To
The Chairman of the Scientific Jury,
(Institute of Microbiology "Stefan Angelov" - BAS)

Re: Protocol No. 1 of 12.12.2025
(Date of the- That meeting)

Attached herewith: **Review**
in a competition for the academic position **of Professor**
4.3. Biological Sciences ('Immunology)
announced for the needs of the Department of Immunology, Laboratory of Experimental Immunotherapy, Institute of Microbiology "Stefan Angelov" – BAS, State Gazette, issue 84 of 10.10.2025.

Reviewer: Corresponding Member Prof. Soren Bohos Hayrabedyan
Scientific specialty **Immunology**
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The review was compiled in accordance with the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria, the Regulations for its Implementation and ***the Regulations on the Terms and Procedures for Acquiring Scientific Degrees and Holding Academic Positions at the Institute of Microbiology "Stefan Angelov" - BAS***

REVIEW

IN A COMPETITION FOR OCCUPYING THE ACADEMIC POSITION OF PROFESSOR

AT THE INSTITUTE OF MICROBIOLOGY "STEFAN ANGELOV" - BAS

I. Analysis of the candidate's career profile.

Assoc. Prof. Dr. Anastas Dimitrov Pashov built his career at the intersection between clinical medicine and fundamental immunology. After graduating magna *cum laude from* the Medical Academy in Sofia (1989) and a brief clinical internship, he turned to immunology, defending his dissertation for the degree of Candidate of Medical Sciences (Ph.D.) at the National Center for Infectious and Parasitic Diseases (1995), focusing on the identification and quantitative characterization of pan-leukocyte antigens recognized by newly generated monoclonal antibodies. This early experience with hybridoma technology and immunophenotyping laid the foundation for the central theme of his entire body of work – ***the specificity and repertoire of antibodies.***

Immediately after defending his dissertation, he worked as a postdoctoral fellow at **INSERM U430, Paris** (1995–1996), where he studied the mechanism of action of intravenous immunoglobulin (IVIg) in multiple sclerosis. He completed **a six-year postdoctoral fellowship (2003–2009) at the University of Arkansas for Medical Sciences** (Little Rock, USA), in the laboratory of Prof. Thomas Kieber-Emmons, where Assoc. Prof. Pashov led research on an NIH-funded project on mimotope-based conversion of carbohydrate HIV-1 antigens and developed approaches to the design of tumor vaccines based on carbohydrate mimotopes. Finally, a third stay in Paris (2009–2010, Equipe 16 INSERM UMRS 872 at the Cordelier Center, the laboratory of Prof. Srinivas Kaveri) completes his international profile. In total, Assoc. Prof. Pashov accumulated **about eight years of postdoctoral research experience** in two of the leading institutional environments for immunological research – INSERM (France) and an academic medical center in the United States – which accounts for both the breadth of his methodological repertoire and his extensive international collaborative network.

In parallel with and following his international specializations, Assoc. Prof. Pashov built a stable academic position in the system of the Bulgarian Academy of Sciences. As a Research Associate (1998–2000) and Senior Research Associate, II class (2000–2006), at **the Institute of Biology and Immunology of Reproduction (IBIR),** he conducted research in the field of antibody specificity. Since 2010, he has held the position of Associate Professor at the Stefan Angelov Institute of Microbiology, Bulgarian Academy of Sciences, and **since 2015 he has been leading the Laboratory of Experimental Immunotherapy** – a position combining scientific leadership with organizational responsibility for a research team and infrastructure.

Assoc. Prof. Pashov's research program is centered on the unifying idea of ***a critical reassessment of the concept of antibody specificity*** – an effort to move beyond the rigid paradigm that considers high specificity and high affinity as defining features of antibodies, and instead to investigate the polyreactivity of antigen receptors as an evolutionarily conserved function of the immune system. This program encompasses: (i) the development of tumor vaccines based on carbohydrate mimotopes and the formulation of concepts for polyspecific/polyvalent epitope vaccines; (ii) creation of a bioinformatic approach for the analysis of the antibody repertoire (IgOme analysis) by phage display and peptide microarrays, applied to the detection of biomarkers in glioblastoma, antiphospholipid syndrome and neurodegenerative diseases; and (iii) theoretical contributions to the revision of the idiotypic

network hypothesis as a conceptual framework for understanding immune homeostasis. This research line reflects a rare combination of clinical-medical training, in-depth immunological erudition, and modern quantitative methods, including **machine learning** and systems immunology.

Comprehensive qualitative assessment of the educational, methodological, and teaching activities, including scientific supervision of students, doctoral students, and postdoctoral researchers.

In the area of teaching, Assoc. Prof. Pashov has delivered a lecture course "Tumor Cell / Tumor Immunology" in the Master's program of the Faculty of Biology of Sofia University (1997–2001), as well as a specialized course on "The Challenges of Tumor Immunology" within a project for the training of PhD and postdoctoral fellows (2014–2015). As a scientific supervisor, Assoc. Prof. Pashov has led to the successful defense **of two PhD students** – Dr. Andrey Kenderov (Doctoral dissertation on immunochemical studies of autoreactivity against HSP90) and Dr. Shina Pashova (antigen-presenting and regulatory functions of B-lymphocyte subpopulations) – and has supervised three master's students, demonstrating a sustained commitment to training the next generation of researchers in immunology.

The project portfolio of Assoc. Prof. Pashov is diverse and includes the management of **2 international projects** (FP7 Marie Curie International Reintegration Grant and East-West Network / INSERM) and **2 national projects** (NSF and EEA Grants), as well as participation in **5 national and 2 international projects**, with a total of **BGN 744,200** raised. International grants – including the NATO Linkage Grant and NIH-funded research – attest to the applicant's recognition in a competitive global research environment.

In summary, the career profile of Assoc. Prof. Pashov demonstrates **sustained and multi-faceted development** across the three key pillars of academic activity – scientific productivity (total IF = 283, h-index 20, 1,490 citations), teaching and scientific mentoring, and active project leadership. These achievements position Assoc. Prof. Pashov as a **mature and accomplished researcher with pronounced scientific leadership potential** and internationally recognized expertise in the field of antibody repertoire analysis and systems immunology.

II. General description of the submitted materials for the competition.

The submitted documents correspond in number and type to the requirements and are duly organized. Copies of all publications, a complete list of citations (including those pertinent to this competition), references to publications, lists of publications submitted for the present and previous competitions, diplomas, and other supporting documents are presented.

III. Evaluation of the candidate's scientific works for the overall academic development.

The corpus of 94 scientific publications of Assoc. Prof. Pashov (of which **42** as the first or corresponding author), published in the period 1991 – 2025, covers four thematic axes – carbohydrate mimotopes and tumor vaccines, polyreactivity and repertoire analysis of antibodies (**IgOme analysis**), IVIg mechanism of action and autoimmunity, as well as idiotypic networks and theoretical immunology – which together outline a coherent and internally consistent scientific program; of these, about **80** articles are in journals with an impact factor, with a total **IF ≈ 283**, distributed as follows: **Q1 – 22** publications (≈ 42%), **Q2 – 11** (≈ 21%), **Q3 – 5** (≈ 10%), Q4 – **7** (≈ 14%); the rest include articles in refereed national journals, monograph chapters and a patent. To the publication portfolio are added two chapters in international collective monographs and one Bulgarian patent for SARS-CoV-2-specific B-

cell epitopes. These statistics, combined with thematic unity and methodological innovations (scalable mimotope libraries for repertoire profiling, bioinformatic igome analysis, carbohydrate mimotope vaccines), testify to a sustained and widely recognizable academic development in which fundamental discoveries about the structure and function of the antibody repertoire are translated into applied solutions for diagnosis, vaccinology and immuno-oncology.

IV. Evaluation of the monographic work or equivalent publications submitted for participation in the competition for "Professor" by the candidate.

In the competition Assoc. Prof. Pashov participated with two groups of publications – publications equivalent to habilitation work (group B) and additional publications (group D), all published in refereed and peer-reviewed journals. Of the 52 publications submitted in the competition, 49 are in journals with an impact factor and carry a significant cumulative IF, all ranked according to Journal Citation Reports or SJR; The remaining items include articles in refereed national journals, two chapters in international monographs, and one patent, ensuring full coverage by peer-reviewed sources.

By rank distribution, **the habilitation corpus** (group B, 35 articles, 717 points) looks like this: **Q1 – 17 articles (49%), Q2 – 8 articles (23%), Q3 – 4 articles (11%), Q4 – 6 articles (17%); thus, 72% of published research in habilitation work are in the first two quartiles**, which underscores sustained publication in internationally visible, high-impact journals**. Of the 35 articles in group B, 13 (37%) are with Assoc. Pashov as a leading or corresponding author**. Among the most prestigious works are the article in **Science Translational Medicine (IF ≈ 17),** characterizing the universal architecture of the human IgG anti-carbohydrate repertoire; the publication in **Blood (IF ≈ 25)** on IVIg-mediated inhibition of dendritic cell maturation; the article in the Journal of Biological Chemistry on cofactor-induced HIV-1 specificity of antibodies; and the four publications in Frontiers in Immunology dedicated to diagnostic profiling of the public IgM repertoire, potential SARS-CoV-2 pre-immune IgM epitopes, and the anti-idiotypic approach. These, together with the recently published review in Immunology (2025) on antibody polyreactivity and the article in the International Journal of Molecular Sciences (2023) on graph repertoire analysis, form an innovative core that encompasses antibody repertoire immunology, carbohydrate mimotopy, and idiotypic networks.

Additional publications (Group D, 17 items, 307 points) expand and deepen the same thematic lines. These include: five Q1 articles in journals such as the Journal of the American Society of Nephrology, Haematologica, and Seminars in Thrombosis and Haemostasis, addressing the role of antibodies in hemophilia, nephrology, and thrombotic conditions; three Q2 articles in the Archives of Virology, DNA and Cell Biology, and Oncotarget, enriching the carbohydrate mimotope vaccine direction with clinical data; two chapters of international monographs on the polyspecificity of antibodies (Naturally Occurring Antibodies, 2012) and on mimotope vaccines in immuno-oncology (Cancer Immunotherapy, 2019, as lead author); as well as a patent for SARS-CoV-2-specific B-cell epitopes (2020). Thus, this second group of publications provides an experimental and conceptual framework that consolidates the thesis that systematic analysis of the antibody repertoire – be it through mimotope libraries, idiotypic networks or bioinformatic graph analysis – is key to understanding and therapeutically harnessing the humoral immune response.

The unifying framework of the candidate's scientific activity, as presented in the habilitation work and the additional refereed and peer-reviewed publications submitted for this competition, is the study of the structure and functional repertoire of antibodies and their role

in immune regulation; in this context, three interrelated subject areas are considered: (1) the anti-idiotypic concept and carbohydrate mimicry in antitumor immunotherapy; (2) the mechanisms and therapeutic application of antibody polyspecificity; and (3) the development of mimotope array-based platforms for antibody repertoire profiling.

A unifying thread across the three domains is the candidate's enduring commitment to exploring the conceptual underpinnings of immune recognition, culminating in a paradigm synthesis published as a review in the journal *Immunology* (2025).

1. **Anti-idiotypic concept and carbohydrate mimicry in antitumor immunotherapy** *(Publications 12–20, 28, 31)*

This group of publications builds on Jerne's idiotypic network theory – in particular, the concept that anti-idiotypic antibodies (Ab2β) can serve as 'internal images' of antigens and therefore function as surrogate immunogens.

The specific application developed by the candidate and collaborators targets tumor-associated carbohydrate antigens (TACAs), in particular the Lewis Y antigen and related glycan structures. TACAs are attractive targets for oncoimmunotherapy due to their overexpression on tumor cells, but they pose fundamental immunological challenges: as T-independent antigens, carbohydrates elicit weak, transient immune responses with poor immunological memory.

The candidate approach uses carbohydrate-mimetic peptides (CMPs) — peptides selected from phage-display libraries that structurally and functionally mimic carbohydrate epitopes. These act as vaccine surrogates capable of engaging T-cell help and generating persistent anti-glycan immunity.

The methodological arsenal includes selection from phage-display peptide libraries against anti-carbohydrate antibodies, conjugated peptide-protein vaccines, preclinical tumor models (breast cancer and melanoma), structural analysis of antibody-peptide interactions, and systematic evaluation of immune pathology.

Key achievements: Preclinical studies (Pub. 17) demonstrate that CMPs can elicit antitumor immune responses cross-reactive with native carbohydrate antigens, providing proof of concept of mimicry. Crucially, these responses occur in the absence of immune pathology (Pub. 18), addressing a central question about the safety of any vaccine strategy targeting self-associated antigens. The structural definition of recognition elements in Lewis Y-reactive antibodies (Pub. 28) provides a rational basis for mimotope design, going beyond purely empirical selection. The conceptual framework linking innate and adaptive antitumor immunity through glycan targeting (Pub. 16, 19) represents a significant intellectual contribution, positioning carbohydrate-targeted immunotherapy within the broader context of natural antibody function. Publication 20 expands on this logic by arguing that antibody polyspecificity – often considered a disadvantage – can be harnessed as a therapeutic asset in immuno-oncology. The review publications (Pub. 12–14) provide authoritative syntheses that revitalize the anti-idiotypic concept in the era of modern immuno-oncology.

2. Antibody polyspecificity: mechanisms and therapeutic applications *(Publications 9, 21–27, 29, 30)*

This group of publications addresses a fundamental property of immunoglobulins that classical clonal selection theory struggles to explain: polyreactivity, defined as the ability of a single antibody molecule to bind structurally diverse antigens. The work encompasses both the mechanistic investigation of this phenomenon and its therapeutic exploitation, primarily through the study of intravenous immunoglobulin (IVIg) preparations.

Methodological approaches include induced polyspecificity assays (with cofactors such as heme and reactive oxygen species), antigen density-dependent binding studies, fractionation

and functional characterization of IVIg, dendritic cell maturation assays, experimental sepsis models, and $F(ab')_2$-dependent blocking experiments.

Main achievements: The demonstration that IVIg auto-reactivity depends on fractionation methods (Pub. 24) is directly relevant to the quality control and therapeutic efficacy of immunoglobulin preparations. 2. The finding that serum immunoglobulins of all major isotypes (IgM, IgG, IgA) regulate the binding of natural autoantibodies by F(ab')-dependent mechanisms (Pub. 25) provides evidence of active idiotypic network regulation *in vivo*. In the same vein, the documentation of anti-idiotypic antibodies in normal IVIg (Pub. 42) and the demonstration of the therapeutic efficacy of specific anti-idiotypic fractions (Pub. 44) further confirm that anti-idiotypic antibodies are being investigated in vivo. that idiotypic network regulation is a functionally relevant mechanism of IVIg action. This supports the concept of the humoral immune system as a self-regulating network rather than merely a collection of independent clones. The demonstration that IVIg modulates immunity by inhibiting dendritic cell maturation (Pub. 27) and interacting with immune networks (Pub. 26) elucidates key mechanisms of this widely used clinical therapy. Of particular translational importance, IVIg preparations with enhanced polyspecificity improve survival in experimental sepsis and systemic inflammatory response syndrome (SIRS) (Pub. 23). This affirms polyspecificity as a therapeutically desirable, rather than merely tolerated, property. Mechanistic studies revealed that cofactor exposure can induce HIV-1 specificity in antibodies with certain germline characteristics (Pub. 21), that antigen density critically modulates IgG binding through avidity effects (Pub. 29), and that induced polyspecific antibodies exhibit heterogeneous recognition behavior (Pub. 30). Enhancing the polyspecificity of secretory IgA for improved pathogen binding (Pub. 22) extends the concept to mucosal immunity. The cornerstone of this thematic line is the comprehensive review in *Immunology* (Pub. 9), which presents antibody polyreactivity as a fundamental challenge to classical immune paradigms. The paper argues that polyreactivity is not an artifact but a central feature of humoral immunity, necessitating a revision of the "one antibody, one antigen" paradigm.

3. Profiling the Antibody Repertoire by Mimotope Arrays *(Publications 32–40, 45, 46)*

This cluster represents the most technically innovative aspect of the research program. The central concept is that the antibody repertoire — in particular, the "public" IgM repertoire shared among individuals — contains diagnostically valuable information that can be decoded using random or rationally designed peptide arrays. Rather than measuring antibodies against known antigens individually (classical serology), this approach profiles aggregate serum antibody reactivity against a structured "alphabet" of peptide probes.

Methods used include random-sequence peptide microarrays, phage display libraries analyzed by next-generation ("**Deep Panning**") sequencing, scalable design of mimotope libraries, comparison of cyclic vs. linear peptide geometry, construction of reactivity graphs (**Reactivity Graphs** through graph theory), and machine learning for biomarker detection.

Key achievements: Mapping of the human IgG anti-carbohydrate repertoire (Pub. 35) reveals a universal architecture with specificity for microbial attachment sites. This demonstrates that the anti-glycan repertoire has a conserved structure of functional significance. The development of scalable mimotope libraries for diagnostic profiling of the public IgM repertoire (Pub. 36) establishes the technical platform for subsequent applications. 3. The introduction of **analysis through reactivity graphs** (Pub. 38) is a significant innovation. The method constructs a network in which peptides are nodes and shared antibody reactivity defines the edges. This yields interpretable "signatures" to the IgM repertoire and solves the "curse of dimensionality", transforming noisy data into interpretable topological structures. Demonstrating that graph topology, rather than individual reactivities, carries diagnostic information is a key conceptual advance. 5. The application to neurodegenerative diseases (Pub. 39, 40) reveals that Alzheimer's disease and frontotemporal dementia are associated with

changes in **the idiotypic connectivity** of the public IgM repertoire, a finding with profound implications for understanding immune dysregulation. Similarly, the restriction of the IgM repertoire in antiphospholipid syndrome is based on the earlier definition of idiotypic populations in this syndrome (Pub. 43), which motivates the subsequent repertoire and graph analysis (Pub. 37, 41). Rapid identification of potential pre-immune IgM epitopes for SARS-CoV-2 (Pub. 45) and integrative profiling of antibody responses in bats (Pub. 46) demonstrate the platform's applicability to emerging threats and comparative immunology.

Contribution to the field of information technology and bioinformatics

The research program is distinguished by a deep integration of computational methods with experimental immunology:

1. High-performance data generation: The integration of a phage display with next-generation ("deep panning") transforms the technique into a systematic approach to characterizing the entire landscape of interactions. 2. **Array design and analysis:** The design of structured mimotope arrays requires optimization of combinatorial libraries and specialized analytical pipelines, including consideration of peptide geometry (cyclic vs. linear). 3. **Graph-theoretical and network approaches:** Reactivity graph analysis (Pub. 38) is the most significant innovation. By treating the data as a bipartite graph, the candidate creates a framework in which topological features (connectivity, clustering, centrality) are converted into biomarkers, capturing biological phenomena (such as idiotypic connectivity) invisible to standard univariate analyses. 4. **Machine Learning:** Signature extraction employs classifiers in which graph features serve as input with reduced dimensionality and enhanced interpretability. 5. **Structural Bioinformatics:** Integration of structural biology with binding data analysis to define recognition elements.

These contributions position the candidate at the interface between experimental immunology and computational biology, with a demonstrated ability to develop novel analytical tools.

Main takeaways forming a new paradigm

The corpus of publications articulates a new paradigm for humoral immunity: **1. Antibody repertoire is a structured network:** The public IgM repertoire possesses a universal architecture and measurable idiotypic connectivity that supports network theory and extends beyond pure clonal selection. **2. Polyreactivity is functional:** Polyreactivity is evolutionarily conserved and therapeutically relevant (e.g., in sepsis and IVIg therapy). **3. Carbohydrate antigens are a bridge:** Carbohydrate antigens link innate and adaptive immunity and are accessible targets through molecular mimicry. **4. The repertoire contains readable information:** Disease conditions (cancer, neurodegeneration) can be decoded through network analysis of mimotope data. **5. Disease is a network perturbation:** Pathology alters not just individual specificities but the connectivity structure of the repertoire. This redirects diagnostics from searching for a "needle in a haystack" to analyzing the topology of the "bowl" itself.

In the light of the considered scientific works of Assoc. Prof. Dr. Anastas Pashov, a clear **conceptual trajectory** emerges that goes beyond the classical binary dogmas of immunology and enters the field of fuzzy logic and systemic immunoinformatics. His research on IgOme and polyreactivity allows us to build the hypothesis of the immunoglobulin network not merely as a collection of isolated clones but as a "*pseudo-intelligent pattern recognition system*", operating through the coordinated interaction of multiple epitopes. Within this framework, the apparent "fuzziness" or polyreactivity of antibodies is not noise or defect but a "*fundamental computational strategy*" that addresses the challenge of infinite foreign genome diversity through a limited number of endogenous genes.

This approach introduces the principle *of degenerate recognition*, in which a polyreactive antibody does not identify a specific pathogen using the key-lock method, but classifies a molecular context or class of physicochemical motifs. If the immune system relied solely on rigid specificity, it would be vulnerable to rapidly mutating viruses – a phenomenon analogous to overfitting in machine learning. Polyreactivity provides resilience and robustness to the system, enabling it to tolerate minor mutations and target conserved structural motifs shared across multiple pathogens. Thus, the network functions as a *"distributed sensor array",* where the classification of the threat does not arise from a single peak in affinity, but from *a topological shift in the overall repertoire*.

The "intelligence" of this system arises from the dynamic interplay between two types of interactions – antibody-antigen interactions and antibody-antibody interactions. Antibody-antigen interactions function as an input layer that quantifies the molecular environment. Through mechanisms of induced fit and thermodynamic flexibility, antibodies not only detect foreign molecular products but also assess their density and spatial configuration. The internal network of antibody-antibody interactions, mediated by idiotype–anti-idiotype recognition, functions as a hidden layer for information processing and homeostatic regulation. This "*internal image*" of the antigenic universe serves as a "*filter suppressing noise"* from innocuous self-binding and setting the threshold for immune activation.

When a foreign antigen enters the system, it perturbs this established network connectivity. *The immune response represents the network's attempt to restore equilibrium or "relax" in a new stable state.* In this framework, health can be defined as a specific "mathematical structure of idiotypic interactions", and disease – including neurodegenerative conditions – as "a disruption of this topology and loss of network memory". Assoc. Prof. Pashov's research on induced polyspecificity complements this picture, showing that the system is also *context-dependent* – environmental factors such as heme or altered pH can "reprogram" the antibody binding profile in real time according to the inflammatory status of the organism.

