidzin, to estrogen receptors (ER) may also account for the estrogen-enhancing effects of *Sophora japonica* fruit extract [Pub. №7: Chakuleska et al., 2022].

The in vitro and in vivo antioxidant and hepatoprotective effects of alcesefoliside (AF) obtained from *Astragalus monspessulanus* have been established for the first time. AF was shown to possess antioxidant activity in an in vitro model of Fe²⁺/AA-induced lipid peroxidation in isolated liver microsomes and in vivo hepatoprotective activity against CCl₄-induced liver injury in rats. Based on its phenolic nature, AF has been shown to be able to stabilize free radicals through electron donation and thereby maintain the integrity of the hepatocyte membrane and prevent the entry of toxic substances or xenobiotics. Moreover, the investigated substance, similar to silymarin, can also affect intracellular glutathione, which prevents lipid peroxidation of membrane structures [Publ. №8: Kondeva-Burdina et al., 2022].

In other works, it was established that the total inhibitory activity on the human recombinant MAO-B (hMAO-B) enzyme of the 2,5-disubstituted 1,3,4-oxadiazoles 3a-3k and hydrazone analogs 5a-5m [Pub. №10: Karabelyov et al., 2023]; in vitro/in vivo the defatted extract and phenolic fraction of *Phlomis tuberosa* did not lead to hepatotoxicity and possessed hepatoprotective properties administered alone and in a model of metabolic bioactivation induced with carbon tetrachloride (CCl₄), respectively [Pub. №11: Kondeva-Burdina et al., 2023]; mauritianin obtained from the aerial parts of *Astragalus monspessulanus* subsp. *monspessulanus*, in in vivo experimental setups, by self-administered and in a tetrachloromethane (CCl₄) intoxication model, has hepatoprotective, neuroprotective and nephroprotective effects [Publ. №12: Manov et al., 2023].

Another group of scientific publications is united in the direction of clinical-morphological studies on infectious and non-infectious diseases in domestic and captive animals. A case of diffuse unilateral seminoma in a dancing Eurasian brown bear (*Ursus arctus*) is described [Pub. №5: Popov, 2021]. It has been shown, on the basis of postmortem histological examination, that the adrenal gland of an adult male brown bear (*Ursus arctus*) possesses communities of endocrine cells in the capsule, which has only been described in the adrenal gland of a horse, [Publ. №6: Sapundzhiev et al., 2021]. Through pathomorphological, imaging and microbiological studies, lobular exudative pneumonia and zonal interstitial fibrosis with supramiliary calcifications and single extensive ossified areas were found in a 58-year-old female Indian elephant (*Elephas maximus indicus*) kept in a zoo [Pub. №13:

Popov et al., 2023]. On the basis of retrospective histological studies of oral lesions in dogs and cats for the period 2018 - 2022, it was found that neoplastic formations predominated, with the ratio between benign and malignant being approximately equal. [Pub. №14: Popov, 2024].

Several of the scientific developments lead to the formation of contributions having a confirmatory nature. Pathomorphological changes were found in the heart, lungs and kidneys in dogs with high-grade cardiac dirofilariasis. [Publ. №9: Rafailov et al., 2022].

Last but not least, works that have a scientifically applied nature should also be mentioned. These are works reflecting pharmacological and pathological anatomical studies with biologically active substances of plant origin, proving a well-expressed protective activity. An opinion was expressed that they represent a prerequisite for the development of phytoproducts in the future and their application in humane and veterinary-medical practice [№№1-3; №5, №8-13, №15, №33].

The candidate in the competition has participated in 4 scientific research projects at the university level. There are 18 reports in scientific forums, presented in 9 oral presentations and 9 posters, respectively.

Teaching activity. The direct obligations of Ch. Assistant Professor G. Popov are connected with the implementation of a practical course in the disciplines "General Pathology" and "Special Pathological Anatomy", where he also participates in the development of an up-to-date curriculum for students in Bulgarian and English. A report on annual classroom occupancy of 360 teaching hours is presented. 8 years of teaching experience are indicated.

• **Reflection of the candidate's scientific works in the literature.** From the presented references for scientometric indicators, it is clear that from publication activity the candidate received a total impact factor of 24.115 from 10 scientific papers, all of which were published in international editions. In 4 of the publications in connection with the competition, he is an independent author, and in the rest he is a co-author of the following positions. Dr. Popov presents a list of a total of 19 citations, 17 of which are in refereed journals in Web of Science and Scopus.

• **Conclusion.** Analyzing the scientific research and educational teaching activity based on the presented scientific productivity, references to reflect the contributions from publication activity and academic employment of the candidate, I believe that they are in accordance with the requirements of the law on the development of the academic staff in the Republic of Bulgaria, the rules for its application and the criteria of the Faculty of Veterinary Medicine at the University of Forestry, Sofia (appendix 8) for acquiring the relevant academic position under this competition.

In this regard, I propose to the respected members of the scientific jury to join the conclusion of my review to form a proposal before the Faculty Council, regarding awarding the academic title "Docent" in "Animal Pathology", to ch. assistant Dr. Georgi Stoichev Popov, from the "Internal non-infectious diseases, pathology and pharmacology" department of the Faculty of Veterinary Medicine at the University of Forestry, Sofia.

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Prof. I. Dinev:

