2018

POROČILO O DELU
ANNUAL REPORT

NACIONALNI INŠTITUT ZA **BIOLOGIJO**
NATIONAL INSTITUTE OF **BIOLOGY**

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Nacionalni inštitut za biologijo (foto: Damjan Končar). National Institute of Biology (Photo: Damjan Končar).

POSLANSTVO

- Ustvarjanje novega znanja s temeljnimi raziskavami na področju biologije in njej sorodnih naravoslovnih ved, varstva okolja, biotehnologije ter biomedicine za razumevanje življenjskih procesov;
- prenos ustvarjenega novega znanja v uporabo s ciljem izboljševanja kakovosti življenja;
- prenos ustvarjenega znanja na mlajše generacije z izobraževanjem na dodiplomski in podiplomski ravni.

VIZIJA

- Želimo ustvarjati vrhunsko znanje in tehnologije na področju biologije in spremljajočih ved o življenju in okolju kot mednarodno uveljavljena avtonomna institucija.
- Z dobro organiziranostjo in vrhunsko opremo bomo skrbeli za zadovoljstvo zaposlenih in vzgojo vrhunskih kadrov.
- V tesni povezavi z družbo in poslovnim sektorjem bomo zagotavljali svoj dolgoročni razvoj.

MISSION

- Creating new knowledge through basic research in biology and related natural sciences, environmental protection, biotechnology and biomedicine with the aim of understanding life processes;
- Applying this new knowledge to practice with the intention of improving quality of life;
- Transferring this knowledge to the younger generations through education at the undergraduate and graduate levels.

VISION

- As an internationally renowned autonomous institution we wish to create elite knowledge and technologies in the fields of life and environmental sciences.
- We will strengthen employee satisfaction and the development of top-level staff through great organisation and first-class equipment.
- Working closely with society and the business sector, we will ensure our long-term development.

Fotografija na naslovnici:
Kozača (*Strix uralensis*) je v Sloveniji pogosta gnezdilka ohranjenih gozdov, na NIB-u jo raziskujemo že več kot 20 let (foto: Davorin Tome).

Cover photo:
The Ural owl (*Strix uralensis*) is a nesting bird frequently found in Slovenia's undisturbed forests and has been the subject of study at NIB for over 20 years (Photo: Davorin Tome).

Sončni žarki pod morsko gladino (foto: Borut Mavrič).
Display of sun rays under a sea surface (Photo: Borut Mavrič).

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UVODNA BESEDA DIREKTORJA

Sodobna družba se sooča z velikanskimi težavami, med katerimi so globalne klimatske spremembe, drastični upad biodiverzitete, onesnaževanje okolja s plastiko in toksičnimi snovmi, prenaseljenost, nezadostna oskrba s pitno vodo, pretiran izlov morskih organizmov, pandemije neslutenih razsežnosti, nove bolezni, bioterorizem. Naša generacija se zaveda teh težav, za katere znanost ponuja konkretne, inovativne rešitve. Znanstveniki razvijamo modele, ki temeljijo na ogromnih količinah podatkov ter na osnovi pametnih algoritmov z verjetnostjo napovedo prihodnje vzorce in procese. Kot primere omenimo napovedi sprememb v atmosferi glede na trenutne izpuste toplogrednih plinov, porast oceanov v prihodnjih desetletjih glede na topljenje zalog ledu, takojšnje fiziološke in ekološke odzive organizmov na globalne spremembe, zmožnost dolgoročnega prilagajanja organizmov oziroma, bolje rečeno, vzorce njihovega izumiranja, stanje ekosistemov v prihodnjih desetletjih, širjenje patogenov v naravi in pristope k njihovemu nadzoru, delovanje organizmov na celični in molekularni ravni ter spremembe lastnosti organizmov z genskim urejanjem.

Rešitve za akutne in kronične probleme našega planeta in njegovih prebivalcev potrebujemo takoj. Danes razpolagamo z znanjem in tehnologijo, ki sta bila še ob prelomu tisočletja neslutena. Znanstveniki čutimo dolžnost, da svoje znanje in nove tehnologije uporabimo v zasledovanju odgovorov na temeljna vprašanja ter v iskanju rešitev za globalne težave. To je naše poslanstvo. Dolžnost civilizirane družbe pa je, da znanstvenikom prisluhne in sledi njihovim zamislim ter da pomaga iskati politično voljo za implementacijo predlaganih rešitev. Tu ni prostora za antiintelektualizem, za zanikanje problemov in za prelaganje odgovornosti na naslednje generacije.

Slovenija s svojimi težavami ni svetovna izjema niti v dobrem niti v slabem. Smo del globalnih problemov, ki jih moramo tako tudi reševati. Slovenska znanost je dobro mednarodno vpeta, potrebuje pa več stabilnosti doma, tako v smislu razumevanja njenega poslanstva kot tudi boljšega financiranja odličnih temeljnih in aplikativnih raziskav. Potrebujemo vrhunsko infrastrukturo, ki bi omogočala ustvarjanje kakovostnega znanja in njegovo prenašanje na naslednje generacije.

Nacionalni inštitut za biologijo (foto: Damjan Končar). National Institute of Biology (Photo: Damjan Končar).

INTRODUCTION BY THE DIRECTOR

Modern society is facing enormous problems in the form of global climate change, a drastic decline in biodiversity, environmental pollution through plastics and toxic substances, overpopulation, inadequate drinking water supply, overexploitation of marine life, pandemics of unimaginable proportions, new diseases and bioterrorism. Our generation is aware of these problems for which science offers concrete, innovative solutions. Scientists are developing models based on vast amounts of data and are able to leverage smart algorithms to reliably predict future patterns and processes. Some examples of these include the predictions of changes in the atmosphere based on the current greenhouse gas emissions, the sea-level rise in the coming decades due to melting ice masses, the immediate physiological and ecological responses of organisms to global change, the long-term adaptation ability of organisms or rather the patterns of their extinction, the state of ecosystems in the coming decades, the spread of pathogens in nature and approaches to their control, the functioning of organisms at the cellular and molecular level and changes in the properties of organisms through gene editing.

Solutions to the acute and the chronic problems of our planet and its inhabitants are needed now. We now have at our disposal knowledge and technology that were undreamed-of at the turn of the millennium. Scientists like myself feel duty-bound to use our knowledge and new technologies in the pursuit of answers to the fundamental questions and to look for solutions to global problems. This is our mission. A civilised society's duty, on the other hand, is to listen to the scientists, to follow their ideas and to help find the political will to implement the proposed solutions. There is no room here for anti-intellectualism, for the denial of problems and for shifting responsibility to the next generations.

In terms of its problems, Slovenia is not a global exception, either in the positive or the negative sense. We are a part of the global problems, and our approach to solving them should be as such. Slovenian science is well-established internationally but needs more stability at home, both in terms of understanding its mission and better funding of its excellent basic and applied research. We need first-class infrastructure so that quality knowledge can be generated and transferred to the next generation.

Sodelavke in sodelavci Nacionalnega inštituta za biologijo trdno verjamemo v ustvarjanje vrhunskega znanja, ki lahko človeku pomaga razumeti naravno ter antropogeno okolje v spreminjajočem se svetu. Sledimo svojim ciljem in viziji, ki smo jih v letu 2018 obnovili. Že danes razpolagamo z vodilnimi kadri in skupinami na mnogih naravoslovnih področjih ter medse vabimo nove. Uvajamo nove raziskovalne pristope v naravoslovnih znanostih, obenem pa trdno verjamemo v povezovanje naravoslovnih znanosti z družboslovjem in humanistiko. Namreč menimo, da so kompleksni problemi človeštva najbolje rešljivi interdisciplinarno.

V slovenskem znanstvenem prostoru se zavzemamo, ne samo deklarativno, za povezovanje in sinergije. Naše okolje je namreč premajhno in trenutno tudi preslabo financirano za odprto konkurenčnost med skupinami. Zato smo odprti za medinštitutsko in medsektorsko sodelovanje in skupna vlaganja v kadre in raziskovalno opremo ter skupno projektno delo. Sodelujemo v pedagoških procesih v vseh slovenskih visokošolskih ustanovah in soustvarjamo nove študijske programe. Smo mentorji študentom v Sloveniji in tujini. Tovrstne povezave bomo v prihodnosti še nadgradili.

V letu 2018 smo na Nacionalnem inštitutu za biologijo spet podelili nagrade Miroslava Zeia stanovskim kolegom. S svojo prisotnostjo sta nas počastila predstavnika države, predsednik Državnega zbora mag. Dejan Židan ter minister za izobraževanje in znanost dr. Jernej Pikalo, iskreno pa se zahvaljujem tudi vsem kolegicam in kolegom, ki ste s svojo prisotnostjo počastili inštitut ter nagrajence. Miroslav Zei je pustil neizbrisljiv pečat ne samo v slovenski znanosti, ampak tudi globalno. Zato nagrajenci NIB-a s ponosom nosijo plakete z njegovim imenom. Med nekdanjimi Zeievimi nagrajenci, če omenim zgolj tiste, nagrajene za življenjsko delo, so eminentni raziskovalci, profesorji Boris Sket, Alenka Malej, Jože Štirn, Andrej Čokl, Jadran Faganeli, Radovan Komel in moja predhodnica Tamara Lah Turnšek. Častni člani Nacionalnega inštituta za biologijo pa so profesorji Kazimir Tarman, Guy Van Den Eede, Ron van Noorden in Tom Turk. Mnogi mlajši kolegi so prav tako že bili počaščeni s plaketo Miroslava Zeia kot priznanjem za izjemne dosežke ali za izjemne doktorate. Veliko nagrado Miroslava Zeia za življenjsko delo na področju dejavnosti NIB-a smo v letu 2018 podelili profesorju Andreju Blejcu, nagrado Miroslava Zeia za izjemne dosežke v zadnjih petih letih pa sta prejela Matjaž Hren in Klemen Zupančič iz podjetja BioSistemika, d. o. o. Nagrado Miroslava Zeia za izjemno doktorsko delo na področju dejavnosti NIB-a sta prejela Barbara Breznik in Matjaž Novak, poleg njiju pa so v obdobju od 1. oktobra 2017 do 30. septembra 2018 doktorirali še Alexandra Bogožalec Košir, José Manuel Gonçalves, Tjaša Lukan, Špela Alič, Barbara Debeljak in Mateja Vidic.

Poslanstvo Nacionalnega inštituta za biologijo je ustvarjanje novega znanja na področju bioloških znanosti za razumevanje življenjskih procesov, ohranjanje biološke raznovrstnosti in zdravega okolja, za doseganje večje kakovosti življenja ter podporo trajnostnemu razvoju. Za dosego svojih ciljev smo pripravljeni kadrovsko in intelektualno. Manjka nam samo še postavitev ustrezne infrastrukture v Ljubljani, s kakršno na Obali že razpolagamo. Prepričani smo, da bo ljubljanski del naše dejavnosti v naslednjih letih zaživel v obnovljeni zgradbi, v Biotehnološkem stičišču NIB. Le tako se bo NIB lahko uveljavil ne samo kot nacionalni, temveč tudi vodilni regionalni center bioloških znanosti.

Izr. prof. dr. Matjaž Kuntner, direktor

All the men and women working here at the National Institute of Biology firmly believe in building state-of-the-art knowledge that can help man understand nature and the anthropogenic environment in a changing world. We follow our mission and vision, which were renewed in 2018. Our staff and groups are among the best in many fields of natural science, but new talent is always welcome. We are introducing new research approaches in natural sciences, but at the same time we firmly believe in the integration of natural sciences with social sciences and humanities. We find that humanity's complex problems can best be resolved in an interdisciplinary manner.

In the Slovenian scientific sphere, we advocate, not only declaratively, for integration and synergies. Our space is too small and presently also not sufficiently financed for there to be open competitiveness among the groups. This is why we are open for any inter-institutional and intersectoral collaboration and joint investments in staff and research equipment and joint project work. We participate in the pedagogical processes in all Slovenian higher education institutions, and we co-create new study programmes. We serve as mentors to students in Slovenia and abroad. We are going to work further on these connections in the future.

In 2018, the National Institute of Biology again presented the Miroslav Zei Awards to its fellow colleagues. We were honoured by the presence of two state officials, the President of the National Assembly, MSc Dejan Židan and the Minister of Education and Science, Dr Jernej Pikalo. I would also like to sincerely thank all the colleagues who, with their presence, honoured the Institute and the Award winners. Miroslav Zei has left an indelible mark not only in Slovenian science but also globally. This is why the NIB Award winners are proud to carry plaques bearing his name. Some of the past Zei Award winners include, to name only the recipients of the Award for Life Work, eminent researchers, professors Boris Sket, Alenka Malej, Jože Štirn, Andrej Čokl, Jadran Faganeli, Radovan Komel and my predecessor Tamara Lah Turnšek. The Honorary Members of the National Institute of Biology include professors Kazimir Tarman, Guy Van Den Eede, Ron van Noorden and Tom Turk. Many of our younger colleagues have also been honoured with Miroslav Zei plaques as awards for their exceptional achievements or exceptional doctoral work. In 2018, the Grand Miroslav Zei Award for Life Work in the Field of Activities of the National Institute of Biology was presented to Andrej Blejc, while the Miroslav Zei Award for Exceptional Achievements in the past five years was conferred on Matjaž Hren and Klemen Zupančič, both from BioSistemika, d.o.o. The Miroslav Zei Award for Exceptional Doctoral Work in the Field of Activities of NIB went to Barbara Breznik and Matjaž Novak. Besides them, Alexandra Bogožalec Košir, José Manuel Gonçalves, Tjaša Lukan, Špela Alič, Barbara Debeljak and Mateja Vidic also received their doctorates in the period from 1 October 2017 to 30 September 2018.

The mission of the National Institute of Biology is to create new knowledge in biological sciences in order to understand life processes, preserve biodiversity and a healthy environment, achieve a greater quality of life and support sustainable development. We are prepared to achieve our objectives, both in terms of staff and intellectually. The only thing we lack is appropriate infrastructure in Ljubljana, such as what we have on the Coast. We are convinced that the Ljubljana-based part of our activity will in the coming years become fully operational in the restored building, in the NIB Biotechnological Hub. Only in this way will NIB be able to position itself not just as the national but also as the leading regional centre of biological sciences.

Assoc. Prof. Dr Matjaž Kuntner, director

VODSTVO INŠTITUTA
INSTITUTE'S MANAGEMENT

DIREKTOR
DIRECTOR

Izr. prof. dr. Matjaž Kuntner (od from 2018)
Mandat Mandate: 1. 3. 2018 – 28. 2. 2023

DIREKTORICA
DIRECTOR

prof. dr. Tamara Lah Turnšek (od from 1996)
Mandat Mandate: 1. 1. 2015 – 28. 2. 2018

POMOČNIK DIREKTORJA ZA FINANČNO IN SPLOŠNO PODROČJE
DEPUTY DIRECTOR FOR FINANCE AND GENERAL MATTERS

mag. Franc Potočnik (od from 1999)
Mandat Mandate: 1. 3. 2018 – 28. 2. 2023

POMOČNIK DIREKTORJA ZA PROJEKTNO PODPORO IN PRENOS TEHNOLOGIJ
DEPUTY DIRECTOR FOR TECHNOLOGY TRANSFER

mag. Jure Vindišar (od from 2017)
Mandat Mandate: 1. 3. 2018 – 28. 2. 2023

UPRAVNI ODBOR
BOARD OF GOVERNORS

dr. Franci Demšar, Nacionalna agencija Republike Slovenije za kakovost v visokem šolstvu – predsednik president
prof. dr. Maja Ravnikar, Nacionalni inštitut za biologijo – podpredsednica vice-president
dr. Eva Batista, Ministrstvo za izobraževanje, znanost in šport
dr. Ruth Rupreht, Ministrstvo za okolje in prostor
dr. Uroš Urleb, Biofarmacevtika Mengeš, Novartis
Mandat Mandate: 22. 6. 2018 – 21. 6. 2022

UPRAVNI ODBOR
BOARD OF GOVERNORS

Ivana Erjavec, Ministrstvo za kmetijstvo, gozdarstvo in prehrano – predsednica president
prof. dr. Marina Dermastia, NIB – podpredsednica vice-president
dr. Peter Venturini, Helios d.o.o.
dr. Matjaž Oven, Lek d.d.
Luka Živić, Ministrstvo za izobraževanje, znanost in šport do to 21. 12. 2017, od from 22. 12. 2017 dr. Eva Batista
Mandat Mandate: 28. 5. 2014 - 27. 5. 2018

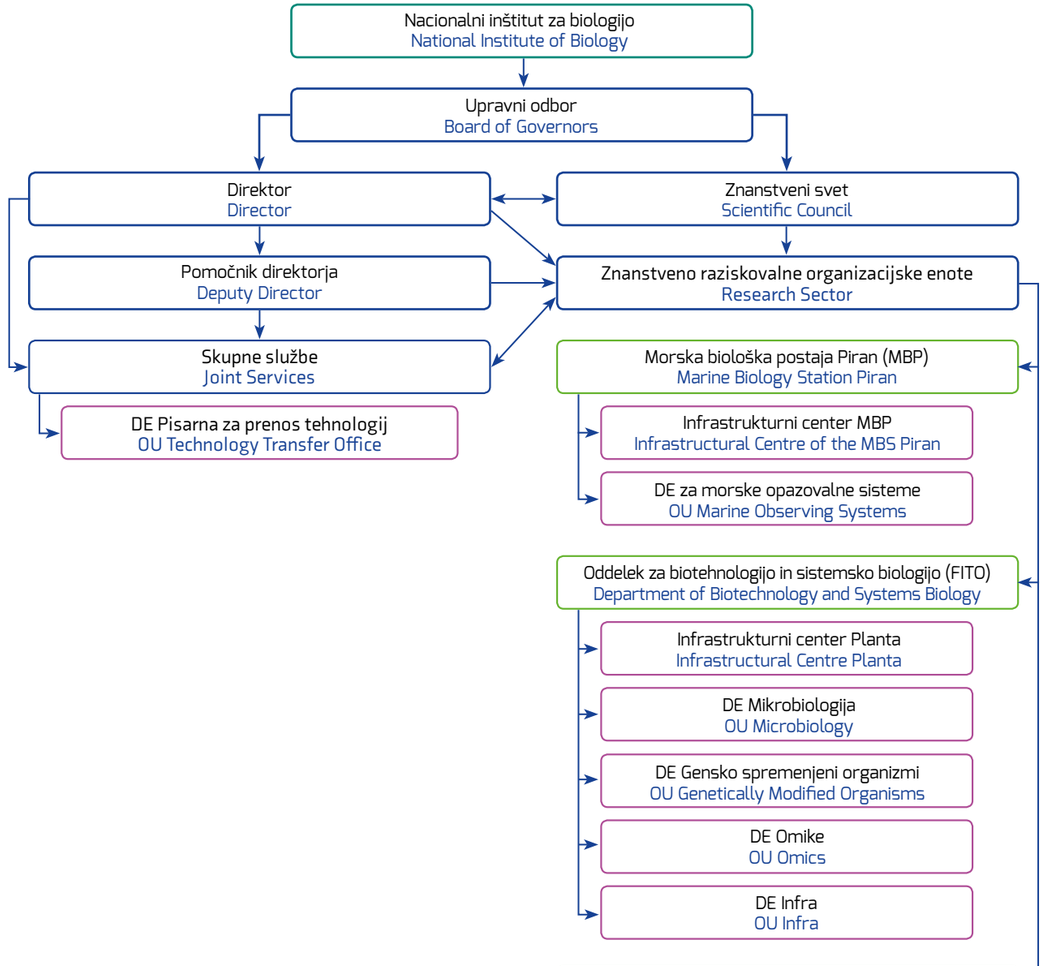
ZNANSTVENI SVET
SCIENTIFIC COUNCIL

izr. prof. dr. Valentina Turk, predsednica
doc. dr. Meta Virant-Doberlet, podpredsednica vice-president
prof. dr. Anton Brancelj
prof. dr. Marina Dermastia
prof. dr. Metka Filipič
prof. dr. Kristina Gruden
izr. prof. dr. Matjaž Kuntner (direktor director)
izr. prof. dr. Patricija Mozetič
doc. dr. Andreja Ramšak
izr. prof. dr. Jana Žel
Mandat Mandate: 26. 4. 2016 – 25. 4. 2020

ČASTNI ČLANI
HONORARY MEMBERS

prof. dr. Kazimir Tarman, od from 25. 10. 2010
dr. Guy Van Den Eede, od from 25. 10. 2010
prof. dr. Cornelis Johannes Forrendinis van Noorden, od from 14. 11. 2014
prof. dr. Tom Turk, od from 8. 11. 2017

ORGANIZACIJSKA SHEMA
ORGANIZATIONAL SCHEME



LEGENDA LEGEND

označuje hierarhičen odnos
denotes a hierarchical relationship

označuje odnos sodelovalne narave
denotes a cooperative relationship

PREGLED POSLOVANJA INŠTITUTA V LETU 2018

Poslovno leto 2018 je bilo za NIB zelo uspešno. Večina zastavljenih ciljev je bilo doseženih, nekateri cilji so bili tudi preseženi.

Finančni cilji, opredeljeni v finančnem načrtu za leto 2018, so bili preseženi tako pri prihodkih kot pri poslovnem izidu. Ustvarjeni prihodki v višini 7.782.962 EUR so bili višji od načrtovanih za 152.616 EUR (2,00 %), ustvarjeni presežek prihodkov nad odhodki (pred obračunom davka od dohodkov pravnih oseb) v višini 198.085 EUR pa je presegel načrtovanega za 99.612 EUR.

V primerjavi z letom 2017 so bili realizirani prihodki NIB-a v letu 2018 višji za 1.005.341 EUR (14,83 %), realizirani odhodki pa za 969.183 EUR (14,46 %). Posledično je bil v letu 2018 ustvarjen boljši poslovni izid kot v letu 2017 (za 36.158 EUR oz. 22,33 %). Nominalno največja rast prihodkov v letu 2018 v primerjavi z letom 2017 je bila dosežena pri prihodkih od ARRS. Ti so v 2018 znašali 4.555.267 EUR in so bili od primerljivih prihodkov v letu 2017 višji za 435.805 EUR (za 10,58 %); prihodki za raziskovalne programe so se povečali za 178.620 EUR (pretežno zaradi povečanja obsega financiranja ob ocenjevanju v 2018), prihodki za raziskovalne projekte pa za 156.787 EUR (pretežno zaradi uspešnosti pri novopridobljenih projektih). Naslednji po nominalni vrednosti povečanja so bili prihodki od projektov iz različnih evropskih programov (INTERREG, LIFE ...), ki so v letu 2018 znašali 599.059 EUR in so bili višji od primerljivih v letu 2017 za kar 364.440 EUR (155,33 %). Razlog za povečanje prihodkov je pretežno v dejstvu, da so se nekateri projekti, ki so bili pridobljeni v letu 2017 in so se začeli izvajati proti koncu leta, v letu 2018 izvajali celo leto. Za 131.181 EUR (18,52 %) so bili v letu 2018 višji kot v letu 2017 prihodki iz druge javne službe; razlog je pretežno v povečanem obsegu financiranja strokovne naloge za varstvo rastlin.

PRIHODKI V EUR REVENUES IN EUR	STRUKTURA 2018 (%) STRUCTURE 2018 (%)	2018	2017	INDEKS 2018/17 INDEX 2018/17
Prihodki od ARRS Slovenian Research Agency	58,53	4.555.266,88	4.119.462,35	110,58
Druge javne službe Other public institutions	18,81	1.464.324,09	1.222.720,88	119,76
Evropski skladi EU funds	11,36	884.164,47	513.215,81	172,28
Domači trg Domestic market	7,02	546.138,05	385.866,76	141,54
Tuji trg Foreign markets	4,15	323.296,17	503.875,51	64,16
Drugi prihodki Other revenues	0,13	9.772,20	32.479,72	30,09
Skupaj prihodki Total revenues	100,00	7.782.961,86	6.777.621,03	114,83

ODHODKI V EUR EXPENSES IN EUR	STRUKTURA 2018 (%) STRUCTURE 2018 (%)	2018	2017	INDEKS 2018/17 INDEX 2018/17
Stroški dela Labour	60,31	4.574.279,48	4.072.840,22	112,31
Stroški amortizacije Amortization	6,49	492.494,04	458.261,16	107,47
Stroški materiala Material	10,80	819.329,90	667.050,62	122,83
Stroški storitev Services	21,35	1.619.144,21	1.359.769,39	119,07
Drugi stroški in odhodki Other	1,05	79.629,10	57.772,07	137,83
Skupaj odhodki Total expenditure	100,00	7.584.876,73	6.615.693,46	114,65

REZULTAT POSLOVANJA BUSINESS RESULT		198.085,13	161.927,57	122,33

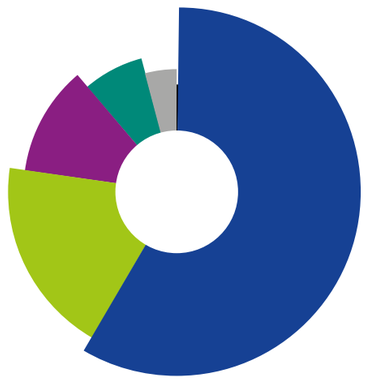
OVERVIEW OF INSTITUTE OPERATIONS IN 2018

The 2018 financial year was very successful for NIB. Most of the objectives have been achieved, and some were even exceeded.

The financial objectives set out in the 2018 financial plan were exceeded both in revenues and in profit. We posted revenues of 7,782,962 EUR, which is 152,616 EUR (2%) more than planned, while the generated profit of 198,085 EUR (before corporate income tax) exceeded the planned profit by 99,612 EUR.

Compared to 2017, NIB's realised gains and losses in 2018 were 1,005,341 EUR and 969,183 EUR (14.83% and 14.46%) higher. As a result, NIB had a better P&L in 2018 than in 2017 (by 36,158 EUR or 22.33%). Nominally, the greatest revenue increase in 2018 compared to 2017 was achieved in relation to revenues from the Slovenian Research Agency (ARRS). These equalled 4,555,267 EUR and were 435,805 EUR (10.58%) higher than comparable revenues in 2017; revenues for research programmes increased by 178,620 EUR (mostly due to the increase in funding following the 2018 assessment), and revenues for research projects increased by 156,787 EUR (mostly due to success in newly-acquired projects). Next in terms of the nominal amount of increase were revenues generated in projects from various European programmes (INTERREG, LIFE, ...), which equalled 599,059 EUR in 2018 and were by as much as 364,440 EUR (155.33%) higher than comparable revenues in 2017. The reason for the revenue increase mainly lies in the fact that some of the projects acquired in 2017 were launched in late 2017 and were underway throughout 2018. In 2018, revenues from other public services were 131,181 EUR (18.52%) higher than in 2017, mostly due to the increased funding for the professional task of plant protection.

STRUKTURA PRIHODKOV NIB V LETU 2018



REVENUE STRUCTURE IN 2018

- 58,53 % Prihodki od ARRS Slovenian Research Agency
- 18,81 % Druge javne službe Other public institutions
- 11,36 % Evropski skladi EU funds
- 7,02 % Domači trg Domestic market
- 4,15 % Tuji trg Foreign markets
- 0,13 % Drugi prihodki Other revenues

V zbirki Biološke knjižnice so tudi redke in dragocene knjige (foto: Barbara Černač).

Leto 2018 je bilo za NIB uspešno tudi na področju izvajanja temeljnega raziskovanja. V tem letu so NIB-ovi raziskovalci objavili 133 znanstvenih člankov v revijah s faktorjem vpliva, od teh 73 v revijah v prvem kvartilu.

Tudi z vidika začetka izvajanja novih projektov je bilo leto 2018 za NIB uspešno. Izvajati je začel devet projektov ARRS (pet kot nosilna organizacija, štiri kot sodelujoča), tri projekte iz programa Obzorje 2020 (dodatno sta bila pridobljena še dva, ki se začneta izvajati v 2019), tri projekte iz drugih evropskih programov (INTERREG, LIFE) in tri projekte iz evropskih strukturnih skladov (razpis MIZŠ za spodbujanje raziskovalcev na začetku kariere). Zelo pomemben dosežek NIB-a v letu 2018 je bila pridobitev statusa dveh evropskih referenčnih laboratorijev na področju varstva rastlin.

Leto 2018 je bilo zaznamovano tudi z NIB-ovim intenzivnim sodelovanjem pri prijavah projektov na različne razpise. Tako je NIB kot nosilna organizacija na javni razpis ARRS za (so)financiranje raziskovalnih projektov za leto 2019 prijavil 21 predlogov projektov in sodeloval pri 20 prijavah predlogov projektov. NIB je sodeloval še pri petih prijavah predlogov projektov na razpisih v okviru programa Obzorje 2020 in pri 20 prijavah predlogov projektov drugih različnih mednarodnih razpisov.

Sodelovanje Nacionalnega inštituta za biologijo na Znanstivalu 2018.

2018 was also a successful year for NIB in terms of the implementation of basic research. In this year, NIB researchers published 133 scientific articles in journals with impact factors, of these 73 in journals in the first quartile.

NIB also had a successful 2018 in terms of the launch of new projects. NIB launched nine projects of the Slovenian Research Agency (five as the leading and four as a participating organisation), three projects from the Horizon 2020 programme (two were acquired subsequently and are set to commence in 2019), three projects from other European programmes (INTERREG, LIFE) and three projects from European structural funds (Ministry of Education, Science and Sport's call for proposals for support to researchers in early stage of career). One of NIB's major achievements in 2018 was obtaining two EU reference laboratory designations in the field of plant protection.

2018 was marked by NIB's intensive collaboration in project applications for various calls for proposals. As such, NIB submitted 21 project proposals for the Slovenian Research Agency's call for proposals for (co-)funding research projects in 2019 as the leading organisation and participated in 20 submissions of project proposals. NIB also participated in five project proposal applications for calls for proposals within the Horizon 2020 programme and in 20 project proposal applications in various other international calls for proposals.

Rare and valuable books in the Biology Library collection (Photo: Barbara Černač).

Participation of the National Institute of Biology at Znanstival 2018 science festival.

IZVAJANJE RAZISKOVALNIH PROGRAMOV IN PROJEKTOV

Kot nosilec je NIB leta 2018 izvajal naslednje raziskovalne programe:

- **P1-0237 – Raziskave obalnega morja**, ki poteka v organizacijski enoti MBP (7,78 FTE), obdobje financiranja 2015–2019;
- **P4-0165 – Biotehnologija in sistemska biologija rastlin**, ki poteka v organizacijski enoti FITO (5,4 FTE), obdobje financiranja 2015–2020;
- **P1-0255 – Združbe, interakcije in komunikacije v ekosistemih**, ki poteka v organizacijski enoti EKOS (6,4 FTE) ter v soizvajalski organizaciji Prirodoslovnega muzeja Slovenije (0,19 FTE), obdobje financiranja 2017–2022;
- **P1-0245 – Ekotoksikologija, toksikološka genomika in karcinogeneza**, ki se ga izvaja v organizacijski enoti GEN (3,83 FTE), obdobje financiranja 2015–2018.

Poleg teh štirih raziskovalnih programov je organizacijska enota MBP sodelovala še pri izvajanju programa **P1-0143 – Kroženje snovi v okolju, snovna bilanca in modeliranje okoljskih procesov ter ocena tveganja**, katerega nosilec je Institut Jožef Stefan, v obsegu 0,33 FTE za NIB.

NIB je leta 2018 izvajal tudi infrastrukturni program v obsegu 6 FTE.

NIB je leta 2018 izvajal 23 projektov ARRS v skupnem obsegu 21.269 raziskovalnih ur oz. 12,51 FTE, in sicer:

- 18 temeljnih (osem kot nosilec),
- dva aplikativna (enega kot nosilec) in
- tri podoktorske projekte.

Obseg financiranja projektov s strani ARRS je bil v letu 2018 za 2,25 FTE oz. 18 % večji kot v preteklem letu.

NIB je leta 2018 izvajal štiri projekte v sklopu CRP »Zagotovimo si hrano za jutri« (kot nosilec) in en projekt v okviru »CRP 2016« (kot sodelujoča raziskovalna organizacija) v skupni vrednosti 51.422 EUR, in sicer:

- tri kot nosilec in
- dva kot sodelujoča raziskovalna organizacija.

Obseg projektov CRP se je po obsegu sredstev leta 2018 v primerjavi s preteklim letom zmanjšal za 30,44 %.

V 2018 je NIB izvajal devet projektov iz programa Obzorje 2020. Od teh se je v tem letu en projekt zaključil, trije pa začeli izvajati. Višina ustvarjenih prihodkov v okviru teh projektov je znašala 280.998 EUR in je predstavljala 3,61 % vseh prihodkov NIB-a.

Poleg teh je NIB v letu 2018 izvajal še dva projekta iz programa ARIMNET, ki sodi v 7. okvirni program EU, ter en projekt iz programa EMPIR in dva projekta iz programa ERA CoBio Tech, ki sta sestavni del programa Obzorje 2020. Višina prihodkov iz teh treh projektov je v letu 2018 znašala 213.303 EUR in je predstavljala 2,74 % vseh prihodkov.

V 2018 je NIB izvajal 11 projektov iz drugih mednarodnih programov financiranja (LIFE, INTERREG Italija-Slovenija, INTERREG Slovenija-Hrvaška, INTERREG Europe itn.).

Poleg teh je izvajal še šest projektov, sofinanciranih s strani evropskih kohezijskih in investicijskih skladov prek slovenskih ministrstev: dva projekta z razpisa MIZŠ »RRI v verigah in mrežah vrednosti«, tri projekte z razpisa MIZŠ za spodbujanje raziskovalcev na začetku kariere in enega z razpisa »Spodbujanje dejavnosti prenosa znanja prek delovanja pisarn za prenos tehnologij«.

Višina ustvarjenih prihodkov v okviru teh projektov je znašala 937.396 EUR in je predstavljala 12,04 % vseh prihodkov v letu 2018.

IMPLEMENTATION OF RESEARCH PROGRAMMES AND PROJECTS

NIB carried out the following research programmes as leader in 2018:

- **P1-0237 – Coastal Sea Research**, running in the MBP organisational unit (7.78 FTE), funding period 2015–2019;
- **P4-0165 – Biotechnology and Plant Systems Biology**, running in the FITO organisational unit (5.4 FTE), funding period 2015–2020;
- **P1-0255 – Communities, Interactions and Communications in Ecosystems**, running in the EKOS organisational unit (6.4 FTE) and co-implemented by the Slovenian Museum of Natural History (0.19 FTE), funding period 2017–2022;
- **P1-0245 – Ecotoxicology, Toxicogenomics and Carcinogenesis**, running in the GEN organisational unit (3.83 FTE), funding period 2015–2018.

In addition to these four research programmes, the MBP organisational unit also collaborated in the implementation of programme **P1-0143 – Cycling of substances in the environment, mass balances, modelling of environmental processes and risk assessment**, with Jožef Stefan Institute as the project leader, in the amount of 0.33 FTE for NIB.

In 2018, NIB implemented an infrastructural programme equalling 6 FTE.

In 2018, NIB carried out 23 ARRS projects totalling 21,269 research hours or 12.51 FTE, specifically:

- 18 basic (eight as the leader),
- two applied (one as the leader) and
- three post-doctoral projects.

The amount of project funding provided by the Slovenian Research Agency in 2018 was 2.25 FTE or 18% higher than in the year before.

In 2018, NIB carried out four projects within the framework of the targeted research programme "Providing Food for Tomorrow" (as the leader) and one project within the framework of "CRP 2016" (as a participating research organisation) totalling 51,422 EUR, specifically:

- three as the leader and
- two as a participating research organisation.

In 2018, the scope of targeted research programme projects decreased by 30.44% compared to 2017 in terms of the amount of funds.

NIB carried out nine Horizon 2020 projects in 2018. Of these, one project was completed and three were started this year. These projects generated 280,998 EUR of revenues, or 3.61% of NIB's total revenues.

Additionally, in 2018 NIB carried out two projects from the ARIMNET programme, which is a part of EU's Seventh Framework Programme, as well as one project from the EMPIR programme and two projects from the ERA CoBio Tech programme, which are integral parts of the Horizon 2020 programme. These three projects generated 213,303 EUR of revenues in 2018, or 2.74% of total revenues.

In 2018, NIB implemented 11 projects from other international funding programmes (LIFE, INTERREG Italy-Slovenia, INTERREG Slovenia-Croatia, INTERREG Europe, etc.).

It also ran six projects that were co-funded by European cohesion and investment funds via the Slovenian ministries: two projects from the Ministry of Education, Science and Sport's call for proposals "RDI in value chains and networks", three projects from the Ministry of Education, Science and Sport's call for proposals for support to researchers in early stage of career and one project from the call for proposals "Promoting knowledge transfer through the operation of technology transfer offices".

These projects generated 937,396 EUR of revenues, or 12.04% of NIB's total revenues in 2018.

Javna predstavitev Biotehnološkega stičišča NIB. Public presentation of Biotechnological Hub NIB.

INVESTICIJE

NIB je v letu 2018 realiziral investicijska vlaganja v višini 460.920,80 EUR, kar predstavlja tudi višino aktiviranih sredstev. Viri nabav so neporabljena amortizacija preteklih let in obračunana amortizacija tekočega leta v višini 397.724,14 EUR, prejeti investicijski transfer s strani MORS v višini 14.000,00 EUR, sredstva, prejeta iz projektnega financiranja (ČIGRA, NAT2CARE), v višini 35.812,51 EUR in s strani zavarovalnice prejete odškodnine za nabavo osnovnih sredstev v višini 13.384,15 EUR.

V letu 2018 so bile opravljene številne dejavnosti za zagotovitev finančnih sredstev za načrtovano investicijo. Predvsem je treba izpostaviti evalvacijo načrtovane investicije s strani mednarodnega tima ekspertov, izvedeno v januarju 2018, in obisk ministra dr. Pikala na temo zagotovitve virov za financiranje načrtovane investicije v decembru 2018. Poleg tega je na pobudo NIB European Investment Advisory Hub pri Evropski investicijski banki izvedel izhodiščno evalvacijo primernosti investicije za kreditni aranžma prek te finančne institucije.

INVESTICIJSKI PROJEKT BIOTEHNOLOŠKO STIČIŠČE NACIONALNEGA INŠTITUTA ZA BIOLOGIJO (BTS-NIB)

NIB je za evalvacijo svoje prihodnje strateške usmeritve, vključno z načrtovano investicijo »Biotehnološko stičišče NIB«, angažiral vrhunske mednarodne strokovnjake, člane KEN Global Expert Pool (Raghunath Anant Mashelkar, Nava Swersky Sofer, Stephen Minger, Vojmir Urlep in Stanislav Pejovnik). V okviru evalvacije je v petek, 12. januarja 2018, v Hotelu Four Points by Sheraton, Ljubljana Mons, potekala javna predstavitev investicijskega projekta »Biotehnološko stičišče NIB (BTS-NIB). Na predstavitvi so svojo pozitivno oceno načrtovane investicije NIB predstavili angažirani strokovnjaki, svoja stališča glede Biotehnološkega stičišča NIB pa so izrazili tudi predstavniki gospodarstva, ministrstev, parlamenta, Slovenskega gospodarskega in raziskovalnega združenja v Bruslju ter akademskih inštitucij. V diskusiji ob koncu predstavitve so prisotni podprli nujnost izvedbe projekta »Biotehnološkega stičišča Nacionalnega inštituta za biologijo (BTS-NIB)« kot platforme za nadaljnje sodelovanje med znanostjo in gospodarstvom.

Načrtovana investicija Biotehnološko stičišče NIB. Planned investment Biotechnological Hub NIB.

INVESTMENTS

In 2018, NIB invested 460,920.80 EUR, which is also the amount of funding that was mobilised. Sources of supply include unused depreciation from past years and a depreciation expense for the current year of 397,724.14 EUR, an investment transfer of 14,000.00 EUR received from the Ministry of Defence, funds received from project funding (ČIGRA, NAT2CARE) equalling 35,812.51 EUR and compensation equalling 13,384.15 EUR received from an insurance company for the acquisition of fixed assets.

In 2018, we carried out a number of activities in order to secure funds for the planned investment. Above all, we should highlight the evaluation of the planned investment by an international team of experts carried out in January 2018 and the visit of Minister Pikalo in December 2018 on the topic of providing sources for funding the planned investment. At NIB's initiative, the European Investment Advisory Hub with the European Investment Bank also performed an initial investment suitability evaluation in order to obtain a credit facility from this financial institution.

BIOTECHNOLOGICAL HUB - NATIONAL INSTITUTE OF BIOLOGY (BTH-NIB) INVESTMENT PROJECT

In order to obtain evaluation of its strategic future orientation, including the investment of Biotechnological Hub NIB, a group of world-renowned experts, members of KEN Global Expert Pool (Raghunath Anant Mashelkar, Nava Swersky Sofer, Stephen Minger, Vojmir Urlep and Stanislav Pejovnik) was invited by NIB. In this framework a public presentation of the Biotechnological Hub NIB investment project was held at the Four Points by Sheraton Hotel Mons Ljubljana on Friday 12 January 2018. At the event experts presented their positive assessment of the planned investment project and representatives of the economic sector, state ministries and the parliament, Slovenian Business & Research Association from Brussels and several academic institutions expressed their views on the project as well. In the discussion that followed the presentation on the audience supported the realisation of the project and stressed the importance of BTH-NIB as a platform for further cooperation between science and the economic sector.

ZAPOSLENI V LETU 2018

Inštitut je bil v letu 2018 sestavljen iz štirih raziskovalnih enot in Skupnih služb. Zaposleni v največjih dveh enotah predstavljajo 60 % vseh zaposlenih na NIB-u. Oddelek za biotehnologijo in sistemsko biologijo je imel 31. 12. 2018 zaposlenih 50 sodelavcev, enota Morska biološka postaja Piran 32 sodelavcev, Oddelek za genetsko toksikologijo in biologijo raka 16 sodelavcev, Oddelek za raziskave organizmov in ekosistemov 23, Skupne službe pa 15 sodelavcev.

Na NIB-u je bilo tako na dan 31. 12. 2018 136 zaposlenih, od tega 76 raziskovalcev, 18 mladih raziskovalcev ter 42 strokovno-tehničnih in administrativnih sodelavcev.

V letu 2018 se je na novo zaposlilo 21 sodelavcev, štirim je delovno razmerje na NIB-u prenehalo.

V letu 2018 je doktoriralo šest mladih raziskovalcev, usposabljati se je začelo pet mladih raziskovalcev.

Na dan 31. 12. 2018 je bilo na inštitutu zaposlenih 54 % delavcev z doktoratom znanosti, 4 % z magisterijem znanosti, 32 % s VII. stopnjo izobrazbe, 10 % zaposlenih je imelo nižjo izobrazbo od VII. stopnje.

STANJE PO ORGANIZACIJSKIH ENOTAH
NA DAN 31. 12. 2018

NUMBER OF STAFF BY UNITS
ON 31. 12. 2018

- 23 % MBP MBS
- 37 % FITO
- 12 % GEN
- 17 % EKOS
- 11 % Skupne službe Joint Services

EMPLOYEES IN 2018

The Institute was in 2018 comprised of four research units and Corporate Services. The employees in the biggest two units represent 60% of all NIB employees. On 31 December 2018, the Department of Biotechnology and Systems Biology had 50 employees, the Marine Biology Station Piran unit had 32, the Department of Genetic Toxicology and Cancer Biology had 16, the Department of Organisms and Ecosystems Research had 23 and Corporate Services had 15.

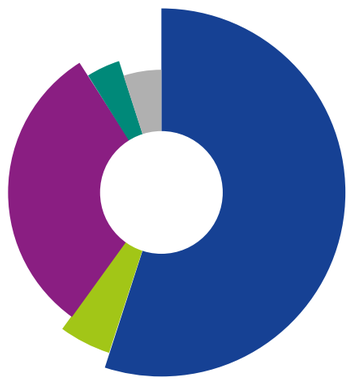
On 31 December 2018, NIB had 136 employees, of which 76 were researchers, 18 were young researchers and 42 were professional-technical and administrative staff.

In 2018, 21 new employees were hired and four employment relationships at NIB were terminated.

In 2018, six young researchers received their doctorate and five young researchers began training.

On 31 December 2018, 54% of the Institute's employees had doctoral degrees, 4% had master's degrees, 32% had a level of education of VII and 10% had a level of education lower than VII.

IZOBRAZBENA STRUKTURA
NA DAN 31. 12. 2018



EDUCATIONAL STRUCTURE
ON 31. 12. 2018

- 54 % Doktorat znanosti PhD
- 4 % Magisterij znanosti MSc
- 32 % VII. stopnja Higher education
- 6 % VI. stopnja Higher Vocational
- 4 % V. stopnja High school

DOKTORATI, MAGISTERIJI IN DIPLOME V LETU 2018

Svojo doktorsko disertacijo so pripravili pod (so)mentorstvom raziskovalcev z NIB in jo zagovarjali v letu 2018:

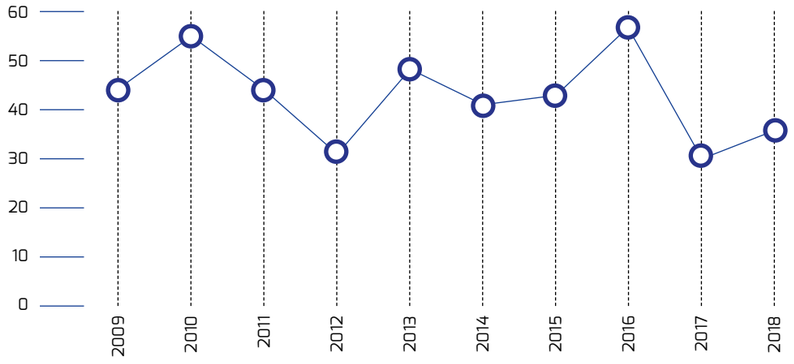
DOCTORAL DISSERTATIONS, MASTER'S THESES AND UNDERGRADUATE THESES IN 2018

Doctoral dissertations under the (co)supervision of NIB researchers in 2018:

ŠTUDENT/ STUDENT	(SO) MENTOR/ (CO)SUPERVISOR
Alič, Špela (FITO)	Mentorica prof. dr. Maja Ravnikar (FITO), somentorica dr. Tanja Dreo (FITO)
Bogožalec Košir, Alexandra (FITO)	Mentorica izr. prof. dr. Jana Žel (FITO), somentor dr. David Dobnik (FITO)
Breznik, Barbara (GEN)	Mentorica prof. dr. Tamara Lah Turnšek (GEN), somentor prof. dr. Cornelis J.F. van Noorden (GEN)
Čandek, Klemen (EKOS)	Mentor izr. prof. dr. Matjaž Kuntner (EKOS), somentor prof. dr. Ingi Agnarsson
Debeljak, Barbara (EKOS)	Mentor prof. dr. Anton Brancelj (EKOS)
Furlan, Petra	Mentorica izr. prof. dr. Nives Kovač (MBP), somentorica prof. dr. Majda Cencič
Carita Gonçalves, Jose Manuel	Mentorja izr. prof. dr. Valentina Turk (MBP) in dr. Ion Gutiérrez Aguirre (FITO)
Lukan, Tjaša (FITO)	Mentorica prof. dr. Kristina Gruden (FITO), somentorica doc. dr. Špela Baebler (FITO)
Vidic, Mateja	Mentorica prof. dr. Tamara Lah Turnšek (GEN), somentor prof. dr. Henning Ulrich

ŠTEVILO DIPLOMSKIH, MAGISTRSKIH IN DOKTORSKIH NALOG POD (SO)MENTORSTVOM RAZISKOVALCEV Z NACIONALNEGA INŠTITUTA ZA BIOLOGIJO V OBDOBJU 2009-2018

NUMBER OF UNDERGRADUATE THESES, MASTER'S THESES AND DOCTORAL DISSERTATIONS UNDER (CO)SUPERVISION OF NIB RESEARCHERS IN YEARS 2009-2018



ŠTEVILO ZAGOVARJANIH MAGISTRSKIH IN DOKTORSKIH NALOG TER MENTORSTEV IN SOMENTORSTEV S STRANI ZAPOSLENIH NA NIB V LETU 2018

NUMBER OF MASTER'S THESES, DOCTORAL DISSERTATIONS, SUPERVISIONS AND CO-SUPERVISIONS BY NIB EMPLOYEES IN YEAR 2018

magistska naloga / Master's Thesis	5
doktorska disertacija / Doctoral Dissertation	6
mentor pri doktorskih disertacijah / Supervisor for Doctoral Dissertations	10
mentor pri magistrskih delih / Supervisor for Master's Thesis	17
mentor pri diplomskih delih / Supervisor for Undergraduate Theses	5
somentor pri doktorskih disertacijah / Co-Supervisor for Doctoral Dissertations	4
somentor pri magistrskih delih / Co-Supervisor for Master's Thesis	7
somentor pri diplomskih delih / Co-Supervisor for Undergraduate Theses	7

OBJAVE IN CITIRANOST V LETU 2018

PUBLICATIONS AND CITATIONS IN 2018

Objavljeni članki (izvirni in pregledni znanstveni članki, kratki znanstveni prispevki) po letu objave, povprečnem faktorju vpilva po JCR (Journal Citation Reports), povprečni umeščenosti revije, v kateri so bili objavljeni, v področne četrtine ("kvartile") po JCR ter število čistih citatov po Web of Science/ Scopus:

Published articles (Original Scientific Articles, Review Articlees and Short Scientific Articles) by year, average Impact Factor (JCR), average journal quarter position (JCR) and number of pure citations in Web of Science/Scopus:

LETO / YEAR	ŠTEVILO OBJAVLJENIH ZNANSTVENIH ČLANKOV / NUMBER OF PUBLISHED SCIENTIFIC ARTICLES	POVPREČNI IF (JCR) / AVERAGE IF (JCR)	POVPREČNA UMEŠČENOST REVIJE V ČETRINE PO JCR / AVERAGE JOURNAL QUARTER POSITION (JCR)	ŠTEVILO ČISTIH CITATOV / NUMBER OF PURE CITATIONS
2014	92	2,735	2	2313
2015	98	2,604	2	2363
2016	98	2,908	2	2468
2017	113	2,899	2	2421
2018	109	3,148	2	3505

NAJVPLIVNEJŠI ČLANKI V LETU 2018

THE MOST INFLUENTIAL ARTICLES IN 2018

ALIČ, Špela, GIJSEGEM, F. van, PÉDRON, Jacques, RAVNIKAR, Maja, DREO, Tanja. Diversity within the novel Dickeya fangzhongdai sp., isolated from infected orchids, water and pears. *Plant Pathology*, ISSN 0032-0862, 2018, vol. 67, iss. 7, str. 1612-1620, doi: 10.1 111/ppa.12866. [COBISS.SI-ID 4709967]
IF (JCR)=2.303

CHAMBERLAND, Lisa, MCHUGH, Anne, KECHEJIAN, Sarah, BINFORD, Greta, BOND, Jason E., CODDINGTON, Jonathan A., DOLMAN, Gaynor, HAMILTON, A. Chris, HARVEY, Mark S., KUNTNER, Matjaž, AGNARSSON, Ingi. From Gondwana to GAARlandia : evolutionary history and biogeography of ogre-faced spiders (Deinopis). Journal of biogeography, ISSN 0305-0270, 2018, vol. 45, iss. 11, str. 2442-2457, doi: 10.1111/jbi.13431. [COBISS.SI-ID 4838223]
IF (JCR)=4.154

GIOVANARDI, Franco, FRANCÉ, Janja, MOZETIČ, Patricija, PRECALI, Robert. Development of ecological classification criteria for the Biological Quality Element phytoplankton for Adriatic and Tyrrhenian coastal waters by means of chlorophyll a (2000/60/EC WFD). *Ecological indicators : integrating monitoring, assessment and management*, ISSN 1470-160X, 2018, vol. 93, str. 316-332, doi: 10.1016/j.ecolind.2018.05.015. [COBISS.SI-ID 4701775]
IF (JCR) = 3.983

KOVAČ, Nives, GLAVAŠ, Neli, RAMŠAK, Teja, DOLENEC, Matej, ROGAN ŠMUC, Nastja. Metal(oid) mobility in a hypersaline salt marsh sediment (Sečovlje Salina, northern Adriatic, Slovenia). *Science of the total environment*, ISSN 0048-9697, 2018, vol. 644, str. 350-359, doi: 10.1016/j.scitotenv.2018.06.252. [COBISS.SI-ID 1409630]
IF (JCR)= 4.61

MANTZOUKI, Evanthia, REMEC-REKAR, Špela, ELERŠEK, Tina, et al. A European multi lake survey dataset of environmental variables, phytoplankton pigments and cyanotoxins. Scientific data, ISSN 2052-4463, 2018, vol. 5, str. [1-13], ilustr., doi: 10.1038/sdata.2018.226. [COBISS.SI-ID 4909903]
IF (JCR)=5.311

RAMŠAK, Živa, COLL RIUS, Anna, STARE, Tjaša, TZFADIA, Oren, BAEBLER, Špela, VAN DE PEER, Yves, GRUDEN, Kristina. Network modelling unravels mechanisms of crosstalk between ethylene and salicylate signalling in potato. *Plant Physiology*, ISSN 0032-0889, 2018, vol. 178, str. 488-499, doi: 10.1104/pp.18.00450. [COBISS.SI-ID 4778575]
IF (JCR)=5.949

TOMC, Jana, KOLOŠA, Katja, ŽEGURA, Bojana, KAMENŠEK, Urška, BREZNIK, Barbara, LAH TURNŠEK, Tamara, FILIPIČ, Metka. Adipose tissue stem cell-derived hepatic progenies as an in vitro model for genotoxicity testing. *Archives of toxicology*, ISSN 0340-5761, 2018, vol. 92, iss. 5, str. 1893-1903, doi: 10.1007/s00204-018-2190-3. [COBISS.SI-ID 4650575]
IF (JCR)=5.728

VIGIAK, Olga, LUTZ, Stefanie, MENTZAFOU, Angeliki, CHIOGNA, Gabriele, YE, Tuo, MAJONE, Bruno, BECK, Hylke, ROO, Ad de, MALAGÓ, Anna, BOURAOUI, Faycal, KUMAR, Rohini, SAMANIEGO, Luis, MERZ, Ralf, GAMVROUDIS, Christos, SKOULIKIDIS, Nikolaos, NIKOLAIDIS, Nikolaos P., BELLIN, Alberto, ACUÑA, Vicenç, MORI, Nataša, LUDWIG, Ralf, PISTOCCHI, Alberto. Uncertainty of modelled flow regime for flow-ecological assessment in Southern Europe. Science of the total environment, ISSN 0048-9697, 2018, vol. 615, str. 1028-1047., doi: 10.1016/j.scitotenv.2017.09.295. [COBISS.SI-ID 4476751]
IF (JCR)=4.61

VOLLAND, Jean-Marie, SCHINTLMEISTER, Arno, ZAMBALOS, Helena, REIPERT, Siegfried, MOZETIČ, Patricija, ESPADA-HINOJOSA, Salvador, TURK, Valentina, WAGNER, Michael, BRIGHT, Monika. NanoSIMS and tissue autoradiography reveal symbiont carbon fixation and organic carbon transfer to giant ciliate host. *The ISME journal*, ISSN 1751-7362, 2018, vol. 12, str. 714-727 doi: 10.1038/s41396-018-0069-1. [COBISS.SI-ID 4610639]
IF (JCR)= 9.52

WALDHERR, Monika, MIŠÍK, Miroslav, FERK, Franziska, TOMC, Jana, ŽEGURA, Bojana, FILIPIČ, Metka, MIKULITS, Wolfgang, MAI, Sören, HAAS, Oskar, HUBER, Wolfgang W., HASLINGER, Elisabeth, KNASMÜLLER, Siegfried. Use of HuH6 and other human-derived hepatoma lines for the detection of genotoxins : a new hope for laboratory animals?. Archives of toxicology, ISSN 0340-5761, 2018, vol. 92, iss. 2, str. 921-934, doi: 10.1007/s00204-017-2109-4. [COBISS.SI-ID 4521807]
IF (JCR)=5,728

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IF (JCR)=4.52

BIBLIOGRAFIJA INŠTITUTA V LETIH 2009 – 2018 (ANALITIČNI PODATKI)

INSTITUTE'S BIBLIOGRAPHY IN 2009 – 2018 (ANALYTICAL DATA)

ZVRST DOKUMENTA TYPE OF DOCUMENT	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	SKUPAJ TOTAL
znanstveni članki z IF scientific papers with IF	71	58	72	86	83	79	80	82	97	91	**799**
znanstveni članki brez IF other scientific papers	25	21	9	16	7	13	18	16	16	18	**159**
strokovni in poljudni članki professional and popular articles	76	56	69	66	62	45	43	62	58	49	**586**
objavljeni prispevki s kongresov published conference papers	40	40	39	18	24	16	17	16	24	17	**251**
povzetki s kongresov published conference paper abstracts	161	145	159	101	166	166	156	149	159	178	**1540**
poglavja v knjigah book chapters	12	13	10	14	28	11	9	7	18	8	**130**
knjige books	1	3	4	4	3	6	1	6	5	1	**34**
poročila reports	30	30	27	28	34	23	35	38	51	51	**347**
doktorska dela dissertation theses	4	7	8	7	9	8	4	4	2	6	**59**
magistrska dela master's theses			1	1		2	1	2	1	5	**13**
patenti patents		2	4	3	2	2	2	0	1	1	**17**
razno other	73	93	128	121	207	138	161	151	217	250	**1539**
SKUPAJ TOTAL	**493**	**468**	**530**	**465**	**625**	**509**	**527**	**533**	**649**	**675**	**5474**

Prispevki soavtorjev iz različnih oddelkov NIB so šteti enkrat.
Papers of co-authors from different NIB departments are counted once.

Veliko nagrado Miroslava Zeia za življenjsko delo na področju dejavnosti NIB-a za leto 2018 je prejel prof. dr. Andrej Blejec, matematik in biostatistik, pionir interdisciplinarnega raziskovanja. The 2018 Grand Miroslav Zei Award for Life Work in the Field of Activities of NIB was presented to Prof. Dr Andrej Blejec, a mathematician and biostatistician and pioneer of interdisciplinary research.

USPEHI, NAGRADE IN PRIZNANJA V LETU 2018

NAGRADE MIROSLAVA ZEIA IN PRIZNANJA NACIONALNEGA INŠTITUTA ZA BIOLOGIJO

Ljubljana, 7. 11. 2018

NIB je ob 58-letnici obstoja že devetič podelil nagrade in priznanja, poimenovana po prof. dr. Miroslavu Zeiu, ki je bil eden njegovih ustanoviteljev. Slavnostni dogodek je potekal 7. 11. 2018 na NIB-u. Zbrane goste je slavnostno nagovoril predsednik Državnega zbora RS mag. Dejan Židan. Med častnimi gosti je bil tudi dr. Jernej Pikalo, minister za izobraževanje, znanost in šport.

Veliko nagrado Miroslava Zeia za življenjsko delo na področju dejavnosti NIB-a za leto 2018 je prejel prof. dr. Andrej Blejec, matematik in biostatistik, pionir interdisciplinarnega raziskovanja.

Nagrado Miroslava Zeia za izjemne dosežke na področju dejavnosti NIB-a za leto 2018 sta prejela dr. Matjaž Hren in dr. Klemen Zupančič, raziskovalca, podjetnika, ki sta svojo kariero začela kot mlada raziskovalca na NIB-u.

Nagrado za izjemno doktorsko delo na področju dejavnosti NIB-a sta prejela dr. Barbara Breznik in dr. Matjaž Novak. Na prireditvi je priznanja NIB-a prejelo tudi osem mladih sodelavcev NIB-a, ki so v obdobju od 1. oktobra 2017 do 30. septembra 2018 pridobili doktorske nazive.

RAZISKOVALCI NIB-A SO PREJELI VEČ NAGRAD SLOVENSKIH STROKOVNIH ZDRUŽENJ IN DRUGIH NAGRAD:

- dr. Špela Alič – velika Krkina nagrada za raziskovalno nalogo, Bakterijska bolezen mehkih gnilob, ki jo povzroča nova vrsta rodu *Dickeya* in možnost biološkega nadzora bolezni z bakteriofagi (mentorica prof. dr. Maja Ravnikar, somentorica dr. Tanja Dreo);

Podelitev Nagrad Miroslava Zeia in priznanj Nacionalnega inštituta za biologijo, 7. 11. 2018.
Miroslav Zei Awards and National Institute of Biology Award Recognitions, 7. 11. 2018.

ACHIEVEMENTS, AWARDS AND RECOGNITIONS IN 2018

MIROSLAV ZEI AWARDS AND NATIONAL INSTITUTE OF BIOLOGY AWARD RECOGNITIONS

Ljubljana, 7 November 2018

At its 58th anniversary, NIB held its ninth award and recognition ceremony, which is named after Prof. Dr Miroslav Zei, one of its founders. The ceremony was held on 7 November 2018 at NIB. The attending guests were addressed by the President of the National Assembly, MSc Dejan Židan. Dr Jernej Pikalo, the Minister of Education, Science and Sport, was also among the guests of honour.

The 2018 Grand Miroslav Zei Award for Life Work in the Field of Activities of NIB was presented to Prof. Dr Andrej Blejec, a mathematician and biostatistician and pioneer of interdisciplinary research.

The 2018 Miroslav Zei Award for Exceptional Achievements in the Field of Activities of NIB was conferred on Dr Matjaž Hren and Dr Klemen Zupančič, researchers and entrepreneurs who started their careers as young researchers at NIB.

The Miroslav Zei Award for Exceptional Doctoral Work in the Field of Activities of NIB went to Dr Barbara Breznik and Dr Matjaž Novak. Moreover, eight young NIB colleagues who received their doctorates from 1 October 2017 to 30 September 2018 were also given NIB recognition awards at the event.

NIB RESEARCHERS RECEIVED SEVERAL AWARDS FROM SLOVENIAN PROFESSIONAL ASSOCIATIONS AS WELL AS OTHER AWARDS:

- Dr Špela Alič – Grand Krka Prize for Research, Bacterial Soft Rot Disease Caused by New *Dickeya* Species and Its Bacteriophage Biocontrol Possibilities (supervisor Prof. Dr Maja Ravnikar, co-supervisor Dr Tanja Dreo);
- Dr Špela Alič, The British Society for Plant Pathology – BSPP, best student paper published in 2018 in *Plant Pathology*; to be eligible for consideration, the student must be the first author and the paper should be substantially the research work of the first author.

- dr. Špela Alič, The British Society for Plant Pathology – BSPP, najboljši študentski članek v 2018 v reviji Plant Pathology; da se študent lahko poteguje za nagrado, mora biti prvi avtor članka z velikim raziskovalnim prispevkom k objavljenemu delu;
- Katarina Bačnik – 1. nagrada za najboljšo predstavitev mladih raziskovalcev na 8. Monolitni šoli in simpoziju 2018, 16.–20. 6. 2018, Portorož;
- Katarina Bačnik – 1. nagrada za najboljšo študentsko predstavitev na ISFEV 2018 konferenci, 7.–10. 10. 2018, Arizona State University, Tempe, Arizona;
- Anja Pecman – srebrno priznanje za mentorstvo pri raziskovalni nalogi na področju biologije, Zveza za tehnično kulturo Slovenije, 52. srečanje mladih raziskovalcev Slovenije, 2018;
- Anja Pecman – nagrada za poster na Power of Viruses konferenci, 16.–18. 5. 2018, Poreč, Hrvaška;
- Arijana Filipić – najboljša predstavitev na 10th Eastern European IWA YWP Conference, Zagreb, Hrvaška, 7.–12. 5. 2018;
- Arijana Filipić – druga nagrada za najboljšo poljudno predstavitev na Znanstvenem slamu, Ljubljana, 19. 11. 2018;
- Alexandra Košir Bogožalec je na kongresu Genetika 2018 septembra v Radencih dobila nagrado za najboljši poster.

PRIZNANJE PROMETEJ ZNANOSTI ZA ODLIČNOST V KOMUNICIRANJU V ZNANOSTI

Slovenska znanstvena fundacija je podelila slovensko priznanje Prometej znanosti za odličnost v komuniciranju v znanosti mlademu raziskovalcu NIB-a mag. Timoteju Turku Dermastii. Med nagrajenci je bil tudi častni član NIB-a, prof. dr. Tom Turk, ki je prejel prestižni častni letni naziv komunikator znanosti.

PRIZNANJA ODLIČNI V ZNANOSTI 2018 JAVNE AGENCIJE ZA RAZISKOVALNO DEJAVNOST REPUBLIKE SLOVENIJE (ARRS) SO PREJELE NASLEDNJE RAZISKAVE IN RAZISKOVALCI:

- Iz programske skupine MBP (P1-0237): »Raziskave mikrobne preproge in solinskega blata v hipersalinem okolju Sečoveljskih solin in možnost uporabe peloida kot zdravilnega blata za terapevtske namene«, dr. Nives Kovač in dr. Neli Glavaš (interdisciplinarne raziskave).
- Iz programske skupine GEN (P1-0245): »Mezenhimske matične celice pripomorejo k napredovanju možganskih tumorjev«, prof. dr. Tamara Lah Turnšek in dr. Barbara Breznik (medicina/onkologija).
- Iz direktorjeve programske skupine na ZRC SAZU (P1-0236): »Genom pajka *Nephila clavipes* pokaže raznolikost pajčjih svilnih genov ter njihovo kompleksno ekspresijo«, izr. prof. dr. Matjaž Kuntner (naravoslovje/biologija).

ČASTNI RED RIO BRANCO FEDERATIVNE REPUBLIKE BRAZILIJE JE PREJELA PROF. DR. TAMARA LAH TURNŠEK

Dne 7. 9. 2018, na dan 196. obletnice razglasitve neodvisnosti Brazilije in 129. obletnice razglasitve republike, je Njegova Ekscelenca veleposlanik Federativne republike Brazilije v Sloveniji Renato Mosca de Souza prof. dr. Tamari Lah Turnšek podelil odlikovanje častni red Rio Branco. **Gre za najvišje mogoče odlikovanje brazilske države tujemu državljanu, ki ga podelijo uglednim osebnostim, ki so pomembno prispevale h krepitvi mednarodnega sodelovanja in prijateljstva med državama.** Priznanje prof. dr. Tamari Lah Turnšek priznava izjemno delo, ki ga je opravila v zadnjih desetletjih v korist znanstvenega sodelovanja, zavedajoč se pomena spodbujanja izobraževanja, znanosti in tehnologije.

Častni red Rio Branco Federativne republike Brazilije je prejela prof. dr. Tamara Lah Turnšek (foto: arhiv NIB).
Prof. Dr. Tamara Lah Turnšek received the Order of the Rio Branco of the Federative Republic of Brazil (Photo: NIB archive).

- Katarina Bačnik – 1st Prize for best young researcher's presentation at the 8th Monolith Summer School and Symposium 2018, 16–20 June 2018, Portorož;
- Katarina Bačnik – 1st Prize for the best student presentation at the ISFEV 2018 conference, 7–10 October 2018, Arizona State University, Tempe, Arizona;
- Anja Pecman – Silver Award for mentoring on the research assignment in biology, Association for Technical Culture of Slovenia, 52nd Meeting of Young Researchers of Slovenia, 2018;
- Anja Pecman – Best Poster Award at the Power of Viruses conference, 16–18 May 2018, Poreč, Croatia;
- Arijana Filipić – Best presentation at the 10th Eastern European IWA YWP Conference, Zagreb, Croatia, 7–12 May 2018;
- Arijana Filipić – Second place for the best non-technical presentation at the "Znanstveni slam" event, Ljubljana, 19 November 2018;
- Alexandra Košir Bogožalec received the Best Poster Award at the Genetika 2018 congress held in September in Radenci.

PROMETHEUS OF SCIENCE FOR EXCELLENCE IN SCIENCE COMMUNICATION

The Slovenian Science Foundation presented the "Prometheus of Science for Excellence in Science Communication" Award to one of NIB's young researchers, MSc Timotej Turk Dermastia. Prof. Dr Tom Turk, a honorary member of NIB, was also among the award winners; he received the prestigious honorary annual title Science Communicator.

THE FOLLOWING STUDIES AND RESEARCHERS RECEIVED THE 2018 EXCELLENT IN SCIENCE AWARD OF THE SLOVENIAN RESEARCH AGENCY:

- From the MBP (P1-0237) programme group: "Raziskave mikrobne preproge in solinskega blata v hipersalinem okolju Sečoveljskih solin in možnost uporabe peloida kot zdravilnega blata za terapevtske namene" (Studies of the microbial mat and the salt-pan mud in the hypersaline environment of the Sečovlje saltworks and the potential uses of the peloid as medicinal mud for therapeutic purposes), Dr Nives Kovač and Dr Neli Glavaš (interdisciplinary research).
- From the GEN (P1-0245) programme group: "Mezenhimske matične celice pripomorejo k napredovanju možganskih tumorjev" (Mesenchymal stem cells contribute to the progression of brain tumours), Prof. Dr Tamara Lah Turnšek and Dr Barbara Breznik (medicine/oncology).
- From the Director's programme group at ZRC SAZU (P1-0236): "The *Nephila clavipes* genome highlights the diversity of spider silk genes and their complex expression", Assoc. Prof. Dr Matjaž Kuntner (natural science/biology).

PROF. DR. TAMARA LAH TURNŠEK RECEIVED THE ORDER OF THE RIO BRANCO OF THE FEDERATIVE REPUBLIC OF BRAZIL.

On 7 September 2018, on the date of the 196th anniversary of Brazil's declaration of independence and the 129th anniversary of the proclamation of the republic, His Excellency Renato Mosca de Souza, Ambassador of the Federative Republic of Brazil, presented the Order of the Rio Branco to Prof. Dr Tamara Lah Turnšek. **This is Brazil's highest possible decoration for foreign citizens, which is awarded to eminent figures who have significantly contributed to the strengthening of international cooperation and friendship between the two countries.** This is a recognition of the exceptional work Prof. Dr Tamara Lah Turnšek has done in the past decades for the benefit of scientific cooperation, acknowledging the importance of promoting education, science and technology.

IZUMI IN INOVACIJE

Izumi in inovacije za NIB pomenijo odsev rezultatov raziskovalnega dela in potencial kakovostnega sodelovanja z gospodarstvom, kar je eden od dolgoročnih ciljev NIB-a. Na NIB-u je področje izumov in inovacij v domeni Komisije za izume, sestavljene iz raziskovalcev, ki jih predlagajo oddelki NIB-a, ter predstavnikov Pisarne za prenos tehnologij.

V letu 2018 se je za izum dr. Bojana Sedmaka s partnerji Arhel, d. o. o., Biotehniška fakulteta Univerze v Ljubljani in Envita, d. o. o., »Metoda in sistem za sočasno zaznavanje koncentracije mikrodelcev v suspenziji in njihovih morfoloških in fizioloških značilnosti« nadaljeval postopek za podelitev patenta v okviru EPO. Podelitev patenta je načrtovana v letu 2019.

V letu 2018 se je začel postopek za preverbo izuma in bila izvedena prijava patenta na področju virusov v vodi. Gre za skupni izum raziskovalcev NIB-a (Maja Ravnikar, Jana Žel, David Dobnik, Ion Gutierrez, Nataša Mehle in Arijana Filipić) in raziskovalcev IJS-ja.

Novembra 2018 je bila izvedena delavnica za sodelavce v Pisarni za prenos tehnologij in za raziskovalce »From Research to Patent« v izvedbi strokovnjaka Evropskega patentnega urada.

Delavnica je bila namenjena krepitvi znanj in kompetenc s področja upravljanja izumov in prenosa tehnologij za zaposlene v Pisarni za prenos tehnologij in raziskovalce.

PRENOS ZNANJA V GOSPODARSTVO

S trženjem izdelkov in storitev na NIB-u se sistemsko ukvarja leta 2010 ustanovljena Pisarna za prenos tehnologij. V okviru leta 2017 ustanovljenega Konzorcija za prenos tehnologij iz JRO v gospodarstvo tudi pisarna na NIB-u izvaja različne dejavnosti (izobraževanja, usposabljanja in svetovanja na področju izdelave poslovnih načrtov, trženja izdelkov in storitev ter obvladovanja intelektualne lastnine), katerih namen je pospešiti prenos znanj v gospodarstvo oziroma povečati delež tržnih prihodkov NIB-a. Namen petletnega projekta, financiranega s strani MIZŠ, je spodbuditi krepitev povezav in sodelovanja med javnimi raziskovalnimi organizacijami in gospodarstvom ter krepitev kompetenc pisarn za prenos tehnologij, raziskovalcev in podjetij.

V letu 2018 se je na področju prenosa znanj v gospodarstvo na NIB-u še okrepilo področje razvoja in izvajanja molekularnih metod za kvantifikacijo virusov za gensko terapijo. Poleg tega je bilo vzpostavljeno sodelovanje s partnerji iz gospodarstva tudi na področju raziskav monitoringa morja, biodiverzitete in ekosistemskih storitev ter za raziskave tumorskih biomarkerjev.

Leta 2018 je bila izvedena akreditacija sistema kakovosti za testiranje mutagenosti v skladu z načeli dobre laboratorijske prakse OECD, kar pomeni temelj za trženje teh storitev za domače in tuje naročnike.

INVENTIONS AND INNOVATIONS

For NIB, inventions and innovations represent a reflection of the results of its research work and the potential to establish quality cooperation with the economy, which is one of NIB's long-term objectives. The field of inventions and innovations at NIB is managed by the Inventions Commission comprised of researchers put forward by the various NIB departments and representatives of the Technology Transfer Office.

In 2018, the patent granting procedure at the EPO continued for the invention of Dr Bojan Sedmak and partners Arhel, d. o. o., the Biotechnical Faculty of the University of Ljubljana and Envita, d. o. o. entitled "Method and system for simultaneous detection of micro-particle concentration in suspension and their morphological and physiological traits". The granting of the patent is planned for 2019.

In 2018, the invention examination procedure was launched and a patent application was filed in the field of viruses in water. This is a joint invention of NIB (Maja Ravnikar, Jana Žel, David Dobnik, Ion Gutierrez, Nataša Mehle and Arijana Filipić) and IJS researchers.

In November 2018, an expert from the European Patent Office held a workshop entitled From Research to Patent for colleagues in the Technology Transfer Office and for researchers.

The aim of the workshop was to strengthen the skills and competences in invention management and technology transfer for employees at the Technology Transfer Office and for researchers.

TRANSFER OF KNOWLEDGE TO THE ECONOMY

Set up in 2010, the Technology Transfer Office is engaged in the systematic marketing of products and services at NIB. As part of the KTT Consortium, which was established in 2017, the Office at NIB runs various activities (education, training and consultation in drawing up business plans, marketing products and services and intellectual property management) whose purpose is to facilitate the transfer of knowledge to the economy or to increase NIB's share of market revenues. The purpose of the five-year project funded by the Ministry of Education, Science and Sport is to promote the strengthening of connections and cooperation among public research institutions and the economy and to strengthen the competences of the technology transfer offices, researchers and businesses.

In 2018, in relation to the transfer of knowledge to the economy, the development and implementation of molecular methods for the quantification of gene therapy viruses at NIB has been further strengthened. In addition, cooperation with partners from the economy has also been established in the area of marine research monitoring, biodiversity and ecosystem services and research into tumour biomarkers.

The quality system for mutagenicity testing in accordance with the OECD Principles of Good Laboratory Practice was accredited in 2018, forming the basis for the marketing of these services to domestic and foreign clients.

1.0

SKUPNE SLUŽBE
JOINT SERVICES

Skupne službe izvajajo posamezne poslovne funkcije inštituta, kot so finance in računovodstvo, kadrovske zadeve, javna naročila, splošne zadeve, vodenje informacijskega sistema, administrativna podpora organom NIB-a in podobno. Poleg tega izvajajo podporne dejavnosti za raziskovalne organizacijske enote, zlasti administrativno-tehnično podporo vodenju projektov ter podporo prenosu znanja in tehnologij.

V sklopu Skupnih služb deluje tudi Biološka knjižnica, ki jo upravljata NIB in Oddelek za biologijo Biotehniške fakultete. Deluje na dveh lokacijah: v Biološkem središču v Ljubljani in na Morski biološki postaji Piran.

Corporate Services manages individual business functions at the Institute, for example finance and accounting, staff administration, public procurement, general affairs, IT system management, administrative support for NIB bodies and the like. It also performs support activities for the research organisational units, particularly administrative technical support for project management and support for the transfer of knowledge and technologies.

The Biology Library operates within Corporate Services and is managed jointly by NIB and the Department of Biology of the Biotechnical Faculty. It is situated at two locations: at the Biology Centre in Ljubljana and at Marine Biology Station Piran.

OSEBJE
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DEPUTY DIRECTOR FOR FINANCE AND GENERAL MATTERS
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Tomšič, Alenka

KNJIŽNJICA
LIBRARY
Černač, Barbara
Glavač, Lučka

Spremenljivost in odzivnost morskih ekosistemov.

Variability and resilience of marine ecosystems.

2.0

MORSKA BIOLOŠKA POSTAJA PIRAN

MARINE BIOLOGY STATION PIRAN

Največja sredozemska školjka leščur (*Pinna nobilis*) v morskem travniku kolenčaste cimodoceje (foto: Tihomir Makovec).
The biggest Mediterranean bivalve, the Noble Pen Shell (*Pinna nobilis*) in the seagrass meadow of *Cymodocea nodosa* (Photo: Tihomir Makovec).

VODJA: izr. prof. dr. Patricija Mozetič
HEAD: Assoc. Prof. Dr Patricija Mozetič

Izr. prof. dr. Patricija Mozetič je od marca 2018 vodja enote Morska biološka postaja Piran in hkrati tudi vodja raziskovalnega programa ARRS »Raziskave obalnega morja« ter izredna profesorica za področje ekologije na Univerzi na Primorskem. Njeno raziskovalno delo je osredotočeno na ekologijo in ekofiziologijo fitoplanktona obalnih morij, kar vključuje raziskave dolgoročnih sprememb fitoplanktonske združbe, ekologije in taksonomije škodljivih cvetenj alg ter fotosintetskih lastnosti in primarne produkcije. Je predsednica Nacionalnega odbora za Medvladno oceanografsko komisijo (NO IOC) pri Slovenski nacionalni komisiji za UNESCO in zastopa Slovenijo v Medvladnem odboru za škodljiva cvetenja alg (UNESCO/IOC HAB program).

As of March 2018, Marine Biology Station Piran is headed by Assoc. Prof. Dr Patricija Mozetič. At the same time, she manages the ARRS research programme "Coastal Sea Research" and serves as Associate Professor in the field of ecology at the University of Primorska. Her research work is focused on the ecology and eco-physiology of the phytoplankton in coastal seas, which includes research into long-term changes in phytoplankton communities, ecology and the taxonomy of harmful algal blooms, photosynthetic properties and primary production. She is the President of the National Committee for the Intergovernmental Oceanographic Commission (NO IOC) at the Slovenian National Commission for UNESCO and represents Slovenia in the Intergovernmental Panel on Harmful Algal Blooms (UNESCO/IOC HAB Programme).

V obalnem morju imajo rjave alge iz rodu Cystoseira (*cistozire*) pomembno vlogo kot vrste, ki gradijo habitate (foto: Borut Mavrič).

RAZISKAVE OBALNEGA MORJA

KLJUČNE DEJAVNOSTI

V letu 2018 je Morska biološka postaja Piran (MBP) kot vodilna enota za raziskave morskih ekosistemov v Sloveniji nadaljevala temeljne in uporabne raziskave v okviru dveh raziskovalnih programov ter več mednarodnih in nacionalnih projektov. Multi- in interdisciplinarne raziskave v okviru programov zagotavljajo temeljna znanja o zgradbi in delovanju ekosistemov ter biogeokemičnih procesih v obalnem morju, kjer so organizmi in ekosistemi izpostavljeni kombinaciji številnih dejavnikov, ki delujejo v različnih prostorskih in časovnih skalah. V tem letu smo pridobili dva projekta ARRS, ki dopolnjujeta temeljne programske raziskave, in projekt CRP, ki omogoča prenos znanja do uporabnikov na področju ribištva in kmetijstva ter povezovanje s sorodnimi institucijami. Z izvajanjem strokovnih nalog za različne uporabnike smo tudi v letu 2018 ponudili podporo tako državnim institucijam, javnim zavodom kot gospodarskim družbam pri trajnostno usmerjenem gospodarskem in družbenem razvoju obalnega prostora in morja.

PODROČJE RAZISKAV

- Raziskujemo različne ravni biološke raznovrstnosti – od genoma do vrstne sestave in raznovrstnosti življenjskih združb in okolij (plankton, bentoški nevretenčarji, makroalge, obrežne ribje združbe, podvodni travniki, biogene formacije). V raziskave vključujemo pristope primerjalne genomike in evolucijske vidike.
- Raziskujemo vlogo fitoplanktona pri kroženju ogljika, analiziramo časovne serije za razumevanje vpliva podnebnih sprememb in evtrofikacije. Raziskujemo raznovrstnost morskih mikrobnih združb ter interakcije mikroorganizmov z organskimi in anorganskimi spojinami. Proučujemo množično pojavljanje želatinoznega planktona in iščemo rešitve za blaženje negativnih vplivov tega pojava na ekosistem.
- Raziskujemo vplive na organizme in okolje, ki so posledica podnebnih sprememb in človekovih dejavnosti v morju. Osredotočeni smo na kroženje in razgradnjo onesnažil, na oksidacijske procese v odpadnih vodah in v morskem okolju, ki so pomembni za razgradnjo. Učinke onesnažil preučujemo v različnih vrstah (školjke, ribe), predvsem na subcelični ravni.

Kosmati morski zajček (*Bursatella leachii*) je tujerodna vrsta polžev zaškrgarjev (Opisthobranchia) (foto: Lovrenc Lipej).

COASTAL SEA RESEARCH

KEY ACTIVITIES

In 2018, Marine Biology Station Piran (MBS), as the leading unit in marine ecosystems research in Slovenia, continued conducting basic and applied research within two research programmes and multiple international and national projects. Programme-based multi- and interdisciplinary research provides fundamental knowledge about the structure and functioning of ecosystems and biogeochemical processes in coastal seas, where organisms and ecosystems are exposed to a combination of many factors operating at different spatial and temporal scales. This year, we obtained two ARRS projects that complement our basic programme research and a targeted research programme project that allows the transfer of knowledge to users in the field of fisheries and agriculture and networking with related institutions. Through the implementation of technical expertise tasks for different users, we also provided support to state institutions, public institutes and companies in relation to sustainable economic and social development of the coastal area and the sea in 2018.

FIELDS OF RESEARCH:

- We research different levels of biodiversity ranging from the genome to species composition and the diversity of biological communities and environments (plankton, benthic invertebrates, macroalgae, coastal fish communities, seagrass meadows, biogenic formations). Our research includes the approaches of comparative genomics as well as evolutionary aspects.
- We investigate the role of phytoplankton in the carbon cycle and analyse time series to understand the impact of climate change and eutrophication. We research the diversity of marine microbial communities and interactions of microorganisms with organic and inorganic compounds. We study the mass appearances of gelatinous plankton and look for solutions to mitigate this phenomenon's negative effects on the ecosystem.
- We investigate the impact on the organisms and the environment resulting from climate change and human activities in the sea. We are focused on the circulation and degradation of contaminants and on oxidation processes in waste waters and in the marine environment that are important for degradation. We study the effects of contaminants on different species (bivalve molluscs, fish), especially at subcellular levels.

- Izvajamo programe monitoringa morja za vrednotenje ekološkega in okoljskega stanja z biološkimi elementi ter fizikalnimi in kemičnimi parametri, v skladu z državno in evropsko okoljsko zakonodajo (ODMS 2008/56/ES in ODV 2000/60/ES). Sodelujemo pri oblikovanju evropskih okoljskih politik za opredelitev dobrega okoljskega stanja morja po različnih deskriptorjih, kot so biodiverziteta morskih organizmov, vključno s tujerodnimi vrstami, in habitatov, strukture prehranjevalnih spletov, hidrografske značilnosti morskega okolja in vsebnost onesnažil v morski hrani.
- Raziskujemo dinamiko vodnih mas in modeliranje v obalnem morju, razvijamo avtomatizirano obdelavo podatkov in krepimo razvoj infrastrukture na morju. S svojim znanjem in izkušnjami lahko ponudimo rešitve za različne gospodarske subjekte in dejavnosti na morju ter v obalnem pasu. Razvijamo inovacije na področju opazovanja morja ter uporabljamo moderno tehnologijo (HF-radar) za opazovanje in napovedovanje tokovanja.
- Povezujemo se v mrežo evropskih morskih bioloških postaj (MARS), razvijamo inovativne raziskovalne metodologije in raziskovalne koncepte, omogočamo dostop do bioloških virov, zgodovinskih podatkov iz opazovanj, najsodobnejše eksperimentalne in analitske zmogljivosti z integriranimi delovnimi postopki in napredne možnosti izobraževanja. Nadaljujemo tradicijo morskih postaj, ki so ponujale svoje zmogljivosti tudi drugim raziskovalcem. Zainteresiranim raziskovalcem in študentom ponujamo bivanje v dormitoriju ter delo v sodobnih laboratorijih in na morju.
- Z različnimi stalnimi dejavnostmi, kot je Dan odprtih vrat Morske biološke postaje Piran, objavljanje prispevkov v poljudnih in strokovnih revijah in izvajanje predavanj za različne starostne skupine ter sodelovanje na drugih dogodkih (npr. Dan biotske raznovrstnosti, Znanstival, Dan očarljivih rastlin), močno prispevamo k širjenju znanja o morju in dvigu morske pismenosti pri strokovni in laični javnosti. Ob svetovnem dnevu oceanov (8. junij) smo organizirali že tradicionalni Dan odprtih vrat, ki se ga je udeležilo več kot 300 obiskovalcev, ter v sklopu prireditev ob Evropski noči raziskovalcev 2018 izvedli Cafe Scientifique. Dejavni smo bili tudi na posvetu, ki je potekal v okviru »Tedna sredozemske obale in makroregionalnih strategij 2018«. Spet smo bili zelo aktivni v medijih (tiskani, radio, TV, elektronski) in obveščali javnost o stanju morja, izrednih pojavih in raziskovalnih dosežkih.

RAZISKOVALNI PROGRAM P1-0237 »RAZISKAVE OBALNEGA MORJA«

Osrednji del programa so predstavljale raziskave biodiverzitete planktona, obrežnih ribjih združb ter bentoške favne, flore in vegetacije ter vloge mikroorganizmov pri kroženju snovi, kar se kaže tudi v številu objavljenih člankov.

Raziskave biologije in ekologije bentoških organizmov so potekale v slovenskem morju in na Hrvaškem (Nacionalni park Brioni). Podatke smo pridobili s potapljaškimi vzorčenji in uporabo nedestruktivne metode (*visual census*, digitalizacija podatkov). Raziskovalca MBP sta bila avtorja pri dveh preglednih člankih o biodiverziteti Sredozemskega morja, s poudarkom na vrstah, povezanih s procesi bioinvazije in tropikalizacije. Problem bioinvazije je bil obravnavan tudi v primeru tujerodne vrste rebrače *Mnemiopsis leidyi*, ki se v severnem Jadranu v večjem številu stalno pojavlja od leta 2016 naprej. Zato smo tudi ob projektni podpori MKGP lani začeli ciljno usmerjene raziskave biologije in prehranjevalne ekologije *M. leidyi* ter poskusa ocene številnosti in pojavljanja te vrste. Ta problematika kot tudi primeri drugih tujerodnih vrst ter mogoče poti in vektorji vnosov neavtohtonih vrst v nova okolja so bili predstavljeni na 10. mednarodni konferenci »10th International Conference on Marine Bioinvasions«, ki je potekala v Mar del Plati, Argentina, med 16. in 18. oktobrom 2018. Raziskovalka MBP je tudi predsedovala eni od sekcij te konference. Drugi, biotehnološki vidiki množičnega pojavljanja želatinoznega planktona (rebrače ter klobučnjaške in trdoživnjaške meduze) pa so zaobjeti v evropskem (H2020) projektu GoJelly in v projektu »Raziskovalci na začetku kariere 2.0«, v okviru katerega mlajša doktorica v sodelovanju s podjetjem Fonda.SI, d. o. o., proučuje možnosti uporabe biomase meduz kot trajnostnega vira hrane v ribogojstvu.

Nadaljevali smo raziskave habitata sredozemske korale, ki gradi biogene formacije v slovenskem delu Tržaškega zaliva in drugje v Jadranskem morju (Mljetska jezera, Boka Kotorska). Posebno pozornost smo namenjali v Sredozemlju zelo ogroženim habitatnim tipom, ki jih ustvarjajo alge cistozire (*Cystoseira* spp.), in biogenim formacijam kamene korale (*Cladocora caespitosa*), z namenom spremljanja razsežnosti sprememb v zadnjih 20 letih, ki bi lahko bile povezane tudi s podnebnimi spremembami. Dolgoletne študije smo dopolnili z laboratorijskimi poskusi, v katerih proučujemo odziv holobionta kamene korale na toplotni stres. Dinamiko združbe spremljamo prek NGS sekvenciranja specifičnih genetskih markerjev in DNA metabarkodiranja, kar je tema drugega projekta »Raziskovalci na začetku kariere 2.0«. V tem projektu mlajši doktor sodeluje s podjetjem Arctur, d. o. o., ki nudi superračunalnik za visokozmogljive simulacije.

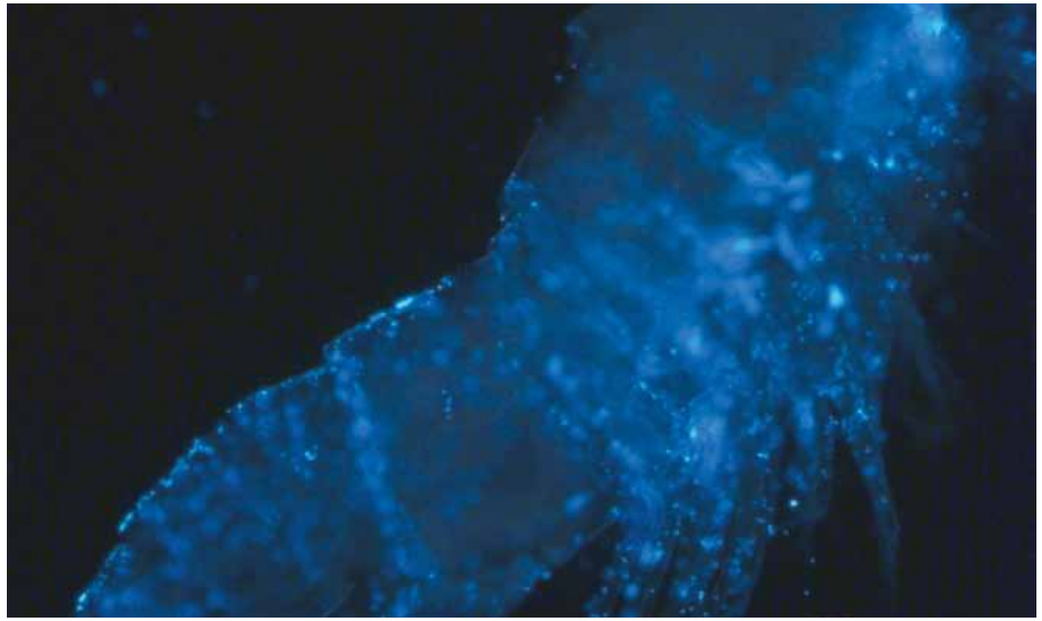
- We carry out marine monitoring programmes for the evaluation of ecological and environmental conditions with biological elements and physical and chemical parameters in accordance with national and European environmental legislation (MSFD 2008/56/EC and FWD 2000/60/EC). We participate in the formulation of European environmental policies to define the good environmental status of the sea through various descriptors, such as the biodiversity of marine organisms (including non-native species) and habitats, structure of the food webs, hydrographic characteristics of the marine environment and the content of contaminants in seafood.
- We investigate water body dynamics and coastal sea modelling, develop automated data processing and strengthen the development of infrastructure at sea. Through our know-how, we can offer solutions for different economic operators and activities at sea and in the coastal area. We develop innovations in marine observation and use modern technology (HF radar) to observe and predict currents.
- We connect with the European network of marine stations (MARS), develop innovative research methodologies and concepts and provide access to biological resources, historical data from observations, state-of-the-art experimental and analytical capabilities with integrated working procedures and advanced education opportunities. We continue the tradition of marine stations that offered their capabilities to other researchers. Interested researchers and students are offered accommodation in dormitories and work in modern laboratories and at sea.
- Through various ongoing activities, such as the Day of Open Doors at Marine Biology Station Piran, the publication of articles in popular magazines and journals, holding lectures for various age groups and participating in other events (e.g. Biodiversity Day, Znanstival, Fascination of Plants Day), we greatly contribute to the dissemination of knowledge of the sea and the increase of marine literacy among the professional and lay public. On World Oceans Day (8 June), we organised our traditional Day of Open Doors, which attracted over 300 visitors, and Cafe Scientifique as part of the European Researchers' Night 2018 series of events. We actively participated at the conference that took place at the Mediterranean Coast and Macro-regional Strategies Week 2018. We were also very active in the media (print, radio, TV, electronic) and kept the public up-to-date about the state of the sea, any extraordinary phenomena that happened and research achievements.

P1-0237 "COASTAL SEA RESEARCH" PROGRAMME

The programme was centred around research into the biodiversity of plankton, coastal fish communities and benthic fauna, flora and vegetation and the role of microorganisms in the circulation of substances, which is also evident in the number of published articles.

Research into the biology and ecology of benthic organisms took place in the Slovenian sea and in Croatia (Brijuni National Park). Data was obtained through sampling during scientific diving and the use of a non-destructive method (visual census, data digitisation). Two MBS researchers were listed as authors in two review articles on the biodiversity of the Mediterranean Sea, with an emphasis on species associated with bioinvasion and tropicalisation. The problem of bioinvasion was discussed on the case of the non-native species of warty comb jelly, *Mnemiopsis leidyi*, which has been appearing regularly in larger numbers since 2016 in the northern Adriatic. That is why last year, with the project support of the Ministry of Agriculture, Forestry and Food, we launched targeted research into the biology and food ecology of *M. leidyi* and attempted to estimate the number and occurrence of this species. This issue, along with examples of other non-native species and the potential routes and vectors of introduction of non-indigenous species into new environments, was presented at the 10th International Conference on Marine Bioinvasions held in Mar del Plata, Argentina, from 16 to 18 October 2018. An MBS researcher chaired one of the sessions at this conference. Other biotechnological aspects of the mass occurrence of gelatinous plankton (the warty comb jelly, scyphozoan and hydrozoan medusae) are covered by the European (H2020) GoJelly project and by the project "Researchers in early stage of career 2.0", in which a young PhD holder, in cooperation with Fonda.SI, d. o. o., is exploring the possibilities of using jellyfish biomass as a sustainable food source in aquaculture.