In conclusion, the scientific contributions of Assoc. Prof. Pashov allow us to interpret the IgOme as a *complex, non-deterministic detector and reflector interface*. It is a system that meets the products of the altered or foreign genome not with a rigid response, but with *flexible, network intelligence*, capable of classifying threats through topological shifts in its structure. This constitutes an immunological landscape in which the state of the organism is encoded in the connectivity of the network.

V. Reflection (citation) of the candidate's publications in national and foreign literature (publication image).

Assoc. Prof. Dr. Anastas Pashov is a highly recognizable figure in the international scientific community, as clearly evidenced by his impressive scientometric profile. As of the date of the competition**, a total of 1490 citations** of his scientific papers have been reported, found in international databases (Scopus/Web of Science) after excluding the autocitations of all authors. These citations are distributed in a wide range of prestigious specialized journals in the fields of immunology, Oncology, Virology and Biochemistry (e.g. *Frontiers in Immunology, Blood, Journal of Biological Chemistry, Vaccine*), reflecting sustained and enduring interest in his research on antibody polyreactivity, idiotypic networks, and vaccine design.

The h-index (Hirsch index) of the candidate is 20, as certified in the attached reference, which significantly exceeds the required minimum for the academic position of "Professor" in the relevant scientific field. The portfolio of Assoc. Prof. Pashov is distinguished by numerous key publications with high visibility, eight of which have been cited more than 30 times, and

the leading articles in the fields of autoimmunity and immunomodulation have accrued more than 40 and 50 citations, respectively.

Citation analysis reveals that the strongest impact is found in studies on: **Autoantibodies vs. Heat Shock Proteins (HSP90)** and their role in the natural antibody repertoire and autoimmune diseases (51 citations); **Mechanisms of action of intravenous immunoglobulins (IVIg)**, in particular their protective effects in experimental autoimmune encephalomyelitis and the modulation of autoimmune responses (more than 70 citations in total for the leading articles in this group); **Carbohydrate mimetic peptides** and the concept of "anti-idiotypic" vaccines in oncology, cited in the context of novel therapeutic strategies for cancer vaccines.

These papers are cited by authors from leading research centers in Europe, the United States, and Asia, including in authoritative review articles on immunotherapy, glycobiology, and systems immunology. This attests to the broad interdisciplinary impact and applicability of his results. The ratio of total citations (1,490) to number of publications indicates a high average citation rate per work, an indicator of the quality and relevance of his scientific output.

The sum of **1490** citations repeatedly exceeds the national minimum requirements for a professorship (which require 100–200 points or an equivalent number of citations) and definitively positions Assoc. Prof. Pashov among leading researchers in systems immunology and antibody bioinformatics. In conclusion, it can be argued that his publication image is that of a world-class scientist, with a proven influence on the development of modern concepts of immune recognition and immunotherapy.

VII. Critical remarks and recommendations.

I have no critical remarks. The scientific works and their fundamental and applied achievements are outstanding, and include material sufficient for the scientific degree of "Doctor of Science"

VIII. General assessment of the applicant's compliance with the minimum requirements and quantitative scientometric indicators

In accordance with the requirements of the Regulations on the Terms and Conditions for Acquiring Scientific Degrees and Occupying Academic Positions at the Institute of Microbiology "Stefan Angelov" at the Bulgarian Academy of Sciences – which applies and builds upon the minimum national thresholds set out in Article 26 of the ZRASRB – Assoc. Prof. Dr. Anastas Dimitrov Pashov meets and ***significantly exceeds*** all necessary quantitative indicators for the academic position of "Professor" in the professional field 4.3. Biological Sciences (Immunology).

