

## REVIEW

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reviewer in the academic board by Order № 252/01.10.2019r of the Deputy Director of the Institute of Oceanology "Prof. Fridtjof Nansen" - BAS, Varna of an application dossier in an open competition for Associate professor for occupation of the academic post "Associate Professor" in the IO-BAS Field of higher education **4. Natural sciences, mathematics and informatics** Professional field **4.3. Biological sciences** Scientific specialty: **Botany, scientific field "Algology (diatomology)"** Published in the State Gazette (SG) 61/02.08.2019 and on the IO-BAS web page for the needs of Department "Marine biology and ecology"

Ralitsa Zidarova, biologist, PhD in the Department "Marine biology and ecology" of the Institute of oceanology-BAS, is the only candidate for the competition.

### 1. General data for the scientific and thematic career of the candidate

Dr. Ralitsa Petrova Zidarova was born on 22 February 1978 in Sofia. In 2001 she graduated the BF of SU "St.Kliment Ohridski" acquiring a Msci degree with excellent grade point average.

During 2001-2002 she worked as a biologist at the Institute of Botany-BAS (from 2010 Institute of Biodiversity and Ecosystem Research-BAS). During the period 2003-2006 she was a PhD student at the Department of Botany, BF. In 2008 she successfully defended her thesis on the theme "Taxonomic composition, ecology and distribution of algae from Livingston Island, southern Shetland Islands, Antarctica" under the supervision of the Doyenne in Diatomology in Bulgaria Prof. Dsci Dobrina Temniskova and received the educational degree "doctor" in "Botany" (HAC, Diploma No 32789 from 05-01-2009).

In 2001-2005 and 2010 she was appointed as an associate assistant in the Department of Botany of Sofia University, in the period 2009-2011 was a senior assistant in the Central Laboratory of General Ecology (today IBER-BAS). In 2011 he acquired an academic position "senior assistant" at the Department of Botany at SU "Kliment Ohridski", which she held until 2016. In 2018 he was employed as a biologist, PhD in the Dep. "Marine Biology and Ecology" at IO-BAS, where she is working currently.

In 2004, during the doctoral course, she completed a training course in the Alpine Research station of the University of Innsbruck, Austria on Alpine cryptogamic flora. He gained experience in cultivation, laboratory physiological and biochemical experimental research of algae, during the PhD and as a participant in the project of IFRG-BAS, excellent knowledge in sample collection and identification of diatoms and skills in teaching at the BF of Sofia University.

Fluent in foreign languages (English, Spanish and Russian), Adobe Creative Suite (Photoshop, Illustrator, InDesign), specialized software (Omnidia-The Diatom Software and statistical data processing, Primer V6), acquired Ship operator license up to 40 BT, (Maritime Administration, 2013) and 1 star Diver certificate (CMAS, 2017) are purposeful and important skills, which undoubtedly contribute to the level and effectiveness of the overall career and research activities of Dr. Zidarova.

In recognition of her achievements she received 2 personal awards for short-term research, funded by international organizations: in 2009 SYNTHESYS (EU) GRANT: BE-TAF 5280, 'A taxonomic revision of the terrestrial and freshwater diatoms (Bacillariophyta) from Livingston Island (South Shetland Islands, Scotia ARC) (Publications: No 9, 28, 30, 35) and in 2012 was awarded L'Oréal's-UNESCO award 'For Women in Science' "Diatoms from the island Livingston (South Shetland Islands, Antarctica): Taxonomy, Ecology and Biogeography' (publications: No 19, 22, 23, 35).

A member of two international organizations -Society for Diatom Research (2012-2014) and APECS (Association of Polar Early Career Scientists) (current)

## **2. A general description of the application documents, participation in scientific forums, scientific projects, expeditions, etc.**

The application documents for the academic post "Associate Professor" include all required documents duly supported with relevant proofs in full compliance with the PURPONSAD of IO-BAS, presented in paper and electronic format. The precision in the organization and style of the documents is highly appreciated.