We continued researching the habitat of the Mediterranean corals building biogenic formations in the Slovenian part of the Gulf of Trieste and elsewhere in the Adriatic Sea (the Mljet lakes, the Bay of Kotor). Special attention was paid to the habitat types that are highly-endangered in the Mediterranean, i.e. those created by the *Cystoseira* spp. algae, and to the biogenic formations of the Mediterranean stony coral (*Cladocora caespitosa*), in order to monitor the extent of changes in the past 20 years that could also have been related to climate change. Long-term studies were supplemented with laboratory experiments where the



Plastične granule mikrometrskih velikosti, ki v kontroliranih poskusih »nadomeščajo« delce mikroplastike v naravnem okolju, se zalepijo na zunanji skelet bentoških kopepodnih rakov (foto: Mateja Grego). Plastic micrometer-sized granules that are used in controlled experiments to "replace" microplastic particles in the natural environment stick to the exoskeleton of benthic copepods (Photo: Mateja Grego).

Nadgradnjo dolgoročnih raziskav favne polžev zaškrgarjev (*Opisthobranchia*) smo uresničili v obliki monografske publikacije »Polži zaškrgarji slovenskega morja«. Objavili smo tudi veliko prvih najdb o vrstah za slovensko in Jadransko morje s posebnim poudarkom na tujerodnih vrstah.

Nadaljevali smo raziskave pestrosti vrst toksičnega fitoplanktonskega rodu *Pseudo-nitzschia* na podlagi morfoloških znakov in genetskih markerjev ter vzdrževanje banke kultur sevov vrst *Pseudo-nitzschia*, izoliranih iz Tržaškega zaliva. Izsledke genetskih in morfoloških analiz je mladi raziskovalec predstavil na 18. mednarodni konferenci o škodljivih algah (18th International Conference on Harmful Algae) oktobra 2018 v Nantesu v Franciji. Vzpostavili smo sodelovanje z Inštitutom za varno hrano, krmo in okolje Veterinarske fakultete v Ljubljani za testiranje izoliranih kultur na prisotnost domojske kisline. Mladi raziskovalec je bil na dvomesečnem strokovnem izpopolnjevanju pri francoskem malem podjetju Microbia Environnement, kjer je razvijal znanje na področju hitrih metod detekcije škodljivih alg v naravnih vzorcih.

Izvedli smo tudi laboratorijske nadzorovane poizkuse, v katerih smo spremljali bakterijsko razgradnjo organske snovi želatinoznega izvora. Analizo strukture mikrobne združbe smo nadgradili z novimi pristopi naslednje generacije Ilumina sekveniranja in RT-qPCR detekcije patogenih virusov v morski vodi. Ugotovili smo, da so odpadne vode lahko vektor vnosa alohtonih in patogenih bakterij in virusov, kar nameravamo še podrobneje proučiti pri lani začetem projektu ARRS.

Potem, ko sta bila v letu 2017 objavljena prva dva članka v posebni številki revije Marine Pollution Bulletin o rezultatih raziskav o avtohtonih in tujerodnih vrst v planktonskih in bentoških združbah jadranskih pristanišč v okviru mednarodnega projekta BALMAS, smo v letu 2018 objavili še nadaljnjih osem.

Pomemben sklop programa so tudi raziskave onesnaženja slovenskega morja. Tako smo objavili prispevke o fotokemični razgradnji onesnažil v sedimentu, o kopičenju in biomonitoringu elementov v sledeh v sredozemskih morskih travah in makroalgah in o bioindikatorjih onesnaženja s plastiko ter o interakcijah Hg in Se v pelagičnih vrstah plenilcev. Proučevali smo odzive biomarkerjev v tarčnem organizmu (*Mytilus galloprovincialis*) na različne koncentracije onesnažil in na občutljivost za okužbe s patogeni. Opravili smo tudi prvo študijo o količini morskih odpadkov v srednjem Jadranu. Zaključena in objavljena je bila mineraloška, geokemična in termofizikalna karakterizacija lastnosti solinskega blata Sečoveljskih solin za uporabo pri peloterapiji.

Dan odprtih vrat MBP. Open day of MBS.

stony coral holobiont's response to thermal stress was studied. The community's dynamics are monitored through the NGS sequencing of specific genetic markers and DNA metabarcoding, which is the topic of the second "Researchers in early stage of career 2.0" project. In this project, a young PhD holder is working together with the company Arctur, d. o. o., which has provided a supercomputer for high-performance simulations.

The long-term investigation of the opisthobranch fauna culminated in the monograph "Polži zaškrgarji slovenskega morja" (Opisthobranchs of the Slovenian Sea). We also published many new discoveries of species in the Adriatic Sea and in the Slovenian part of it, with particular emphasis on non-native species.

We continued researching the species diversity of the toxic phytoplankton genus *Pseudo-nitzschia* based on their morphological features and genetic markers and continued maintaining the bank of cultures of strains of the *Pseudo-nitzschia* species isolated from the Gulf of Trieste. Our young researcher presented the genetic and morphological analysis findings at the 18th International Conference on Harmful Algae held in October 2018 in Nantes, France. We established cooperation with the Institute of Food Safety, Feed and Environment of the Veterinary Faculty of Ljubljana to test the isolated cultures for the presence of domoic acid. A young researcher attended a two-month professional training course at the small French company Microbia Environnement, where he built knowledge in the field of rapid methods of detecting harmful algae in natural samples.

We performed controlled laboratory experiments in which we observed the bacterial degradation of organic matter of gelatinous origin. Microbial community structure analysis was upgraded with new approaches – Illumina next-generation sequencing and RT-qPCR detection of pathogenic viruses in sea water. We have found that waste water can be a vector of the introduction of allochthonous and pathogenic bacteria and viruses, which we intend to study in more detail in the ARRS project that was launched last year.

After publishing the first two articles in the special issue of the Marine Pollution Bulletin in 2017 on the results of research on indigenous and non-native species in planktonic and benthic communities of the Adriatic ports as part of the BALMAS international project, we published a further eight in 2018.

An important strand of the programme is research into the pollution of the Slovenian sea. As such, we published papers on the photochemical degradation of contaminants in sediment, on the accumulation and biomonitoring of

Pri procesno orientiranem modeliranju smo se osredotočili na dve področji: modeliranje resuspenzije sedimentov zaradi pomorskega prometa, valov in tokov ter modeliranje populacijske dinamike, disperzije in povezanosti populacij meduz klobučnjaka *Aurelia aurita* s.l. Z uporabo preprostega populacijskega modela za oceno variabilnosti populacij polipov in primerjalno analizo okoljskih dejavnikov v dveh zaprtih sistemih Japonskega morja in severnega Jadrana smo ugotavljali vzroke za pogostejše množične pojave meduz. Razvili smo metodo za avtomatizirano štetje polipov na osnovi podvodnih fotografij.

Programske raziskave pomagajo pri implementaciji koncepta ekosistemskega pristopa upravljanja v morsko okolje in omogočajo podporo evropskim oz. nacionalnim politikam o vodah. Tako smo lani objavili rezultate študije za vrednotenje ekološkega stanja morja z uporabo indeksov z bentoškimi nevretenčarji ter pregled vrednotenja okoljskega stanja pelagičnega habitata s planktonskimi indeksi.

GLAVNI DOSEŽKI V LETU 2018

PRISPEVEK K POPULARIZACIJI IN PROMOCIJI ZNANOSTI

Poleg že omenjenih dejavnosti za promocijo in popularizacijo morskih raziskav velja poudariti dva dogodka in izdajo monografije:

- 7. februarja 2018 je bila na Nacionalnem inštitutu za biologijo predstavljena nova knjiga avtorjev z MBP (Lovrenc Lipej, Borut Mavrič, Domen Trkov) »Polži zaškrgarji slovenskega morja« (COBISS.SI-ID 292859904). Dogodek je bil združen s praznovanjem 40. obletnice Biološkega okteta in ob tej povezavi znanosti in kulture obeležil slovenski kulturni praznik.
- Slovenska znanstvena fundacija je podelila priznanje »Prometej znanosti za odličnost v komuniciranju v znanosti v letu 2018« Timoteju Turku Dermastii, mlademu raziskovalcu na oddelku MBP. Priznanje je bilo podeljeno v januarju 2019.
- Konec leta 2018 je izšla knjiga »Dinoflagelati, diatomeje, njihovi toksini in zastrupitve z morsko hrano« v zbirki NIB-a *Vse živo*, ki jo je uredil prof. Tom Turk (COBISS.SI-ID 4916303). Trije raziskovalci MBP (Janja Francé, Patricija Mozetič, Timotej Turk Dermastia) so avtorji treh poglavij. Uradna predstavitev knjige je bila 6. februarja 2019 na MBP v Piranu.

ORGANIZACIJA DELOVNIH SREČANJ IN SESTANKOV

Organizirali smo več sestankov in delavnic mednarodnih projektov, pri katerih sodelujemo kot partner, ter strokovnih srečanj:

- Letno srečanje COST akcije CA16203 »MARISTEM«, ki je potekalo od 4. do 6. februarja 2018 v prostorih MBP v Piranu. Udeleženci so predstavili raziskave s področja regeneracije v različnih morskih nevretenčarjih.
- Soorganizacija dvodnevne Študentske konference Mednarodne podiplomske šole Jožefa Stefana (MPŠ), 10. in 11. maja 2018.
- Delavnica »SWOT analysis of marine biological stations towards long term sustainability assessment« v okviru H2020 projekta AssemblePlus, 21. do 25. maja 2018. Na delavnici so bile predstavljene SWOT analize morskih postaj, ki sodelujejo pri projektu, prav tako so bile predstavljene slabe prakse delovanja, ki so vodile v zaprtje uglednih morskih postaj (npr. Port Erin), ter mogoči poslovni modeli, ki bi lahko bili vključeni v poslovne modele delovanja morskih postaj.
- Delavnica projekta FishAgroTech CBC Interreg SLO-ITA za deležnike iz ribiškega sektorja, predstavnike ministrstev in raziskovalnih institucij, 14. 9. 2018. Delavnica je bila namenjena izmenjavi znanj in izkušenj s področja ribištva in sorodnih dejavnosti.
- Interaktivna delavnica H2020 projekta GoJelly, ki je potekala 19. 9. 2018. Na delavnico smo povabili tarčne skupine strokovnjakov s področja ribištva, čiščenja odpadnih voda, podjetništva, izobraževalnih zavodov, vladnih in nevladnih organizacij.

trace elements in Mediterranean seagrasses and macroalgae, on bioindicators of plastic pollution and on the interactions of Hg and Se in pelagic predator species. We studied the responses of biomarkers in the target organism (*Mytilus galloprovincialis*) to different concentrations of contaminants and the susceptibility to infection with pathogens. We also conducted the first study on the amount of marine litter in the Central Adriatic. We completed and published the mineralogical, geochemical and thermophysical characterisation of the properties of salt-pan mud from the Sečovlje saltworks for use in pelotherapy.

In process-oriented modelling, we focused on two areas: modelling sediment resuspension due to maritime traffic, waves and currents and modelling the population dynamics, dispersal and connectivity of moon jellyfish (*Aurelia aurita* s.l.) populations. Using a basic population model for estimating the variability of polyp populations and for making a comparative analysis of environmental factors in two closed systems, the Sea of Japan and the North Adriatic, we attempted to identify the causes for the more frequent mass occurrences of jellyfish. We developed an automated method for counting polyps based on underwater photographs.

Programme-based research is helping to implement the concept of the ecosystem-based management approach to the marine environment and supports European and national water policies. Last year, we published the results of a study on the evaluation of the sea's ecological status using benthic invertebrate indices and an overview of the environmental status evaluation of the pelagic habitat using planktonic indices.

MAJOR ACHIEVEMENTS IN 2018

CONTRIBUTION TO THE POPULARISATION AND PROMOTION OF SCIENCE

Besides the previously mentioned activities for the promotion and popularisation of marine research, an additional two events and the publication of a monograph also need to be pointed out:

- On 7 February 2018, the National Institute of Biology hosted the presentation of the new book "Polži zaškrgarji slovenskega morja" (COBISS.SI-ID 292859904) by authors from the MBS (Lovrenc Lipej, Borut Mavrič, Domen Trkov). The event coincided with the celebration of the 40th anniversary of the Biological Octet and marked the Slovenian cultural holiday with this integration of science and culture.
- The Slovenian Science Foundation presented the "Prometheus of Science for Excellence in Science Communication 2018" Award to Timotej Turk Dermastia, a young researcher at the MBS. The award was presented in January 2019.
- The book "Dinoflagelati, diatomeje, njihovi toksini in zastrupitve z morsko hrano" was published at the end of 2018 in the NIB collection "Vse živo", which was edited by Prof. Tom Turk (COBISS.SI-ID 4916303). Three researchers from the MBS (Janja Francé, Patricija Mozetič, Timotej Turk Dermastia) authored three chapters. The official presentation of the book took place on 6 February 2019 at the MBP building in Piran.

ORGANISATION OF WORKING SUMMITS AND MEETINGS

We organised several meetings and workshops within the scope of international projects in which we work as a partner as well as expert meetings:

- The COST Action CA16203 "MARISTEM" annual meeting held from 4 to 6 February 2018 at the MBS building in Piran. The participants presented research in the field of regeneration in various marine invertebrates.
- Co-organisation of the two-day Jožef Stefan International Postgraduate School (MPŠ) Students' Conference, 10 and 11 May 2018.
- The "SWOT analysis of marine biological stations towards long term sustainability assessment" workshop within the framework of the H2020 project AssemblePlus, 21–25 May 2018. At the workshop, SWOT analyses of marine stations participating in the project were presented as well as poor operational practices that led to the closure of reputable marine stations (e.g. Port Erin), along with possible business models that could be integrated in the operating business models of marine stations.
- The FishAgroTech CBC Interreg SLO-ITA project workshop for stakeholders from the fisheries sector and representatives of ministries and research institutions, 14 September 2018. The aim of the workshop was to exchange knowledge and experience in the field of fisheries and related activities.

Raziskovalno plovilo PI-800 »Sagita«. Reserch vessel PI-800 »Sagita«.

ZNANSTVENA ODLIČNOST

V letu 2018 smo objavili 33 izvirnih in 3 pregledne znanstvene članke. Od skupno 36 znanstvenih člankov jih je bilo 30 kategorije A1/2, večina kategorije A1 (22), od tega 17 A' in 5 A''. Kot enega največjih dosežkov predstavljamo članek z najvišjim faktorjem vpliva (IF = 9,52), objavljen v reviji *The ISME Journal*. Članek z naslovom »NanoSIMS and tissue autoradiography reveal symbiont carbon fixation and organic carbon transfer to giant ciliate host« (Volland et al.) [COBISS.SI-ID 4610639] je nastal v sodelovanju z avstrijskimi raziskovalci z dunajske univerze.

Še posebej pa velja omeniti dva članka, objavljena v reviji *Science of the Total Environment*, pri katerih sta bili raziskovalka in nekdanja raziskovalka z MBP prvi avtorici: »Metal(oid) mobility in a hypersaline salt marsh sediment (Sečovlje Salina, northern Adriatic, Slovenia)« (Kovač et al.) [COBISS.SI-ID 1409630], »The structure and role of the ‚petola' microbial mat in sea salt production of the Sečovlje (Slovenia)« (Glavaš et al.) [COBISS.SI-ID 4780623]. Oba prispevka sta bila kot zaključena celota več raziskav sedimenta in mikrobne plasti – petole iz hiperslanega okolja Sečoveljskih solin izbrana za dosežek ARRS »Odlični v znanosti 2018« na področju interdisciplinarnih raziskav. Omenjeni deli sta rezultat sodelovanja domačih in tujih raziskovalcev ter tesnega sodelovanja s podjetjem SOLINE Pridelava soli, d. o. o., pri čemer je slednje vodilo k zaposlitvi mlade raziskovalke. Pridobljena nova znanja in informacije pomembno prispevajo k ohranitvi in nadaljnjemu razvoju slovenskega solinarstva in termalizma, tj. uporabe zdravilnega solinskega blata.

Med izjemnimi znanstvenimi dosežki velja omeniti tudi uspeh mlajše raziskovalke dr. Tinkare Tinte, ki je lani pridobila štipendijo za podoktorske raziskovalce iz sklada Marie Skłodowska-Curie (MSCA grant) in se za obdobje dveh let (julij 2018 – junij 2020) zaposlila na Univerzi na Dunaju, Oddelku za limnologijo in biooceanografijo.

Znanstveni potapljač pri slikanju obrasti v kateri prevladujeta školjka *Mytilus galloprovincialis* in kačjerep *Ophiotrix quinquemaculata* (foto: Borut Mavrič). Scientific diver photographing fouling community dominated by a bivalve *Mytilus galloprovincialis* and a brittlestar *Ophiotrix quinquemaculata* (Photo: Borut Mavrič).

- The interactive workshop of the H2020 project GoJelly, which was held on 19 September 2018. Target groups of experts from the field of fisheries, waste water treatment, entrepreneurship, educational institutions and governmental and non-governmental organisations were invited to the workshop.

SCIENTIFIC EXCELLENCE

In 2018, we published 33 original scientific articles and 3 review articles. Out of a total of 36 scientific articles, 30 were category A1/2, most of them A1 (22) and 17 of those A' and 5 A''. One of our greatest achievements is the article with the highest impact factor (IF = 9.52) that was published in *The ISME Journal*. The article entitled "NanoSIMS and tissue autoradiography reveal symbiont carbon fixation and organic carbon transfer to giant ciliate host" (Volland et al.) [COBISS.SI-ID 4610639] was created in collaboration with Austrian researchers from the University of Vienna.

Especially worth mentioning are the two articles published in *Science of the Total Environment*, where a researcher and a former researcher from the MBS were listed as the first authors: "Metal(oid) mobility in a hypersaline salt marsh sediment (Sečovlje Salina, northern Adriatic, Slovenia)" (Kovač et al.) [COBISS.SI-ID 1409630], "The structure and role of the 'petola' microbial mat in sea salt production of the Sečovlje (Slovenia)" (Glavaš et al.) [COBISS.SI-ID 4780623]. As a complete set of multiple studies of the sediment and the microbial layer – petola from the hypersaline environment of the Sečovlje saltworks, both papers were chosen for the ARRS achievement "Excellent in Science 2018" in the field of interdisciplinary research. The two works are the result of collaboration among domestic and foreign researchers and close cooperation with SOLINE Pridelava soli, d. o. o., which also led to the employment of a young researcher. The new knowledge and information acquired significantly contribute to the preservation and continued development of Slovenian salt panning and thermalism, i.e. the use of medicinal salt-pan mud.

Other exceptional scientific achievements include the success of young researcher Dr. Tinkara Tinta, who last year received a MSCA (Marie Skłodowska-Curie Actions) grant for postdoctoral researchers and was hired for a period of two years (July 2018 – June 2020) by the University of Vienna, the Department of Limnology and Bio-Oceanography.

Črniki (*Chromis chromis*) v biocenozi fotofilnih alg (foto: Borut Mavrič).
Damsel fish (*Chromis chromis*) in the biocoenosis of photophilic algae (Photo: Borut Mavrič).

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BIBLIOGRAPHY

33 Izvirni znanstveni članek Original Scientific Article
3 Pregledni znanstveni članek Review Article
3 Kratki znanstveni prispevek Short Scientific Article
16 Poljudni članek Popular Article
4 Objavljeni znanstveni prispevek na konferenci Published Scientific Conference Contribution
21 Objavljeni povzetek znanstvenega prispevka na konferenci Published Scientific Conference Contribution Abstract
4 Samostojni znanstveni sestavek ali poglavje v monografski publikaciji Independent Scientific Component Part or a Chapter in a Monograph
2 Recenzija, prikaz knjige, kritika Review, Book Review, Critique
2 Predgovor, spremna beseda Preface, Afterword
10 Intervju Interview
3 Drugi sestavni deli Other Component Parts
1 Znanstvena monografija Scientific Monograph
1 Univerzitetni, visokošolski ali višješolski učbenik z recenzijo Reviewed University, Higher Education or Higher Vocational Education Textbook
1 Drugo učno gradivo Other Educational Material
10 Končno poročilo o rezultatih raziskav Final Research Report
1 Elaborat, predštudija, študija Treatise, Preliminary Study, Study
7 Radijska ali televizijska oddaja Radio or Television Broadcast
1 Druge monografije in druga zaključena dela Other Monographs and Other Completed Works
20 Radijski ali TV dogodek Radio or Television Event
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2 Vabljeno predavanje na konferenci brez natisa Unpublished Invited Conference Lecture
5 Druga izvedena dela Other Performed Works
11 Uredništvo Editorship

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Umetniki in njihove ideje bi morali biti uspešni, toliko kot so uspešne ideje v biotehnologiji.

Kehinde Wiley, ameriški portretist, ki je naslikal portret predsednika Baracka Obame za Smithsonian National Portrait Gallery.

Artists should be able to allow their ideas to flourish as much as those in biotechnology.

Kehinde Wiley, the American portrait painter who painted the portrait of President Barack Obama for theSmithsonian National Portrait Gallery.

3.0

ODDELEK ZA BIOTEHNOLOGIJO IN SISTEMSKO BIOLOGIJO

DEPARTMENT OF BIOTECHNOLOGY AND SYSTEMS BIOLOGY

Utrinek z Dneva očarljivih rastlin 2018, ki so ga že sedmič po vrsti soorganizirali člani FITO.
A highlight from the Fascination of Plants Day 2018, which was co-organised by members of the FITO unit for the seventh time.

NIB
ODDELEK ZA BIOTEHNOLOGIJO IN SISTEMSKO BIOLOGIJO

DEPARTMENT OF BIOTECHNOLOGY AND SYSTEMS BIOLOGY

VODJA: prof. dr. Maja Ravnikar
HEAD: Prof. Dr Maja Ravnikar

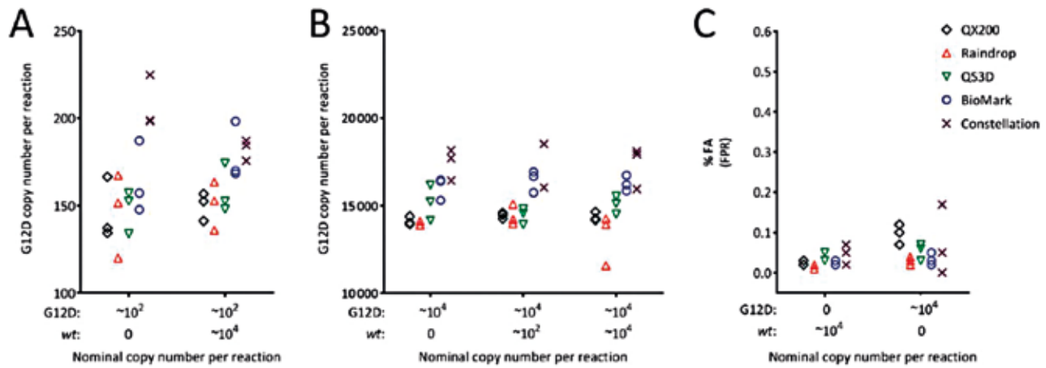
Prof. dr. Maja Ravnikar, znanstvena svetnica, je vodja Oddelka za biotehnologijo in sistemsko biologijo ter redna profesorica na Univerzi Nova Gorica. Njene raziskave so odmevne predvsem na področjih virologije in sicer proučevanja raznolikosti in diagnostike ter epidemiologije virusov ter razvoja metod za nekemično eliminacijo mikrobov in karakterizacijo virusov za različne biotehnološke aplikacije.

Prof. Dr Maja Ravnikar, scientific councillor, is the Head of the Department of biotechnology and systems biology and professor at University Nova Gorica. Her research met high response in the field of virology, especially in virus diversity, diagnostics and epidemiology studies and in development of nonchemical methods for microbe elimination and characterisation of viruses, developed for different biotechnological applications.

Utrinek z Dneva očarljivih rastlin 2018, ki so ga že sedmič po vrsti soorganizirali člani FITO.
An impression from the Fascination of Plants Day 2018, which was co-organised by members of the FITO unit for the seventh time.