Indicator group	Minimum ZRASRB	Minimum IMicB	Candidate Score	Excess (vs. IMicB)
A (dissertation "Doctor")	50	50	**50**	–
C (habilitation work and publications)	100	100	**717**	**+617 pts.**
D (publications outside habilit. work)	200	220	**307**	**+87 pts.**
E (citations in WoS/Scopus)	100	120	**2 980**	**+2 860 t.**

Indicator group	Minimum ZRASRB	Minimum IMicB	Candidate Score	Excess (vs. IMicB)
E (projects, guides, etc.)	150	150	**454**	**+304 pts.**
TOTAL	**600**	**640**	**4 508**	**+3 868 t.**

In total, Assoc. Prof. Pashov scored **4,508 points** against the required minimum **of 640 under the Rules of the IMicB** (600 under the Law on Administrative Offenses), which is an excess of more than **7 times.** The most significant predominance was reported in Group **D**, where 1,490 independent citations in Scopus (excluding autocitations) brought 2,980 points – – nearly 25 times the minimum threshold of 120 points required by the IMicB regulations; this exceptional citation correlated with **an h-index of 20** and a total impact factor IF = 283, indicates the lasting international visibility of the candidate's scientific output.

In group **B** (habilitation work) the candidate achieves 717 points against a minimum of 100, reflecting a solid corpus of 35 articles with IF (17 in Q1, 8 in Q2, 4 in Q3 and 6 in Q4), demonstrating consistent publication in leading international journals. In group **D,** additional publications, monograph chapters, and a patent contribute 307 points against the IMicB minimum of 220. Group **E** (454 points against a minimum of 150) reflects active project leadership including the management of 2 international and 2 national projects, participation in 7 additional projects, attracted funding of BGN 744,200, and the scientific supervision of PhD students.

Detailed distribution of points by subcategories:

Indicator / Subcategory	Number	Points per item	Points
C. Habilitation Paper – Quartile Articles			
Q1	17	25	425
Q2	8	20	160
Q3	4	15	60
Q4	6	12	72
		Total:	**717**
D. Articles outside the habilitation work and additional contributions			
Q1	5	25	125
Q2	3	20	60
Q3	1	15	15
Q4	1	12	12
Without IF	4	10	40
D.8 Monograph chapters	2	15	30
D.9 Patents	1	25	25
		Total:	**307**
E. Citations			
Citations (Scopus, without autocitation.)	1 490	2	2 980
		Total:	**2 980**
F. Project and teaching activities			
F.13 Doctoral students	1,5	50	75
F.14 Participation in national projects	5	10	50
F.15 Participation in international projects	2	20	40
F.16 Management of national projects	2	20	40

Indicator / Subcategory	Number	Points per item	Points
F.17 Management of international projects	2	50	100
F.18 Funds raised (BGN)	744 200	0,0002	149
		Total:	**454**

Conclusion: Assoc. Prof. Dr. Anastas Dimitrov Pashov fully meets and repeatedly exceeds the mandatory quantitative criteria and scientometric indicators under both the ZRASRB and the Regulations of the Institute of Microbiology "Stefan Angelov" at the Bulgarian Academy of Sciences. The exceptional scores in groups B, D, and E attest to a combination of high scientific productivity with publications in top-ranked journals, exceptional international citation rate (h-index 20, IF = 283) and active project and scientific-mentoring leadership, which makes him fully suitable for occupying the academic position **of "Professor".**

IX. Conclusion – Does Assoc. Prof. Anastas Dimitrov Pashov, PhD, fully meet the mandatory and specific conditions and scientometric criteria for the academic position of Professor?

Assoc. Prof. Dr. Anastas Pashov **repeatedly exceeds** all mandatory and specific conditions, as well as the quantitative scientometric criteria set out in the Regulations for the Development of the Academic Staff of the Institute of Microbiology at the Bulgarian Academy of Sciences and in the announcement of the competition. His work on the immunoglobulin response and the role of polyreactivity as a recognition and response phenomenon redefines our understanding of immunological specificity – from epitope-specific to pattern-specific. Due to the proven scientific, methodological and teaching achievements and the seven times exceeding the minimum requirements, he is the suitable candidate for the academic position **of Professor**.

I strongly recommend that the Scientific Jury elect Assoc. Prof. Dr. Anastas Dimitrov Pashov to take the academic position **of Professor**.