

## SCIENTIFIC OPINION

from Prof. Antoaneta Borissova Trendafilova-Savkova, PhD, Institute of Organic Chemistry with Centre of Phytochemistry, BAS, regarding the materials submitted for participation in a competition for the academic position of "Associate Professor" in the Institute of Microbiology "Stephan Angeloff" – BAS (IMicB-BAS) in the scientific field **5. Technical Sciences**, scientific specialty **5.11. Biotechnologies (Technology of biologically active compounds)** for the needs of Biotechnology Department, Laboratory of Metabolomics, IMicB-BAS.

### 1. General presentation of the procedure and the applicant

The competition for the academic position of "Associate Professor" in IMicB-BAS has been announced in the State Gazette, issue 12 /12.02.2021. My participation in the Scientific Jury is in accordance with order № I-31 / 29.03.2021 of the Director of IMicB - BAS. For participation in the competition documents are submitted by one candidate – Dr. Andrey Marchev, Assistant Professor in IMicB-BAS. The full set of documents presented by Dr. A. Marchev was in full agreement of the Regulation for the development of the academic staff at IMicB-BAS and corresponded to the criteria of IMicB-BAS for occupying the academic position "Associate Professor".

Dr. Andrey Marchev completed his Master's degree in Biotechnology in 2006 at the University of Food Technology, Plovdiv. He successfully defended his dissertation thesis in 2014 for obtaining the educational and scientific degree "Doctor" at IMicB - BAS. In 2012 he started working at IMicB - BAS initially as an Assistant (2012-2015), and since 2015 he has been an Assistant Professor. He was also appointed as an Assistant Professor at the Centre for Plant Systems Biology and Biotechnology, Plovdiv in 2017.

The candidate is a participant in many research projects and a project leader of three of them. Specializations in renowned international institutions have contributed to a significant increase in his qualifications. The results of his research are the subject of a total of 49 publications in international specialized journals (including 1 utility model) with a total IF 86.83, and 271 observed citations. The professionalism of Dr. A. Marchev is evidenced by the award for excellent project management under the program "Support for Young Scientists" of the Ministry of Education and Science and the Bulgarian Academy of Sciences, as well as his nomination for the prestigious Pythagorean Prize in 2016 in the category "Young Scientist". Dr. A. Marchev is a member of the organizing committee of 3 international conferences, a member of the Board of the Bulgarian Phytochemical Society and a reviewer of numerous articles in scientific journals

### 2. Fulfilment of the requirements for holding the academic position "Associate Professor"

To participate in this competition, Dr. A. Marchev presented **43** scientific papers with a total impact factor of **83.18** and h-index **9**, with which the candidate meets and exceeds the minimum national requirements under the Development of Academic Staff in the Republic Bulgaria Act as follows:

**Group A - 50 points** (required **50**): PhD Thesis" Biologically active compounds from rare Bulgarian *Salvia* species and their *in vitro* cultures"(2014) for obtaining the educational and scientific degree "Doctor" in scientific field 4.3. Biological sciences, scientific speciality: 02.11.11. Technology of biologically active compounds at IMicB - BAS.

**Indicator 4 in the group V - 102.74 points** (required **100**): 10 publications (5-Q1, 4-Q2 and 1-Q3) in international scientific journals with high impact factor, published between 2016 and 2021. Dr. Marchev is the first or corresponding author in four of them.

**Indicators 7, 8 and 9 in the group G – 202.70 points** (required **200**): 17 publications in referenced and indexed scientific journals (8-Q1, 2-Q2, 2-Q3, 1-Q4 and 4-without Q), 11 publications – in non-indexed journals with scientific review, as well as 4 book chapters. Dr. Marchev is the first or corresponding author in 13 of them.

**Indicator 12 in the group D – 2190 points** (required **50**): It is impressive the number of citations of the scientific publications (219) of Dr. A. Marchev, included in the competition for Associate Professor, which are available in the database with scientific information Scopus.

**Indicators 18, 19, 20, 22 and 26 in the group E – 216 points**: In this group the candidate has accumulated 216 points from his participation in national scientific or educational projects (70 points), in international projects (40 points), as a leader of scientific projects (60 points), as well as in the development of a utility model (40 points).

Dr. A. Marchev significantly exceeds the additional criteria for academic growth according to the Regulation of IMicB-BAS in terms of publications (43 with a minimum of 20), citations (219 with a minimum of 100), IF (86.63 with a minimum of 20), h-index (9 with a minimum of 5) and participation in research projects (12 with a minimum of 3).