KLJUČNE DEJAVNOSTI:

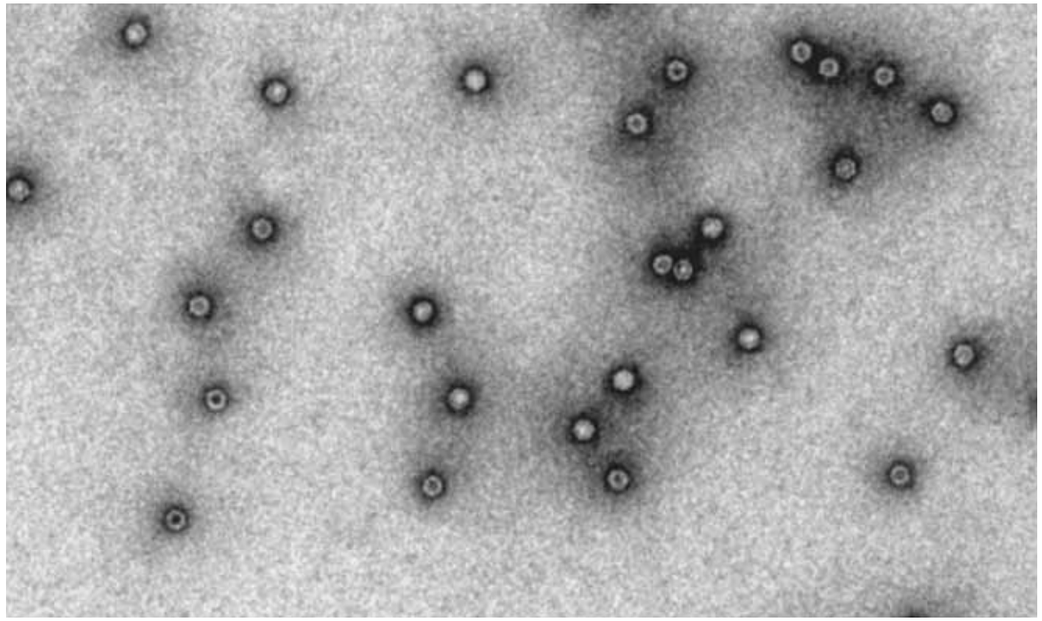
- ustvarjanje vrhunskega znanja za celostno razumevanje bioloških procesov, ki izhaja iz dolgoletnih raziskav interakcij med rastlinami in patogenimi mikroorganizmi, z uporabo kvantitativne in kvalitativne molekulske biologije ter razvijanjem pristopov sistemske biologije;
- boljše razumevanje biologije, raznovrstnosti, patogenosti in epidemiologije mikroorganizmov ter na osnovi novega znanja razvoj boljših pristopov za njihovo detekcijo in zatiranje;
- razvoj novih biotehnoloških metodoloških pristopov za učinkovitejšo identifikacijo in detekcijo gensko spremenjenih organizmov glede na njihovo pričakovano povečano uporabo v prihodnjih letih;
- nadgrajevanje tehnološke platforme, ki podpira raziskave sistemske biologije in meroslovno naravnane raziskave tarčnih organizmov;
- prenos ustvarjenega znanja o biologiji patogenih in gensko spremenjenih organizmov ter razvitih metod za njihovo določanje na področje kmetijstva, farmacije, medicine in varovanja okolja (v okviru oddelka FITO delujeta nacionalna referenčna diagnostična laboratorija za dokazovanje gensko spremenjenih organizmov in rastlinskih patogenih bakterij in fitoplazem);
- partnersko sodelovanje z drugimi raziskovalnimi skupinami na NIB-u ali zunaj njega v Sloveniji in po svetu pri komplementarnih raziskavah za pridobivanje vrhunskega znanja;
- partnersko povezovanje z državnimi in evropskimi institucijami, visokošolskimi organizacijami in industrijo za skupni prispevek k reševanju aktualnih problemov s področja delovanja oddelka.



Primerjava platform digitalnega PCR. Vir: *Clinical Chemistry*. 2018; 64: 1296–1307.
Digital PCR platform comparison. Source: *Clinical Chemistry*. 2018; 64: 1296–1307.

KEY ACTIVITIES:

- Creating state-of-the-art knowledge for comprehensive understanding of biological processes resulting from long-term studies of interactions between plants and pathogenic microorganisms using quantitative and qualitative molecular biology and by developing systems biology approaches;
- better understanding of the biology, diversity, pathogenicity and epidemiology of microorganisms and developing better approaches for their detection and control on the basis of new knowledge;
- developing new biotechnological methodological approaches for more effective identification and detection of genetically modified organisms in view of their expected increased use in the coming years;
- upgrading a technology platform that supports systems biology research and metrology-oriented research of target organisms;
- transferring the created knowledge about the biology of pathogenic and genetically modified organisms and the developed methods for their determination into agriculture, pharmacy, medicine and environmental protection (two national diagnostic laboratories, for the detection of genetically modified organisms and of plant pathogenic bacteria and phytoplasmas, operate within the FITO department);
- cooperative partnerships with other research groups at or outside NIB in Slovenia and worldwide in complementary research to acquire state-of-the-art knowledge;
- partnerships with state and European institutions, higher education organisations and the industry for a common contribution to solving current problems in the department's fields of activity.



Polne in prazne kapside z adenovirusi povezanih virusov (AAV) (foto: Magda Tušek Žnidarič).
Full and empty capsids of adenoassociated virus (AAV) (Photo: Magda Tušek Žnidarič).

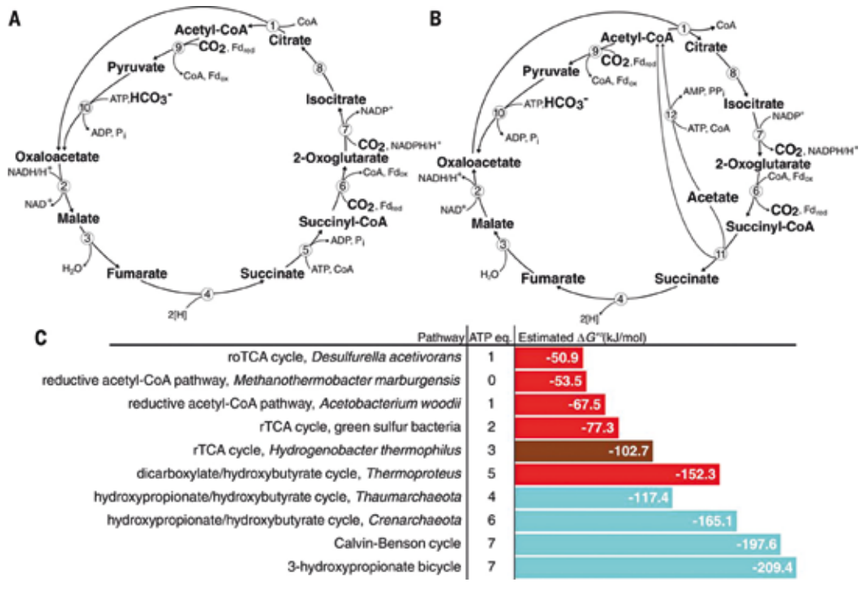
GLAVNI DOSEŽKI V LETU 2018

Kot del zaključenega projekta »Sledljivost biološko relevantnih molekul / Traceability for biologically relevant molecules and entities« znotraj Meroslovnega raziskovalnega programa (EMPR) Evropske zveze nacionalnih meroslovnih inštitutov (EURAMET) je bil objavljen članek »Assessment of digital PCR as a primary reference measurement procedure to support advances in precision medicine«. Pri projektu in pripravi članka je bil NIB eden od šestih ključnih partnerjev iz EU in Turčije. Članek je bil v reviji *Clinical Chemistry*, z visokim dejavnikom vpliva 8,636 in uvrščen v kategorijo SICRIS A'', še posebej izpostavljen z intervjujem z enim od soavtorjev, ki je bil objavljen v pododdaji revije. V članku je opisana možnost uporabe digitalnega PCR kot primarnega referenčnega merilnega postopka v napredni precizni medicini.

V eni najprestižnejših revij s področja biologije rastlin, ki jo od leta 1929 neprekinjeno izdaja Ameriško društvo rastlinskih biologov (ASPB), *Plant Physiology*, je bil objavljen članek »Network modelling unravels mechanisms of crosstalk between ethylene and salicylate signalling in potato«. V članku je predstavljeno modeliranje omrežij kot učinkovito orodje za odkrivanje novih lastnosti kompleksnega imunskega signaliziranja pri krompirju.

Britansko društvo za rastlinsko patologijo podeljuje letne nagrade študentom za najboljši znanstveni članek v reviji *Plant Pathology*. Da se študent lahko poteguje za nagrado, mora biti prvi avtor članka z velikim raziskovalnim prispevkom k objavljenemu delu. Nagrado za leto 2018 je prejela Špela Alič za članek, ki je bil sestavni del njene doktorske disertacije. Zanjo je prejela tudi veliko Krkino nagrado za leto 2018. Nagrada revije *Plant Pathology* je denarna, vključuje pa tudi članstvo v British Society for Plant Pathology. V članku je opisana večlokusna sekvenčna analiza, ki je odkrila več novih izolatov rastlinskih patogenih bakterij v rodu *Dickeya*, ki jih lahko uvrstimo v vrsto *D. fangzhongdai* in so bili izolirani iz okuženih orhidej, vode in hrušk.

V letu 2018 sta bila objavljena dva članka v najprestižnejših revijah, uvrščenih v kategorijo SICRIS A'', katerih soavtorici sta članici FITO, a so bile raziskave, opisane v člankih, še iz časa, ko nista bili zaposleni na NIB-u.



Reverzibilni cikel TCA v *D. acetivorans* in njegova učinkovitost v primerjavi z drugimi potmi avtotrofne vezave CO_2. Vir: *Science*. 2018; 359 (6375): 563–567.
A reversible TCA cycle in *D. acetivorans* and its efficiency in comparison with other autotrophic CO_2 fixation pathways. Source: *Science*. 2018; 359 (6375): 563–567.

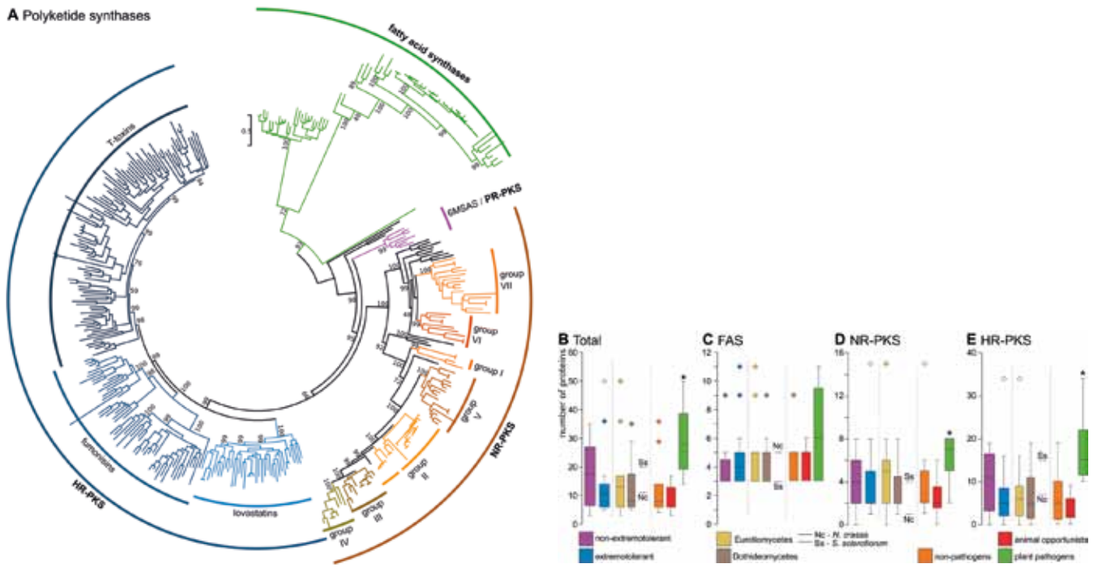
MAJOR ACHIEVEMENTS IN 2018

The article "Assessment of digital PCR as a primary reference measurement procedure to support advances in precision medicine" was published as part of the completed project "Traceability for biologically relevant molecules and entities" within the European Metrology Research Programme (EMRP) of the European Association of National Metrology Institutes (EURAMET). In the project and in the preparation of the article, NIB was one of the six key partners coming from the EU and Turkey. The article was published in *Clinical Chemistry*, with a high impact factor of 8.636 and ranked in the SICRIS A'' category; it received special attention, as one of its co-authors was interviewed on the journal's podcast. The article describes the possibility of using digital PCR as a primary reference measurement procedure in advanced precision medicine.

The article "Network modelling unravels mechanisms of crosstalk between ethylene and salicylate signalling in potato" was published in *Plant Physiology*, one of the most prestigious journals on plant biology that has been continuously published since 1929 by the American Society of Plant Biologists (ASPB). The article presents network modelling as an effective tool for discovering new properties of the complex immune signalling in potato.

Every year, the British Society for Plant Pathology gives out an award to students for the best scientific paper published in *Plant Pathology*. To be eligible for consideration, the student must be the first author and the paper should be substantially the research work of the first author. Špela Alič received the 2018 prize for the article, which was an integral part of her doctoral dissertation. She also received the 2018 Grand Krka Prize for her dissertation. The *Plant Pathology* prize also includes a cash award and membership in the British Society for Plant Pathology. The article describes how a multilocus sequence analysis has highlighted the occurrence of multiple new isolates of plant pathogens of the *Dickeya* genus that can be classified as *D. fangzhongdai* and that were isolated from infected orchids, water and pears.

2018 saw the publication of two articles in the most prestigious journals classified in the SICRIS A'' category by two co-authors who are FITO members, although the research described in these articles dates back to the time when the two co-authors were not yet employed at NIB.



Napovedane poliketid sintaze. Vir: *Fungal Diversity.* 2018; 195–213. Predicted polyketide synthases. Source: *Fungal Diversity.* 2018; 195–213.

V prvem članku »Reversibility of citrate synthase allows autotrophic growth of a thermophilic bacterium«, objavljenem v reviji *Science* z dejavnikom vpliva 41, so avtorji pokazali, da anaerobna deltaproteobakterija *Desulfurella acetivorans* lahko v ciklu trikarboksilnih kislin oksidira acetat in veže avtotrofni ogljik. V avtotrofnih razmerah lahko encim citrat sintaza neodvisno cepi citrat adenozin trifosfat v acetilkoencim A in oksalacetat. Do tega odkritja je veljalo, da ta reakcija ni mogoča v fizioloških razmerah.

V široki filogenetski analizi, objavljeni v reviji z dejavnikom vpliva 14, so avtorji pokazali, da je sopojavljanje poliekstremotolerance in opurtunistične patogenosti na ravni glivnih redov statistično značilno.

Sodelavec FITO, Andrej Blejec, je prejel veliko nagrado Miroslava Zeia za življenjsko delo.

Znanstveno delo mladih raziskovalcev FITO, Špele Alič, Arijane Filipić, Katarine Bačnik, Alexandre Bogožalec Košir in Anje Pecman, je bilo nagrajeno na slovenskih ali mednarodnih znanstvenih srečanjih ter tekmovanjih.

FITO je že več let nacionalni referenčni laboratorij za določanje GSO v hrani in krmi. Temu imenovanju se zdaj pridružuje imenovanje za nacionalni referenčni laboratorij za škodljive organizme rastlin (bakterije in fitoplazme) v okviru javnega pooblastila za opravljanje nalog zdravstvenega varstva rastlin. Poleg tega sta bila imenovana dva konzorcija, katerih član je FITO, kot evropska referenčna laboratorija za področji: 1) virologije in fitoplazem ter 2) bakteriologije.

Dr. Špela Alič, prejemnica velike Krkine nagrade za doktorsko delo, z mentoricama prof. dr. Majo Ravnikar in dr. Tanjo Dreo.
Dr Špela Alič, a recipient of the Grand Krka Prize for her doctoral thesis together with her mentors, Prof. Dr Maja Ravnikar and Dr Tanja Dreo.

In the first article, “Reversibility of citrate synthase allows autotrophic growth of a thermophilic bacterium”, published in *Science* with an impact factor of 41, the authors demonstrated that the anaerobic deltaproteobacterium *Desulfurella acetivorans* is capable of both acetate oxidation and autotrophic carbon fixation via the tricarboxylic acid cycle. Under autotrophic conditions, the enzyme citrate synthase cleaves citrate adenosine triphosphate independently into acetyl coenzyme A and oxaloacetate. Until this discovery, this reaction was regarded as impossible under physiological conditions.

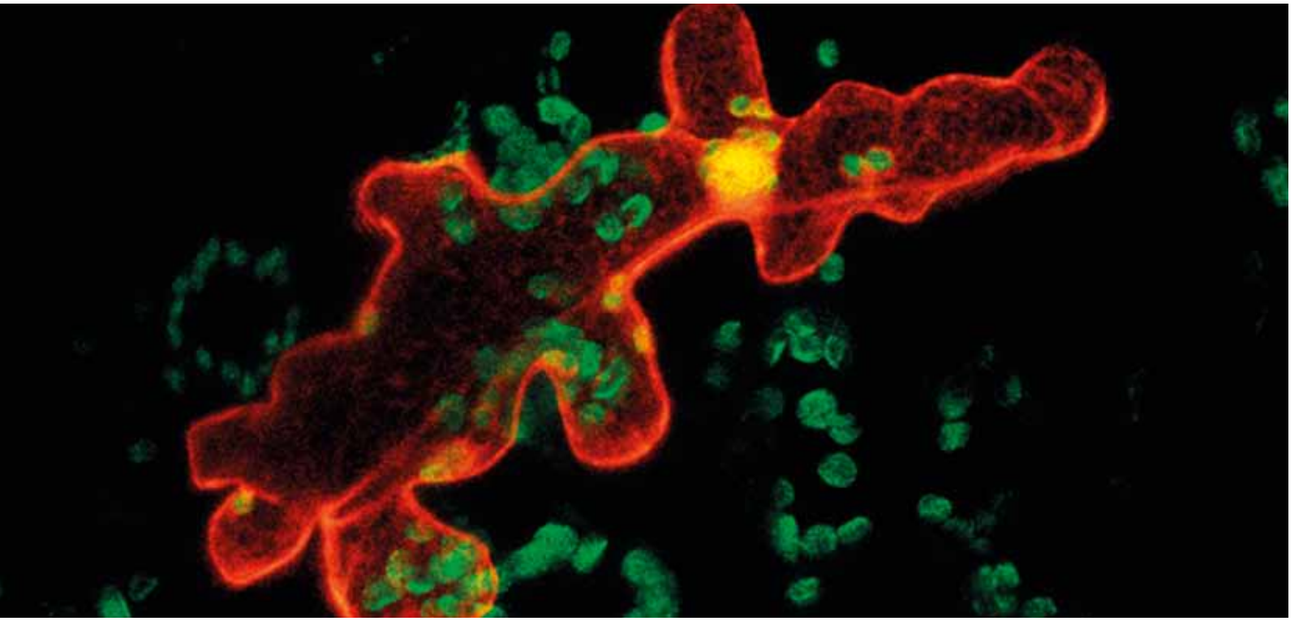
In a broad phylogenetic analysis published in a journal with an impact factor of 14, the authors showed that the co-occurrence of polyextremotolerance and opportunistic pathogenicity at the level of fungal orders is statistically significant.

The Grand Miroslav Zei Award for Life Work was awarded to Andrej Blejec, a FITO associate.

The scientific work of Špela Alič, Arijana Filipić, Katarina Bačnik, Alexandra Bogožalec Košir and Anja Pecman, young researchers from FITO, was awarded at Slovenian or international scientific meetings and competitions.

Dr Špela Alič, a recipient of the Grand Krka Prize for her doctoral thesis together with her mentors, Prof. Dr Maja Ravnikar and Dr Tanja Dreo.

FITO has been a national reference laboratory for the detection of GMOs in food and feed for several years. In addition to this, it has now received another designation – a national reference laboratory for organisms that are harmful to plants (bacteria and phytoplasmas), with public authority to perform plant health tasks. Furthermore, two consortia of which FITO is a member have been designated as EU Reference Laboratories for the following fields: 1) virology and phytoplasmas and 2) bacteriology.



Celica tobaka, spremenjena na način, da izraža rdeči fluorescentni protein (foto: David Dobnik).
Tobacco cell modified to express red fluorescent protein (Photo: David Dobnik).

BIBLIOGRAFIJA

BIBLIOGRAPHY

27 Izvirni znanstveni članek Original Scientific Article
1 Pregledni znanstveni članek Review Article
3 Kratki znanstveni prispevek Short Scientific Article
5 Strokovni članek Professional Article
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8 Objavljeni znanstveni prispevek na konferenci Published Scientific Conference Contribution
4 Objavljeni povzetek znanstvenega prispevka na konferenci (vabljeno predavanje) Published Scientific Conference Contribution Abstract (invited lecture)
88 Objavljeni povzetek znanstvenega prispevka na konferenci Published Scientific Conference Contribution Abstract
1 Objavljeni povzetek strokovnega prispevka na konferenci Published Professional Conference Contribution Abstract
3 Samostojni znanstveni sestavek ali poglavje v monografski publikaciji Independent Scientific Component Part or a Chapter in a Monograph
1 Samostojni strokovni sestavek ali poglavje v monografski publikaciji Independent Professional Component Part or a Chapter in a Monograph
1 Intervju Interview
1 Drugi sestavni deli Other Component Parts
1 Srednješolski, osnovnošolski ali drugi učbenik z recenzijo Reviewed Secondary and Primary School Textbook or Other Textbook
4 Drugo učno gradivo Other Educational Material
3 Doktorska disertacija Doctoral Dissertation
3 Magistrsko delo Master's Thesis
21 Končno poročilo o rezultatih raziskav Final Research Report
3 Elaborat, predštudija, študija Treatise, Preliminary Study, Study
4 Radijska ali televizijska oddaja Radio or Television Broadcast
1 Patentna prijava Patent Application
1 Druge monografije in druga zaključena dela Other Monographs and Other Completed Works
7 Radijski ali TV dogodek Radio or Television Event
64 Prispevek na konferenci brez natisa Unpublished Conference Contribution
1 Vabljeno predavanje na konferenci brez natisa Unpublished Invited Conference Lecture
7 Druga izvedena dela Other Performed Works
11 Uredništvo Editorship

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Kakovost okolja in zdravje ljudi sta neločljiva.

The quality of the environment and human health are inherently connected.

4.0

ODDELEK ZA GENETSKO TOKSIKOLOGIJO IN BIOLOGIJO RAKA

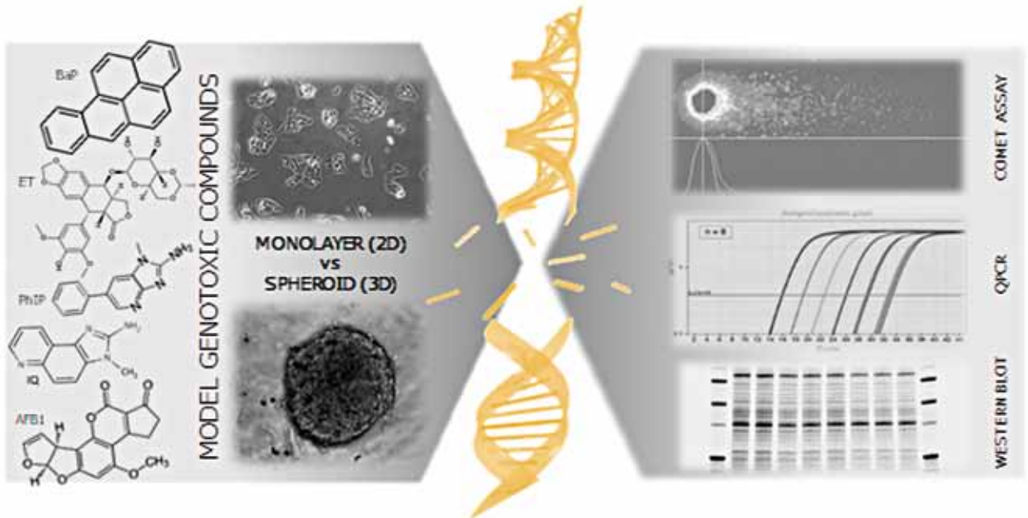
DEPARTMENT OF GENETIC TOXICOLOGY AND CANCER BIOLOGY

Celice glioblastoma (foto: Barbara Breznik).
Glioblastoma cells (Photo: Barbara Breznik).