Dr. Zidarova presented a total of 41 scientific publications. Of these, 8 are related to the PhD thesis (including The thesis summary) and one additional (No. 9) to achieve compliance with the new requirements for Academic posts, which are not subject to this review (A1-A5 from the list of publications). For the current competition, I accept for review 32 publications as follows:

- 20 manuscripts published in scientific journals with IF referenced and indexed in the world data bases WoS and Scopus with Total IF 26.003
- 1 paper in referenced scientific journal without IF
- 5 publications in non-referenced journals
- 6 – other publications

Out of the 20 publications with IF, 4 were published in journals with Rank Q1 (SJR), in 2 of which Zidarova is the first author and in 2- a second, 7-in the journals with Rank Q2 (SJR) and 7 in journals with Q3 (SJR) and 2 in journals with Rank Q4 (SJR). The articles are published in prestigious specialized international scientific journals such as *Fottea*, *Phytotaxa*, *Phycologia*, *Plant Ecology and Evolution*, *Diatom research*, in English, which makes them readily available to the international scientific

community.

In 5 publications the candidate is the first author, in 4 - a second ( 45% of the publications), in 8-3rd and in the rest - a next author. I believe that the modern multidisciplinary science, and the increasingly narrow specialisation in research areas, with the application of specific methods, is a prerequisite for teamwork and deserves a positive assessment. It is clear from the recommendation of Prof. Dr. Bart Van de Vijver (co-author in most publications) that his statement is for shared co-authorship in recognition of the individual scientific contribution of Zidarova and her high qualification as a researcher and collaborator. The articles were published in the period 2010 – 2016, which points to the high publication activity of the candidate.

Among the publications in unreferenced journals one is a full text in Conference proceedings, 1- paper in a series and 3 in books of Sofia University Academic publisher with ISBN, dedicated to the Bulgarian studies in Antarctica. The 6 publications in the category other are individual taxonomic descriptions in a peer-reviewed book (Diatoms of Europe 7, Koeltz Scientific Books, 2013).

Zidarova presented also published abstracts in Books of abstracts from scientific forums, 27 in total, out of which 24 were presented in international forums, mainly specialized meetings of diatomists, dedicated to research in Antarctica, held in Belgium, USA, France, Poland etc., during the period 2009-2019. In 12 of these abstracts Zidarova is a leading author.

The expedition activity of the applicant in Antarctica (2004-2018) is impressive -participation in 6 expeditions with fieldwork on the islands Livingstone, King George, Nelson, Disception and a total duration of over 6 months.

The list of projects shows an active project activity-a total of 11 projects, for 2 of which Zidarova is a coordinator (1 funded by NSF and 1 from National Centre for Polar Studies, after acquiring the PhD degree), participation in 2 projects with international Funding, 1 Project funded by the Operational programme "Environment", 1- by the NSF, 2- by MOEW/Bulgarian Antarctic Institute and 3 – by IAOS at MOEW), 6 of which after acquiring a PhD degree. As an expert in sample collection, analysis and ecological status assessment by BQE ' phytobenthos ' she participated in contracts with private organizations (Ecoengineering RM EOOD (2014-2016) and civil contracts with NIS-SU (2014, 2015).

In the period 2013-2019 the candidate reviewed 17 papers for prestigious journals with IF such as *Phytotaxa*, *Diatom Research*, *Polish Polar Research*, *Plant Ecology and Evolution*, *Phycologia*, etc., which along with the publishing and project activity indicates a highly rated international image of Zidarova among the specialized research community.

### **3. Main themes of research and achievements**

I appreciate the candidate personal statement and selfassessment of her achievements. The focus of Dr.

Zidarova's research interests is on the taxonomy, biodiversity and biogeography of the limno-terrestrial diatoms from Antarctica, which are a continuation and an upgrade of the research provoked by taxonomic discrepancies and gaps of knowledge established in the course of the development of her PhD thesis and subsequent research activities.

Obviously the main achievements of the candidate are related to the study of taxonomy, biodiversity and biogeography of diatoms from Antarctica, over which I will place the emphasis in the review.

Firstly, I would like to pay particular attention to the apparent quantity of samples analysed (more than 750), including the reanalysis of known cosmopolitan species from Antarctica using a light and scanning electron microscope techniques, revised samples and published materials (up to 2006). Undoubtedly, one of the most important contribution is in taxonomy, with global significance and original contribution to the clarification of the current diversity and species richness in different diatoms genera from the Antarctic sea area.

- **An impressive number of new for science species have been identified—a total of 90 taxa:** 89 species and 1 variety (co-authorship) described according to the International Code of Nomenclature for algae, fungi, and plants in a series of publications in high quality international editions (Publications N 10-16, 18-30 incl., and 36-41 incl.).

- **New materials analyzed (after 2009) and described new to the science species** - *Chamaepinnularia elliptica* Zidarova et al., *Cosmioneis regigeorgiensis* Zidarova et al., [N 15] , *Mayamaea tytgatiana* Zidarova et al., *Luticola neglecta* Zidarova et al [N 23] etc., species from genus Gomphonema [N 14], Halamphora [N 20], Humidophila ( Diadesmis) [N 11, 16], Muelleria [N 15, 21] etc.

- **Taxonomic revision and correct taxonomic identification** of a large number of incorrectly identified species of algae, missidentified as identical to European or North American taxa, e.g. *Caloneis australis* Zidarova et al., formerly reported from freshwater habitats in Antarctica as a brackish-marine species *C. bacillum* N 15+), *Luticola olegsakharovii* Zidarova et al., misidentified as *L. nivalis* (Ehrenberg) D.G.Mann [N 23] and a number of other species (publications N 26, N 10, N 15, N 24, N 29 и др.)

- **Identified as different species, among reported in Antarctic literature as a single taxon, e.g.** species from the complex of *Psammothidium germainii* (Manguin) Sabbe, reported under the name *P. germainii* [N 13], while detailed analyses by light and scanning electron microscope of a large number of populations of the species from different areas of Antarctica and Subantarktica distinguish between three different species with different distribution in Antarctica. Similar results were obtained for the genus *Luticola* [N 23, 28, 35], genus *Hantzschia* [N 30], genera *Pinnularia* [26, 27], *Humidophila* (formerly *Diadesmis*) and *Stauroneis* [22].

Another area of significant contributions is the investigation of the biogeographic characteristics of

diatom algae from Antarctica, which give ground for the formulation of a new hypothesis as counterpoint to the existing hypothesis (Finlay & Clarke, 1999), according to which microorganisms are ubiquitous, and the same species are found under similar conditions anywhere in the world.

Characteristic of morphological features, ecological preferences, and the peculiarities of the spatial spread of diatom algae in Antarctica and subregions in Subantarctica and South America were made based on the analysed large array of data, microscopic analyses and comparisons of Antarctic populations with original descriptions and images of European and/or cosmopolitan species.

The actual presence of some European or more widespread species from other areas of the world is confirmed [N 10, N 25, N 30], while it is proven that the diatomic flora of the Antarctic Sea area is strictly specific to the region, with a high percentage of endemic species, a large proportion of which have limited distribution and narrow bioregionalism [N 35], and that in the south direction there is a decrease in the diversity and substitution of species from the northern part of the marine zone with species typical of the Antarctic continent. The peculiarities of the proliferation of diatom species from the Antarctic Marine Zone [N 10-16, N18-30, 35] confirm the biogeographic differentiation to continental Antarctica and the Antarctic sea area.

Particular attention should be paid to the study of marine benthic microalgae from Antarctica, as a new phase in the research activity of the applicant, which, although currently pilot, I consider extremely promising.

**Pioneer investigations were conducted on the colonization processes** in marine benthic diatoms in two areas of contrasting conditions. The increased growth (nearly doubled) in bays directly influenced by the melting of glaciers (N7 from the list of presentations in scientific forums) suggests that marine benthic diatoms could play an essential role in the development of benthic communities under the increasing impacts of climate changes with contrasting effects - as an substrate for the development of other organisms, but also as a factor inhibiting their growth.

Biodiversity of marine benthic diatoms on the coast of Livingston Island (from different substrates) was studied and a huge diversity of 127 species established (relative to the area of study and its conditions), with a clear distinction between habitats.

For sure the enlargement of this research ( a new project funded under the Antarctic Programme in 2019) will reveal new facts and mechanisms of climate change impact, contributing to global fundamental science. No doubt studies related to Antarctica represent a hot topic and attract the interest of the world research community, especially in relation to global climate change and impacts on natural ecosystems. This topic is also a priority for Bulgaria and in this sense, I believe that the achievements of Zidarova contribute to the prestige of Bulgarian science in the World Research area.

✓ **Scientific and applied contributions of national importance** are valuable for the transposition of the European Water Framework directive in pursuance of Bulgaria's commitments, as a community member -participation in the development of a new typology and classification system for ecological status assessment of surface lotic water according to Ordinance no N-4 /14.09.2012, indicator ' Phytobenthos ' (Project N 7) and practical participation in the monitoring of the condition of lakes on the territory of the Republic of Bulgaria for BQEs ' phytoplankton ' and ' macrophytes ' [Projects N 8, 10], [N 17] and also biodiversity conservation-participation in the team proposal of a new method for evaluation of rare and endangered micro algae [N 32], developed in accordance with the needs and regulations of the Republic of Bulgaria, but with a potential for adaptation in other countries, a new habitat of the species *Hildenbrandia rivularis* (Liebmann) J. Agardh in Bulgaria [N 31], included in the Red List of Bulgarian algae has been found, contributing to a better understanding of its ecology.

#### **4. Reflection (citation) of the candidate's publications in the National and foreign Literature (Publication image).**

From the presented very well structured and detailed information of citations it is evident that Dr. Zidarova is well recognizable in the international research area. 22 papers are cited in 147 literature sources, all 22 have a total of 97 citations in articles with IF, 13 - in 20 editions without impact factor or SJR, 4 are cited 7 times in books of publishers of scientific literature and 14 publications - 23 times in dissertations and theses. In publications indexed in SCOPUS are found 60 citations of 22 publications. No autocitations were found.

#### **5. Critical Remarks and recommendations**

I have no critical remarks to the research activity and the application documents.

My personal impressions from Ralitsa Zidarova are related to the review of her PhD thesis, and since 2018 to her activity as an employee in IO-BAS and a member of my research team. I am very happy to underline the consistency of her committed accomplishment, motivation and creativity. In the research activity of IO-BAS, the study of microphytobenthos is a new field and Antarctica - a new marine geographic area of research. I am convinced that the interdisciplinary profile of IO-BAS, along with the application of molecular methods for studying biodiversity of microorganisms, developed in IO-BAS, will open a new perspective in studying

microphytobenthos, which is already activated. In less than 2 years, on the initiative and under the coordination of Dr. Zidarova the team from IO-BAS managed to win 3 projects – 2 funded by the Antarctic Program and 1 – by the NSF call for fundamental research in 2019.

**6. Overall assessment of the applicant's compliance with the mandatory conditions, quantitative criteria and scientometric indicators**

From the application documents it is evident that the research activities of Ralitsa Zidarova covers and exceeds the national criteria for all groups of indicators for the academic post "Associate Professor" in the Field of higher education 4. Natural sciences, mathematics and informatics, Professional field 4.3. Biological sciences and the mandatory quantitative criteria and indicators according to the PURPONSAD of the IO-BAS.

➤ **Minimum requirements by group indicators for acquisition of education and scientific degree doctor ( PhD)**

Group of indicators	Indicator	PhD	Ralitsa Zidarova
A	Indicator 1 <i>(attached PhD thesis summary)</i>	50	50
Б	Indicator 2	-	-
В	Indicator 3 or 4	-	-
Г	Показател Г.7. <i>(attached publications # 2, #4, #9)</i>	30	30 (SJR) 36 (WoS)

➤ **Minimum requirements by group indicators for acquisition of academic post „Associate professor“**

Group of indicators	Indicator	Associate professor	Ralitsa Zidarova
A	Indicator 1	50	50
Б	Indicator 2	-	-
В	Indicator B.4. <i>(attached publications #10, #12, #15, #22, #23, #26 )</i>	100	120 (SJR) 102 (WoS)
Г	Indicator Г.7. <i>(attached publications #11, #13, #14, #16–21, #24, #25, #27–30)</i>	220	249 (SJR) 246 (WoS)
Д	Indicator Д.11. <i>(attached list of citations in Scopus: 60)</i>	60	120
<b>Total points</b>		430	539 /518

## CONCLUSION

The application documents of Dr. Ralitsa Petrova Zidarova fully comply with the mandatory and specific conditions and the scientometric criteria for the academic post "Associate Professor". The research activity, the presented publications, participation in scientific projects and forums, as well as her achievements of original scientific and applied importance are in the field of the announced competition, in scientific specialty "botany", scientific field "Algology (diatomology)", rated accordingly nationally and abroad.

All the above, as well as my personal impressions, give ground for my positive assessment and recommendation to the Honorable members of the academic board to vote for the promotion decision of Ralitsa Petrova Zidarova to the academic post "Associate professor" in the Field of higher education 4. Natural sciences, mathematics and informatics, Professional field 4.3. Biological sciences, scientific specialty Botany and to propose to the Scientific Council of IO-BAS a positive statement for her appointment.

29.11.2019

Reviewer:

/prof. Snejana Moncheva/