### **3. Research work and the most important contributions**

The research work of Dr. A. Marchev is focused in the following modern scientific areas: plant biotechnology (biosynthesis of biologically active compounds *in vitro*), chemistry of natural compounds and metabolomics (identification and quantification of active compounds in plant extracts) and pharmacology (biological activity and mechanisms of action of extracts and pure substances). Plant biotechnology is a promising alternative for obtaining valuable plant metabolites with high yield and constant quality through selection of highly productive lines and optimization of cultivation conditions. In this field the candidate has significant scientific and scientific-applied contributions such as the development of a protocol for genetic transformation of *Verbascum eriophorum* (publ. 22), *V. nigrum* (publ. 24) and *Salvia rihgens* (publ. 42) with *Agrobacterium rhizogenes*, the initiation of rhizogenic cell suspension culture from the rare and endangered plant *Salvia scabiosifolia* (publ. 31), nutrient medium optimization for hyoscyamine and tropane alkaloids production in diploid and tetraploid *Datura stramonium* L. hairy root cultures (publ. 32 and 29), development of the protocol for obtaining callus cultures from *Fumaria rostellata* as potential producers of isoquinoline alkaloids (publ. 34), investigation of the protopine biosynthesis in *Fumaria rostellata* and *F. officinalis* cell suspensions (publ. 25). The most significant contribution in this research field, both scientific and applied, is the developed utility model for the nutrient medium composition for *in vitro* reproduction of the endangered species *Haberlea rhodopensis*.

Metabolomics is a modern scientific platform that is used to study metabolites in plants, their taxonomic and biochemical differences, to clarify biosynthetic pathways and metabolic markers that correlate with their biological activity, as well as for quality control of raw materials and final products developed on the basis of medicinal plants. The candidate has significant scientific and scientific-applied contributions in this field, which is closely related to the chemistry of natural compounds. Dr. A. Marchev skilfully uses NMR spectroscopy to study the metabolic profiles of medicinal plants and their *in vitro* cultures and to identify their main components - verbascoside in *V. eriophorum* (publ. 22), myconoside and calceolarioside E in *H. rhodopensis*

(publ. 8), *p*-tyrosol, salidroside, rosavin, rosin and rosarin in *R. rosea* (publ. 9), crenulatin in *R. crenulata* (publ. 9), arbutin, aucubin, catalpol and verbascoside in *V. austriaca* (publ. 10), phenolic acids and flavonoids in *N. nuda* (publ. 11) and *C. vulgare* (publ. 14). It should be also noted that some of the methods developed for quantification of the main components in different extracts have not only scientific but also applied significance: in *Fumaria spp* (publ. 30 and 37), *V. austriaca* (publ. 10) and *R. rosea* (publ. 9 and 20), as well as in Bulgarian tomato varieties, apples and plums (publ. 28, 38 and 39). The created analytical platform for the investigation of the phytochemical diversity of different *Rhodiola* species by NMR and HPLC can be very useful for the recognition of their unique metabolites and for quality control of the *R. rosea* based products (publ. 9).

In his research, Dr. A. Marchev did not limit himself only to the *in vitro* cultivation of valuable medicinal plants and elucidation of their metabolic profiles, but also focused on the study of their biological activity and therapeutic potential. Some of the most significant contributions in this area are: studies of fractions containing myconoside and calceolarioside E obtained from extracts of *in vitro* grown *H. rhodopensis* plants on Nrf2 stimulation and their potential for regulation of pathological processes associated with oxidative stress and regulation of cellular homeostasis (publ. 8); the effect of *V. austriaca* extracts and pure arbutin on the survival of neutrophils isolated from murine bone marrow (publ. 10); inhibition of replication of some strains of human alpha herpes virus by using water extract of *Nepeta nuda* ssp. *nuda* (publ. 11); anti-inflammatory activity of *C. vulgare* extract and its main components (publ. 14), the effect of a standardized commercial *Rhodiola* extract on learning and memory processes in naive rats as well as its effects in rats with scopolamine-induced memory impairment (publ. 21); the potential of rosavin and rosarian to modulate TNF-related apoptosis-inducing ligand (TRAIL) as a tool to rescue the resistance to apoptosis in autoimmune diseases and cancer (publ. 19); the potential of salidroside and curcumin, as well as the combination of the two compounds for the treatment of chronic stress and mild to moderate depression due to their pronounced immunomodulatory, anti-inflammatory and antidepressant properties (publ. 15).

## CONCLUSION

The documents and materials submitted by Assist. Prof. Dr. Andrey Marchev meet all the requirements of the Development of Academic Staff in the Republic Bulgaria Act, the Regulations of its implementation, Regulation for the development of the academic staff at IMicB-BAS. From the presented extended habilitation report and scientific publications can be clearly seen the original scientific, scientifically-applied and applied contributions, proving that Assist. Prof. Dr. Andrey Marchev is a scientist with interdisciplinary qualification and experience necessary for the development of research in the unit for which the competition was announced. In conclusion, all this allows me to give a **positive assessment** and to recommend to the Scientific Jury to prepare a report-proposal to the Scientific Council of IMicB-BAS for the selection of Assist. Prof. Dr. Andrey Marchev at the academic position of 'Associate Professor' at IMicB-BAS in the professional field 5.11. Biotechnology (Technology of biologically active compounds).

10.06.2021  
Sofia

Prof. Dr. Antoaneta Trendafilova-Savkova