VODJA: prof. dr. Metka Filipič
HEAD: Prof. Dr Metka Filipič

Prof. dr. Metka Filipič, znanstvena svetnica, je od leta 2005 vodja Oddelka za genetsko toksikologijo in biologijo raka ter redna profesorica toksikološke kemije na Fakulteti za farmacijo Univerze v Ljubljani. Njeno raziskovalno področje so raziskave mehanizmov genotoksičnega in potencialno karcinogenega delovanja antropogenih in naravnih onesnažil okolja in hrane, raziskave potencialnih antigenotoksičnih snovi ter razvoj novih *in vitro* testnih sistemov za proučevanje genotoksičnosti. Njene raziskave so pomembno doprinesle tudi na področju znanosti o okolju, predvsem k razumevanju škodljivih vplivov ostankov zdravil na okolje in zdravje ljudi za kar je prejela Zoisovo priznanje za pomembne dosežke.

Prof. Dr Metka Filipič, scientific councillor, is the Head of the Department of Genetic Toxicology and Cancer Biology since 2005 and professor of Toxicological chemistry at the Faculty of Pharmacy, University of Ljubljana. Her research is focused on the studies of the mechanisms of genotoxicity and potential carcinogenicity of man-made and natural environmental and food pollutants, studies of potential anti-genotoxic substances and development of new *in vitro* test systems in genetic toxicology. She is recognised also for her important contribution in the field of environmental sciences particularly in understanding of the adverse effects of residues of pharmaceuticals on the environment and human health for which she received the national Zois award for important achievements.



3D celični model za testiranje genotoksičnosti. 3D cell models for genotoxicity testing.

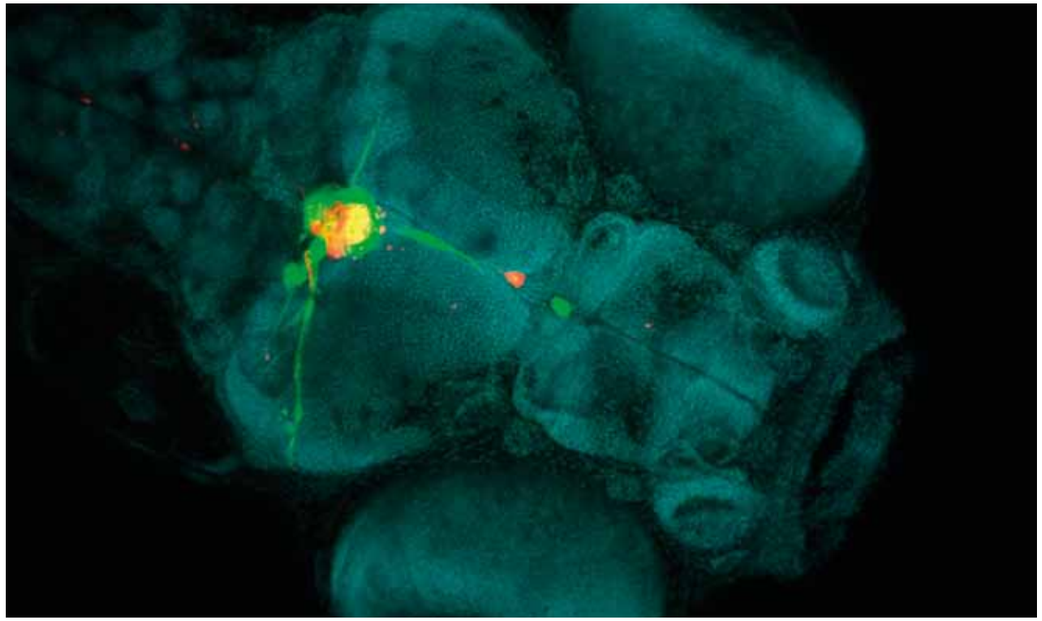
KLJUČNE DEJAVNOSTI

Raziskovalno delo na Oddelku za genetsko toksikologijo in biologijo raka je usmerjeno v razumevanje kompleksnih mehanizmov, prek katerih okolje vpliva na zdravje ljudi in obratno, kako človekove dejavnosti vplivajo na okolje.

Specifična področja naših raziskav so:

- Raziskave molekularnih mehanizmov toksičnega in genotoksičnega delovanja okolijskih onesnažil. Osredotočamo se na proučevanje potencialnih škodljivih učinkov tako posameznih onesnažil (bisfenoli, cianobakterijski toksini, ostanki zdravil ...) kot tudi njihovih zmesi na zdravje ljudi in vodne organizme.
- Raziskave nastanka možganskih tumorjev – gliomov, glioblastomskih matičnih celic in njihove vloge pri napredovanju in odpornosti proti zdravljenju. Raziskave osredotočamo na proučevanje vloge rakavih matičnih celic in mikrookolja tumorjev na odpornost proti zdravljenju s kemo- in radioterapijo ter iskanje novih terapevtskih pristopov.
- Razvoj novih *in vitro* testnih sistemov za nadomeščanje uporabe poskusnih živali v genetski toksikologiji in raziskavah raka. Razvijamo tridimenzionalne (3D) celične modele in modele z zarodki rib cebric (*Danio rerio*).
- Ekološki monitoring kakovosti površinskih voda in razvoj novih metodologij ekološkega vrednotenja kakovosti voda na osnovi analiz okolijske DNK v vodnih telesih.

Na vseh področjih partnersko sodelujemo z raziskovalnimi skupinami v Sloveniji in tujini. Za potrebe državnih institucij ter partnerje iz gospodarstva izvajamo naročniške raziskovalne projekte in svetovanje. Izvajamo testiranja varnosti proizvodov za potrebe registracij (testiranje mutagenosti v skladu z načeli dobre laboratorijske prakse (DLP), testiranje biokompatibilnosti medicinskih pripomočkov v skladu z ISO-standardi).



Invazija celic glioblastoma v možganih zarodka ribe cebrice (foto: Miloš Vittori).
Invasion of glioblastoma cells in the brain of a zebrafish embryo (Photo: Miloš Vittori).

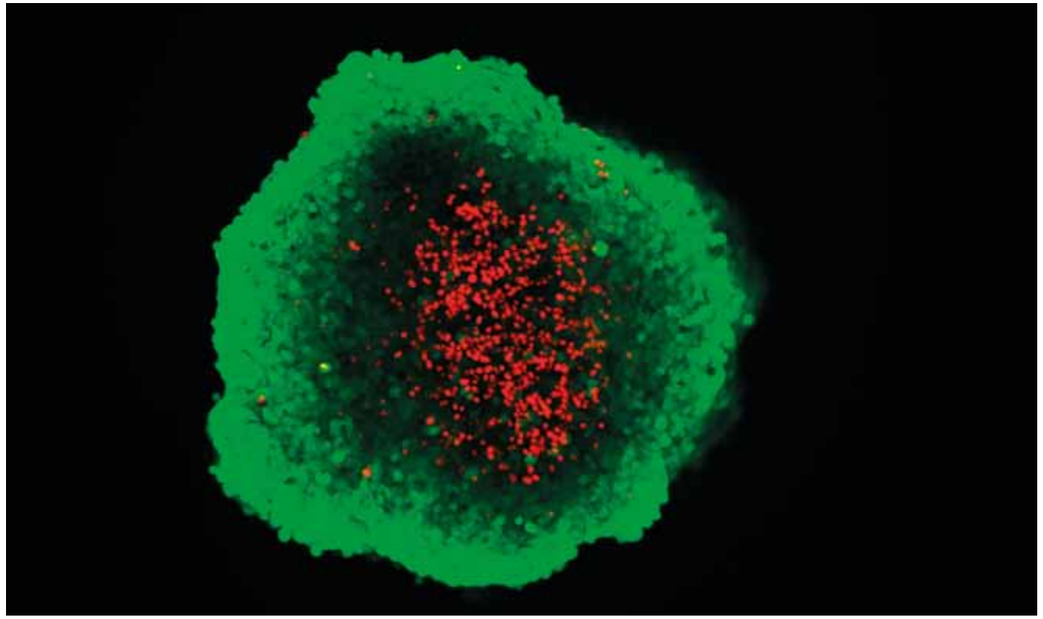
KEY ACTIVITIES

Research work at the Department of Genetic Toxicology and Cancer Biology is focused on understanding the complex mechanisms through which the environment affects human health and vice versa and how human activities affect the environment.

Specific areas of our research include:

- Research into the molecular mechanisms of toxic and genotoxic action of environmental contaminants. We focus on investigating the potential adverse effects of individual contaminants (bisphenols, cyanobacterial toxins, unused medicinal products, etc.) and their mixtures on human health and aquatic organisms.
- Research on the development of brain tumours – gliomas, glioblastoma stem cells and their role in tumour progression and therapeutic resistance. Our research focuses on the study of the role of cancer stem cells and the tumour microenvironment in chemo- and radioresistance as well as the search for new therapeutic approaches.
- Development of new in vitro test systems to replace experimental animal use in genetic toxicology and cancer research. We are developing three-dimensional (3D) cell models and models with zebrafish embryos (*Danio rerio*).
- Ecological monitoring of surface water quality and development of new methodologies for ecological assessment of water quality based on the analysis of environmental DNA in water bodies.

In all areas, we work in partnership with research groups in Slovenia and abroad. For the needs of state institutions and industrial partners, we carry out contract research projects and consulting. We perform product safety testing for registration purposes (mutagenicity testing in accordance with GLP principles, biocompatibility testing of medical devices in accordance with ISO standards).



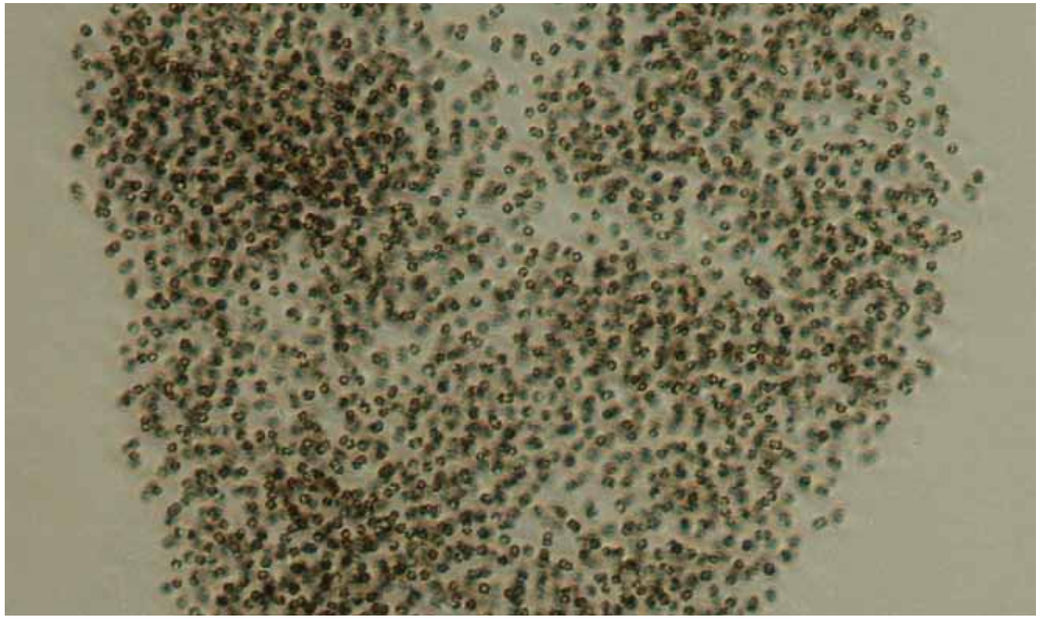
Sferoid HepG2 celic (foto: Martina Štampar). HepG2 cells spheroid (Photo: Martina Štampar).

GLAVNI RAZISKOVALNI DOSEŽKI V LETU 2018

V dveh člankih, objavljenih v prestižni reviji na področju toksikologije: *Archives of Toxicology*, smo predstavili rezultate naših raziskav v okviru razvoja novih alternativnih testnih sistemov za nadomeščanje laboratorijskih živali za proučevanje in testiranje genotoksičnosti. Z raziskavami lastnosti in občutljivosti celičnih modelov za zaznavanje genotoksičnih karcinogenov, ki so potekale v sodelovanju z Medicinsko univerzo na Dunaju, smo v naboru 12 celičnih linij raka jeter kot najobetavnejši identificirali celični liniji HepG2 in HuH6. Poleg tega smo mezenhimske matične celice uspešno diferencirali v metabolno aktivne celice, podobne jetrnim celicam, ki so sposobne zaznavanja genotoksične aktivnosti posredno delujočih genotoksičnih karcinogenov. Rezultati obeh raziskav odpirajo možnosti razvoja občutljivejših testnih sistemov za rutinsko testiranje genotoksičnosti.

Glioblastom (GBM) je najagresivnejši in najpogostejši možganski tumor, sedanji pristopi zdravljenja pa niso uspešni. Že naše pretekle raziskave so pokazale, da v mikrookolju tumorjev mezenhimske matične celice, ki izražajo močan tropizem proti GBM in vplivajo na njegovo malignost, lahko predstavljajo vektor za zdravljenje GBM. V reviji *Scientific Reports* smo objavili raziskavo primerjave učinkov mezenhimskih matičnih celic iz kostnega mozga in iz maščevja na heterogeno populacijo celic GBM z različnim profilom mezenhimskega transkriptoma. Rezultati so pokazali povezanost ravni kininskega receptorja 1 (B1R) z invazivnostjo celic GBM ter da se le-ta izrazi samo v celicah U87 s slabo izraženim mezenhimskim profilom in le v prisotnosti mezenhimskih matičnih celic kostnega mozga. Ti rezultati podpirajo predhodne raziskave, ki kažejo, da je B1R potencialna tarča za adjuvantno zdravljenje GBM. Poleg tega so rezultati pokazali selektivnost matičnih celic različnega izvora, kar je treba nadalje raziskati, saj lahko na heterogene populacije tumorskih celic vplivajo negativno. Te raziskave so potekale v sodelovanju z Department of Biochemistry, Institute of Chemistry, University of São Paulo, Brazilija.

Naše raziskave vloge mezenhimskih matičnih celic pri napredovanju možganskih tumorjev so bile v okviru projekta ARRS za promocijo znanosti »Odlični v znanosti 2018« uvrščene med najvidnejše raziskovalne dosežke na področju medicine/onkologije.



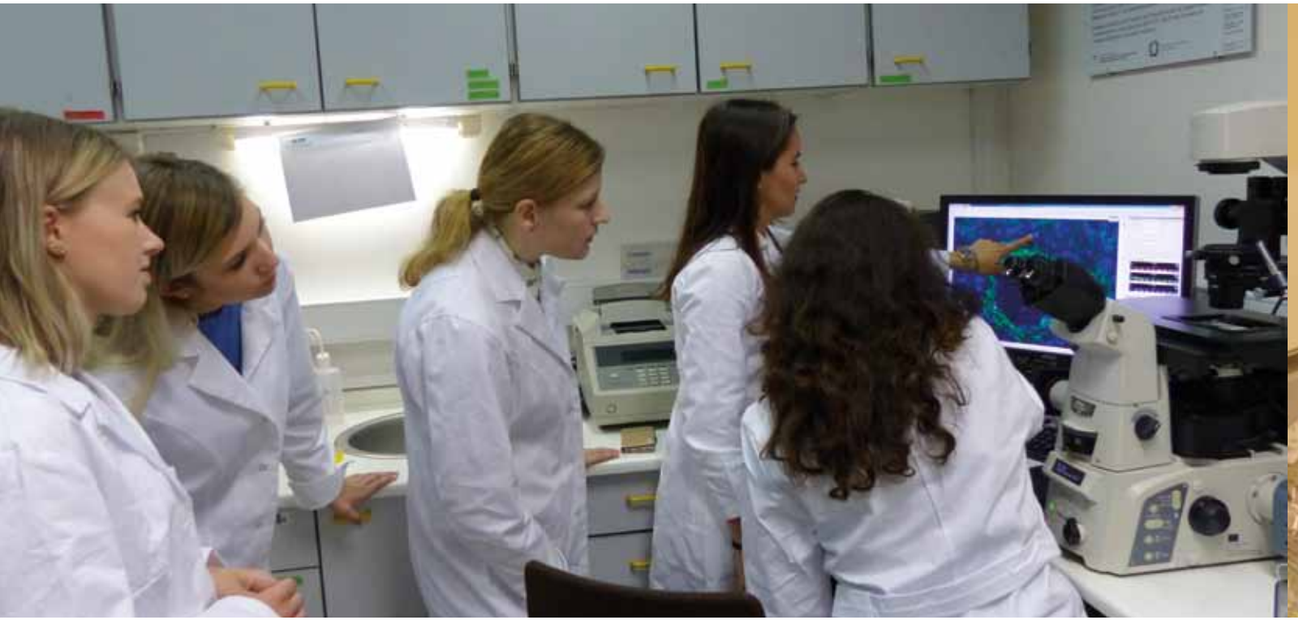
Cianobakterija *Microcystis flos-aquae* (foto: Tina Eleršek). Cyanobakteria *Microcystis flos-aquae* (Photo: Tina Eleršek).

MAJOR RESEARCH ACHIEVEMENTS IN 2018

In two articles published in the prestigious toxicology journal *Archives of Toxicology*, we presented the results of our research in the development of new alternative testing systems for the replacement of laboratory animals for the study and testing of genotoxicity. In the research into the properties and sensitivity of cellular models for the detection of genotoxic carcinogens, which was conducted in cooperation with the Medical University of Vienna, the cell lines HepG2 and HuH6 were identified as the most promising in a range of 12 liver cancer cell lines. In addition, we successfully differentiated mesenchymal stem cells into metabolically active cells similar to liver cells capable of detecting genotoxic activity in indirect-acting genotoxic carcinogens. The results of both research studies open the possibility of developing more sensitive testing systems for routine genotoxicity testing.

Glioblastoma (GBM) is the most aggressive and the most common brain tumour, and current approaches to treatment are not successful. Our past research has shown that mesenchymal stem cells, which in the microenvironment of tumours express a strong tropism toward GBM and affect its malignancy, can represent a vector for the treatment of GBM. We published a study in *Scientific Reports* comparing the effects of mesenchymal stem cells from bone marrow and adipose tissue on a heterogeneous GBM cell population with a different mesenchymal transcriptoma profile. The results showed a correlation of the level of kinin receptor 1 (B1R) with the invasion of GBM cells and that it expresses only in U87 cells with a low mesenchymal profile and only in the presence of bone marrow mesenchymal stem cells. These results support previous research showing that B1R is a potential target for an adjuvant approach in GBM therapy. Moreover, the results revealed the selectivity of stem cells of different origin, which needs to be further explored, since heterogeneous tumour cell populations may be affected adversely. This research was conducted in collaboration with the Department of Biochemistry, Institute of Chemistry, University of São Paulo, Brazil.

Our research into the role of mesenchymal stem cells in brain tumour progression was ranked among the most prominent research achievements in medicine/oncology within the framework of the ARRS project for the promotion of science entitled “Excellent in Science 2018”.



Izobraževanje študentov (foto: Martina Štampar). Students' education (Photo: Martina Štampar).

Zaradi podnebnih sprememb se jezera, kot ponudniki ekosistemskih storitev, soočajo z vse več stresorji, ki ogrožajo njihovo delovanje. Cvetenje škodljivih cianobakterij, ki je posledica obremenjevanja s hranili in stresorjev, ki jih povzročajo podnebne spremembe, je stalni globalni problem. Pri sistematskem spremljanju podatkov o teh pojavih je velik problem primerljivost različnih virov podatkov. Raziskovalci GEN (dr. Tina Eleršek) so sodelovali v raziskavi, ki je potekala v okviru evropske mreže CyanoCost poleti 2015. V raziskavo je bilo vključenih 396 evropskih jezer (EMLS), vzorčenje in analize fizikalnih, kemičnih in bioloških spremenljivk pa so bili v celoti standardizirani. Rezultati in metodologija so objavljeni v prestižni reviji *Nature – Scientific Data* (A'') ter so spodbuda za podobna proučevanja velikih geografskih območij, kar bo prispevalo k boljšemu razumevanju odzivov jezer na spreminjajoče se dejavnike okolja.

V letu 2018 smo začeli izvajati projekt Interreg Alpski prostor (2018–2021) Eco-AlpsWater, ki se ukvarja z inovativnim ekološkim vrednotenjem in strategijo upravljanja voda za zaščito ekosistemskih storitev v alpskih jezerih in rekah. Novi pristop ekološkega vrednotenja bo temeljil na analizi okolijske DNK v vodnih telesih (od bakterij do rib), na osnovi sekvenciranja naslednje generacije (NGS) ter pametnih tehnologij pri obdelavi in shranjevanju velikih podatkovnih baz.

NAGRADE IN AKREDITACIJE

V letu 2018 sta dr. Matjaž Novak in dr. Barbara Breznik prejela nagradi Miroslava Zeia za izjemno doktorsko delo na področju dejavnosti Nacionalnega inštituta za biologijo.

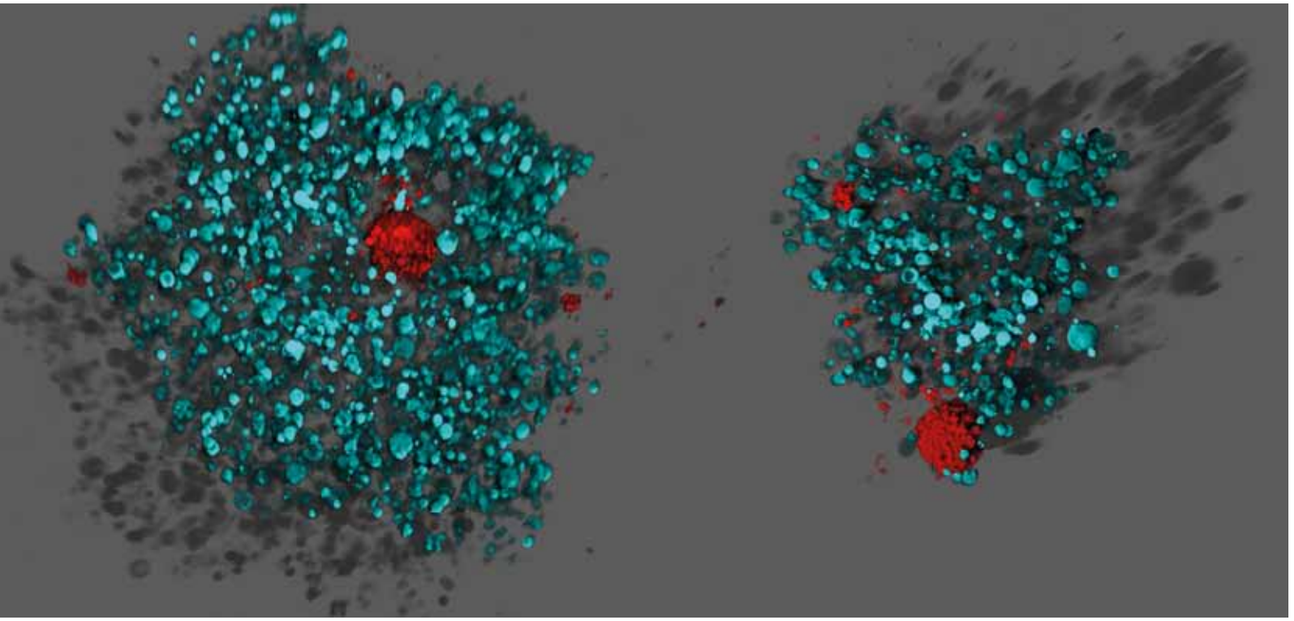
Priprava sferoidov (foto: Martina Štampar). Preparation of spheroids (Photo: Martina Štampar).

Climate change is causing lakes, as providers of ecosystem services, to face more and more stressors that threaten their functioning. Blooming of harmful cyanobacteria, which is a consequence of excess nutrient loads and stressors caused by climate change, is a constant global problem. The comparability of different data sources is a major problem in systematic monitoring of data on these phenomena. Researchers from the GEN unit (Dr. Tina Eleršek) participated in the study conducted as part of the European CyanoCost network in the summer of 2015. The study included 396 European lakes (EMLS), and the sampling and analysis of physical, chemical and biological variables were completely standardised. The results and the methodology are published in the prestigious *Nature – Scientific Data* (A'') journal and are an incentive for similar studies of large geographical areas, which will contribute to a better understanding of the responses of lakes to changing environmental factors.

In 2018, we started implementing Interreg Alpine Space (2018–2021) Eco-AlpsWater, a project dealing with innovative ecological assessment and water management strategy for the protection of ecosystem services in Alpine lakes and rivers. The new approach will make use of Next Generation Sequencing (NGS) to analyse environmental DNA in water bodies (from bacteria to fish) and smart technologies to process and store large databases.

AWARDS AND ACCREDITATIONS:

The 2018 Miroslav Zei Award for Exceptional Doctoral Work in the Field of Activities of NIB went to Dr Barbara Breznik and Dr Matjaž Novak.



Sferoidi tumorja možganov (foto: Barbara Breznik). Brain tumor spheroids (Photo: Barbara Breznik).

BIBLIOGRAFIJA
BIBLIOGRAPHY

19 Izvirni znanstveni članek Original Scientific Article
3 Poljudni članek Popular Article
2 Objavljeni povzetek znanstvenega prispevka na konferenci (vabljeno predavanje) Published Scientific Conference Contribution Abstract (invited lecture)
19 Objavljeni povzetek znanstvenega prispevka na konferenci Published Scientific Conference Contribution Abstract
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2 Elaborat, predštudija, študija Treatise, Preliminary Study, Study
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Neokrnjeni naravni ekosistemi so naše bogastvo.

Pristine natural ecosystems are our asset.

5.0

ODDELEK ZA RAZISKAVE ORGANIZMOV IN EKOSISTEMOV

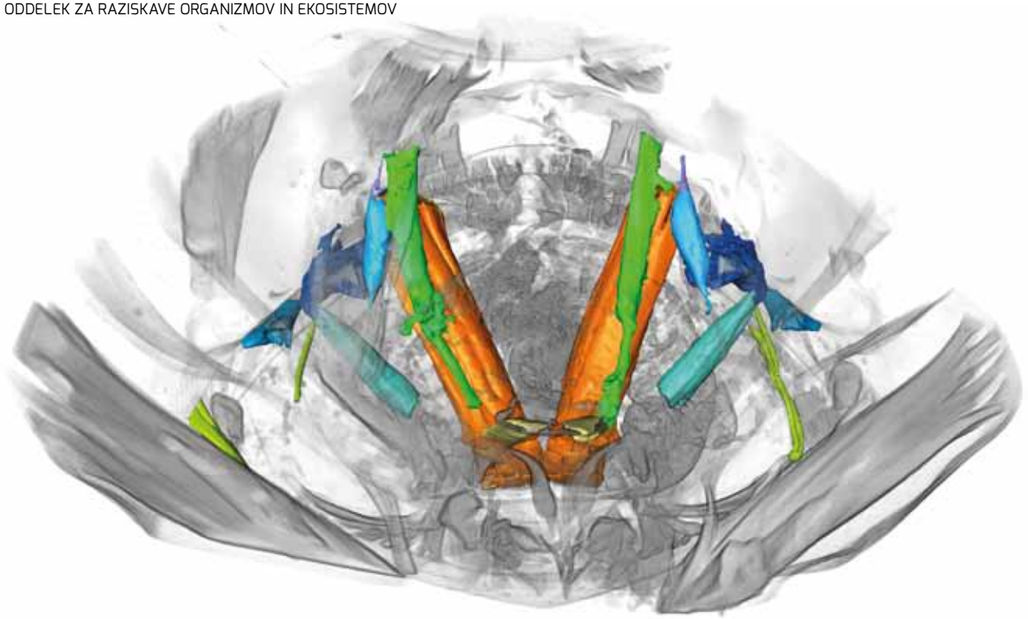
DEPARTMENT OF ORGANISMS AND ECOSYSTEMS RESEARCH

Trichonephila inaurata (samica), Južna Afrika (foto: Matjaž Kuntner).
Trichonephila inaurata (female), South Africa (Photo: Matjaž Kuntner).

VODJA: doc. dr. Meta Virant-Doberlet
HEAD: Assist. Prof. Dr Meta Virant-Doberlet

Doc. dr. Meta Virant-Doberlet, znanstvena svetnica, je vodja Oddelka za raziskave organizmov in ekosistemov, ki je bil ustanovljen leta 2016. Je ena od vodilnih svetovnih avtoritet na področju vibracijske komunikacije nevretenčarjev in njeno raziskovalno delo je usmerjeno na procese, ki so ključnega pomena ne-le za evolucijo vibracijske komunikacije temveč tudi za razumevanje splošnih osnovnih procesov sporazumevanja. Ima tudi pomembno vlogo pri razvoju in uporabi vibracijskih signalov kot novega, okolju prijaznega pristopa za nadzor žuželčjih škodljivcev. Kot priznanje za njene prelomne raziskave je prejela mednarodno nagrado 'Insect Drummer Lifetime Achievement Award' ter nagrado Miroslava Zeia za izjemne znanstvene dosežke na področju dejavnosti NIB.

Assist. Prof. Dr Meta Virant-Doberlet, scientific councillor, is the Head of the Department of Organisms and Ecosystems Research, which has been established in 2016. She is a leading authority on arthropod vibrational communication and her research is focused on processes shaping not only the evolution of vibrational communication, but are also central to understanding the communication in general. She also played an important role in developing the exploitation of vibrational signals as a new, alternative, environmentally-friendly approach for managing insect pests. In recognition of her ground-breaking studies she has been awarded international 'Insect Drummer Lifetime Achievement Award' and the Miroslav Zei award for Exceptional Scientific Achievements within the fields of Research at NIB.



Mikro-CT 3D rekonstrukcija mišic timbalnega aparata pri škržatku (vir: Anka Kuhelj).
Micro-CT 3D reconstruction of muscles associated with tymbal mechanism in leafhoppers (Source: Anka Kuhelj).

KLJUČNE DEJAVNOSTI ODDELKA

Na Oddelku za raziskave organizmov in ekosistemov s temeljnimi in aplikativnimi raziskavami ustvarjamo vrhunsko znanje, potrebno za celostno razumevanje organizmov in njihove vloge v okolju – od nevronalnih mehanizmov zaznavanja okolja in komunikacije med celicami do interakcij v ekosistemih. Naše interdisciplinarno znanje in izkušnje uporabljamo za predloge učinkovitejših in bolj trajnostnih posegov v okolje.

Specifična področja raziskav so naslednja:

- biodiverziteta kopenskih in sladkovodnih ekosistemov, vključno s podzemnimi ekosistemi;
- filogenija, taksonomija in biogeografija izbranih skupin pajkov;
- evolucija ekstremnih fenotipov;
- vibracijska komunikacija, v sklopu katere analiziramo naravno vibracijsko zvočno krajino, proučujemo komunikacijska omrežja, raziskujemo mehanizme produkcije vibracijskih signalov, analiziramo vedenjske odzive ter izvajamo nevrobiološke in ekofiziološke študije;
- prilagojenost izbranih vrst na spremembe dejavnikov v okolju na osnovi ekofizioloških študij;
- odnosi med tuje- in domorodnimi vrstami s podobnimi ekološkimi nišami;
- biologija in ekologija hroščev s seznama vrst evropskega varstvenega pomena;
- ekosistemske storitve, v sklopu katerih raziskujemo procese v vodonosnikih in ekologijo opraševanja s poudarkom na divjih opraševalcih;
- vpliv rabe prostora na ekosistemske procese v vodotokih;
- interakcije človeka z okoljem v travniškem in mestnem okolju;
- razvoj alternativnih pristopov za nadzor žuželčjih škodljivcev in monitoring ogroženih vrst.

Strokovni posvet »Pestrost opraševalcev za zanesljivo pridelavo hrane« z ministrico dr. Aleksandro Pivec in državno sekretarko mag. Tanjo Strniša (foto: Jernej Polajnar).Workshop »Pollinator diversity for reliable food production« with Dr Aleksandra Pivec, Minister of Agriculture, Forestry and Food and MSc Tanja Strniša, State Secretary (Photo: Jernej Polajnar).

KEY ACTIVITIES OF THE DEPARTMENT:

Through basic and applied research, the Department of Organisms and Ecosystems Research creates top-level knowledge necessary for comprehensive understanding of organisms and their role in the environment – from neural mechanisms underlying perception of the environment and intercellular communication to interactions in ecosystems. We leverage our interdisciplinary know-how to devise proposals for more effective and more sustainable interventions affecting the environment.

Our specific areas of research include:

- biodiversity of terrestrial and freshwater ecosystems, including underground ecosystems;
- phylogeny, taxonomy and biogeography of selected groups of spiders;
- evolution of extreme phenotypes;
- vibrational communication, where we analyse the natural vibrational soundscape, study communication networks, explore the generation mechanisms of vibration signals, analyse behavioural responses and perform neurobiological and eco-physiological studies;
- adaptation of selected species to changes in environmental factors based on eco-physiological studies;
- relationships between non-native and indigenous species with similar ecological niches;
- biology and ecology of beetles from the list of species of European conservation importance;
- ecosystem services, in which we explore the processes in aquifers and the ecology of pollination with an emphasis on wild pollinators;
- impact of the use of space on ecosystem processes in watercourses;
- human interaction with the environment in grassland and urban environments;
- development of alternative approaches for the control of insect pests and monitoring of endangered species.

Svetli zemeljski čmrlj (*Bombus lucorum*) na jablani (foto: Danilo Bevk).

GLAVNI DOSEŽKI V LETU 2018

Ob zaključku projekta CRP »Pomen divjih opraševalcev pri opraševanju kmetijskih rastlin in trajnostno upravljanje v kmetijstvu za zagotovitev zanesljivega opraševanja« smo organizirali strokovni posvet z naslovom »Pestrost opraševalcev za zanesljivo pridelavo hrane«. Udeležili sta se ga tudi ministrica za kmetijstvo, gozdarstvo in prehrano dr. Aleksandra Pivec ter državna sekretarka na tem ministrstvu mag. Tanja Strniša. Namen posveta je bila javna predstavitev rezultatov projekta, v okviru katerega je bila izvedena prva raziskava o pomenu divjih opraševalcev v kmetijstvu v Sloveniji. Na posvetu smo izpostavili velik pomen ohranjanja divjih opraševalcev kot edine strategije za zagotavljanje zanesljivega opraševanja. NIB je ob tej priložnosti izdal tudi informativno zgibanko.

V letu 2018 smo začeli izvajati projekt »LIFE integrated project for enhanced management of Natura 2000 in Slovenia«. Osemletni projekt, v skupni vrednosti 17 milijonov evrov, koordinira Ministrstvo za okolje in prostor, izvaja pa ga 15 partnerjev. Glavna cilja projekta sta prenova Programa upravljanja območij Natura 2000 ter izboljšanje varstvenega statusa izbranih vrst in habitatov z vpeljavo novih in izboljšanih ter efektivnejših metod monitoringa.

V članku, objavljenem v reviji *Ecography*, smo izpostavili skladne vzorce metabolnih odzivov vrst z različnimi vzorci vertikalne razširjenosti pri evolucijsko neodvisnih živalskih skupinah (plazilci, dvoživke, hrošči), kar predstavlja novost v razumevanju mehanizmov, ki oblikujejo prostorske vzorce biotske raznovrstnosti.

V članku, objavljenem v reviji *Scientic Reports*, smo z vedenjskimi, biofizikalnimi in nevrofiziološkimi poskusi ter modeliranjem raziskovali mehanizme in procese, ki majhnim žuželkam na rastlinah omogočajo orientacijo proti viru vibracijskih signalov. Pokazali smo, da je na rastlinah časovni zamik med prihodom vibracijskega signala na prostorsko ločene čutilne organe v posameznih nogah najzanesljivejši parameter za določanje smeri, iz katere prihaja signal.

Cybister lateralimarginalis (foto: Al Vrezec).

MAJOR ACHIEVEMENTS IN 2018

On completion of the targeted research programme “The Importance of Wild Pollinators in the Pollination of Agricultural Crops and Sustainable Management in Agriculture to Ensure Reliable Pollination”, we organised a professional consultation entitled “The Diversity of Pollinators for Food Security”. It was also attended by Dr Aleksandra Pivec, Minister of Agriculture, Forestry and Food, and MSc Tanja Strniša, State Secretary at this Ministry. The purpose of the consultation was the public presentation of the results of the project, which included the first study on the importance of wild pollinators in agriculture in Slovenia. At the consultation, we highlighted the importance of preserving wild pollinators as the only strategy for ensuring reliable pollination. On this occasion, NIB issued an information leaflet.

In 2018, we launched the “LIFE integrated project for enhanced management of Natura 2000 in Slovenia”. This eight-year project in the total value of €17 million is coordinated by the Ministry of the Environment and Spatial Planning and is being implemented by 15 partners. The project’s two main objectives are the renewal of the Natura 2000 Management Programme and the improvement of the protection status of selected species and habitats through the introduction of new and improved and more effective monitoring methods.

The article published in *Ecography* highlighted the consistent patterns of metabolic responses of species with different vertical distribution patterns in evolutionarily independent animal groups (reptiles, amphibians, beetles), which is a new feature in the understanding of the mechanisms that shape the spatial patterns of biodiversity.

In the article published in *Scientific Reports*, we used behavioural, biophysical and neurophysiological experiments and modelling to explore the mechanisms and processes by which small insects on plants can orientate towards the source of vibration signals. We showed that the time delay between the arrival of a vibration signal on spatially separated sensory organs in individual legs is the most reliable parameter for determining the direction from which the signal originates.

Kosec (*Crex crex*) (foto: Davorin Tome). Corn crake (*Crex crex*) (Photo: Davorin Tome).

V člankih, objavljenih v reviji *Journal of Biogeography*, smo preverjali, ali zgodovinski biogeografski vzorci pajkov nosijo odtise vikariance ali disperzije. V enem smo z rekonstrukcijo filogenetske zgodovine pajkov družine *Deinopidae* od krede do danes pokazali, da se njihova biogeografska poselitev Karibov ujema s hipotezo GAARlandia, ki predvideva obstoj kopenskega mostu med Južno Ameriko in Velikimi Antili v eocenu. V drugem smo na vzorcu primitivno segmentiranih pajkov (družina *Liphistiidae*) ugotovili, da je njihova zgodovina diverzifikacije v oligocenu in miocenu pogojena z nastajanjem gorskih masivov in rek v kontinentalni Kitajski.

Prof. dr. Andrej Blejec je prejel veliko nagrado Miroslava Zeia za življenjsko delo na področju dejavnosti Nacionalnega inštituta za biologijo.

Mladič lesne sove (*Strix aluco*) (foto: Al Vrezec). Tawny owl chick (*Strix aluco*) (Photo: Al Vrezec).

In the articles published in the *Journal of Biogeography*, we investigated whether historical biogeographical patterns of spiders bear the impressions of vicariance or of dispersal. In the first, we reconstructed the phylogenetic history of the *Deinopidae* family of spiders from their Cretaceous origins to today, thereby showing that their biogeographical colonisation of the Caribbean islands matches the GAARlandia, a hypothesised land bridge that connected South America to the Greater Antilles during the Eocene. In the second article, we found, on a sample of primitively segmented spiders (*Liphistiidae*), that their history of diversification in the Oligocene and the Miocene was driven by the formation of massifs and rivers in mainland China.

Prof. Dr Andrej Blejec received the Grand Miroslav Zei Award for Life Work in the Field of Activities of the National Institute of Biology.

Koščak (*Austropotamobius torrentium*) (foto: Davorin Tome). Stone Crayfish (*Austropotamobius torrentium*) (Photo: Davorin Tome).

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1 Kratki znanstveni prispevek Short Scientific Article
4 Strokovni članek Professional Article
9 Poljudni članek Popular Article
5 Objavljeni znanstveni prispevek na konferenci Published Scientific Conference Contribution
2 Objavljeni povzetek znanstvenega prispevka na konferenci (vabljeno predavanje) Published Scientific Conference Contribution Abstract (invited lecture)
50 Objavljeni povzetek znanstvenega prispevka na konferenci Published Scientific Conference Contribution Abstract
4 Strokovni sestavek v slovarju, enciklopediji, leksikonu Professional Entry in Dictionary, Encyclopaedia or Lexicon
2 Recenzija, prikaz knjige, kritika Review, Book Review, Critique
2 Predgovor, spremna beseda Preface, Afterword
5 Intervju Interview
3 Drugi sestavni deli Other Component Parts
2 Srednješolski, osnovnošolski ali drugi učbenik z recenzijo Reviewed Secondary and Primary School Textbook or Other Textbook
2 Doktorska disertacija Doctoral Dissertation
1 Magistrsko delo Master's Thesis
7 Končno poročilo o rezultatih raziskav Final Research Report
3 Elaborat, predštudija, študija Treatise, Preliminary Study, Study
4 Radijska ali televizijska oddaja Radio or Television Broadcast
6 Druge monografije in druga zaključena dela Other Monographs and Other Completed Works
18 Radijski ali TV dogodek Radio or Television Event
2 Razstava Exhibition
6 Predavanje na tuji univerzi Invited Lecture at Foreign University
10 Prispevek na konferenci brez natisa Unpublished Conference Contribution
14 Druga izvedena dela Other Performed Works
20 Uredništvo Editorship

NIB
ODDELEK ZA RAZISKAVE ORGANIZMOV IN EKOSISTEMOV
DEPARTMENT OF ORGANISMS AND ECOSYSTEMS RESEARCH

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6.0

INFRASTRUKTURNI CENTER NIB

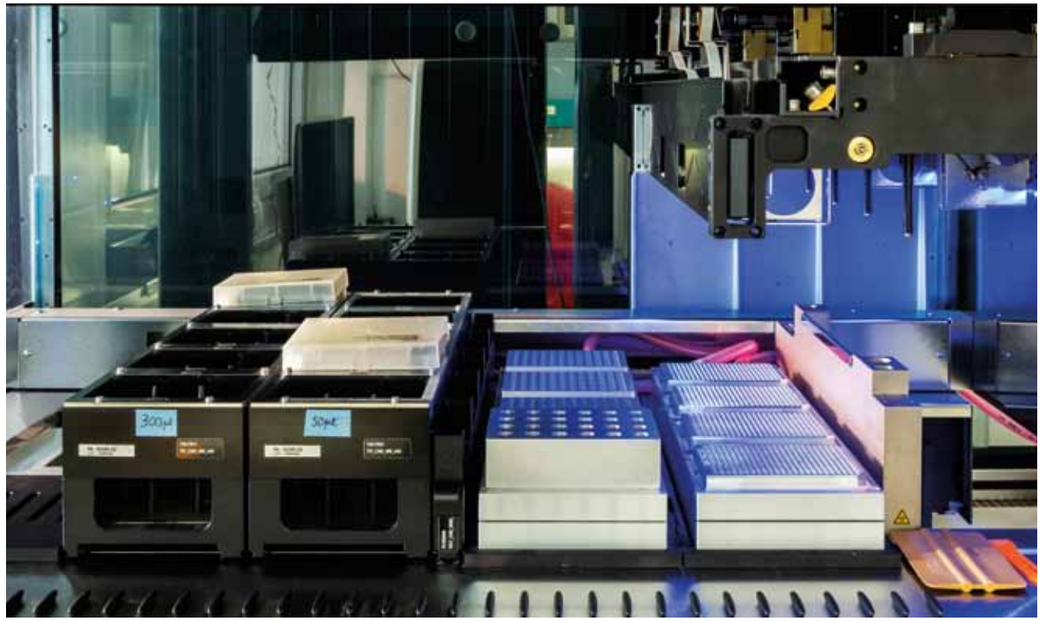
NIB INFRASTRUCTURAL CENTRE

Boja »Vida« (foto: Tihomir Makovec).
Buoy »Vida« (Photo: Tihomir Makovec).

VODJA: izr. prof. dr. Maruša Pompe Novak
HEAD: Assoc. Prof. Dr Maruša Pompe Novak

Infrastrukturni center NIB (IC NIB) sestavljata dva programsko in organizacijsko zaključena centra: Infrastrukturni center Planta (IC Planta), ki deluje pod okriljem Oddelka za biotehnologijo in sistemsko biologijo, in Infrastrukturni center MBP (IC MBP) na Morski biološki postaji Piran (MBP). IC NIB sofinancira Agencija za raziskovalno dejavnost RS prek infrastrukturnega programa NIB (IP NIB), v katerega je od leta 2018 poleg IC Planta in IC MBP vključeno tudi Slovensko vozlišče evropske infrastrukture za sistemsko biologijo (ISBE.SI). Vsak del IC NIB ponuja uporabo opreme ter storitve javnemu in zasebnemu sektorju.

The NIB Infrastructural Centre (IC NIB) consists of two distinct centres in terms of programmes and organisation: Infrastructural Centre Planta (IC Planta), which is part of the Department of Biotechnology and Systems Biology, and Infrastructural Centre MBS (IC MBS) as part of Marine Biology Station Piran (MBS). The IC NIB is co-financed by the Slovenian Research Agency through the NIB Infrastructural Programme (IP NIB), which as of 2018 also includes the Slovenian Node of Infrastructure for Systems Biology Europe (ISBE.SI) in addition to IC Planta and the IC MBS. Each part of the IC NIB offers services and equipment to the public and private sector.



Notranjost robota za pipetiranje s prostorom za nastavke pipet, vzorce in reakcijske plošče ter setom štirih pipet (foto: David Dobnik).
The core of pipetting robot with space for pipette tips, samples and reaction plates, and a set of four pipettes (Photo: David Dobnik).

Veliko infrastrukturno opremo IC Planta sestavljajo:

- presevni elektronski mikroskop (Philips CM100) s CCD-kamerama (Gatan Orius SC200 in Gatan BioScan 792), ki je v solastništvu Nacionalnega inštituta za biologijo (NIB) in Oddelka za biologijo Biotehniške fakultete (BF) Univerze v Ljubljani (UL),
- konfokalni stereomikroskop (Leica TCS LSI),
- aparature za PCR v realnem času (ABI 7900HT Fast, Roche Light Cycler 480, ABI PRISM ViiA7 in ABI QuantStudio7),
- aparature za digitalni PCR (Biorad QX100, Biorad QX200 in Fluidigm BioMark HD),
- robot za pipetiranje (Hamilton Microlab STARlet),
- komore za gojenje rastlin in tkivnih kultur (Kambič),
- komore za ločeno gojenje rastlin (Kambič) ter
- dva karantenska rastlinjaka.

Poleg tega je mogoča tudi uporaba:

- spektrofluorometrov (SynergyMx, BioTek) in
- sistema za identifikacijo bakterij z analizo celičnih maščobnih kislin s plinsko kromatografijo (Sherlock Microbial Identification System), ki je trenutno lociran na Biotehniški fakulteti (BF) Univerze v Ljubljani (UL).

Veliko infrastrukturno opremo IC MBP sestavljajo:

- raziskovalno plovilo Sagita s sodobno navigacijsko in raziskovalno opremo, različnimi vzorčevalniki, akustičnim tokomerom in sodobno multiparametrično sondo,
- oceanografska boja Vida z meteorološkimi merilnimi instrumenti, multiparametričnimi sondami in akustičnim tokomerom,
- manjše plovilo in
- visokofrekvenčni radar Wera.

Notranjost raziskovalnega karantenskega rastlinjaka (foto: David Dobnik). Research quarantine greenhouse from the inside (Photo: David Dobnik).

The large infrastructural equipment of IC Planta consists of:

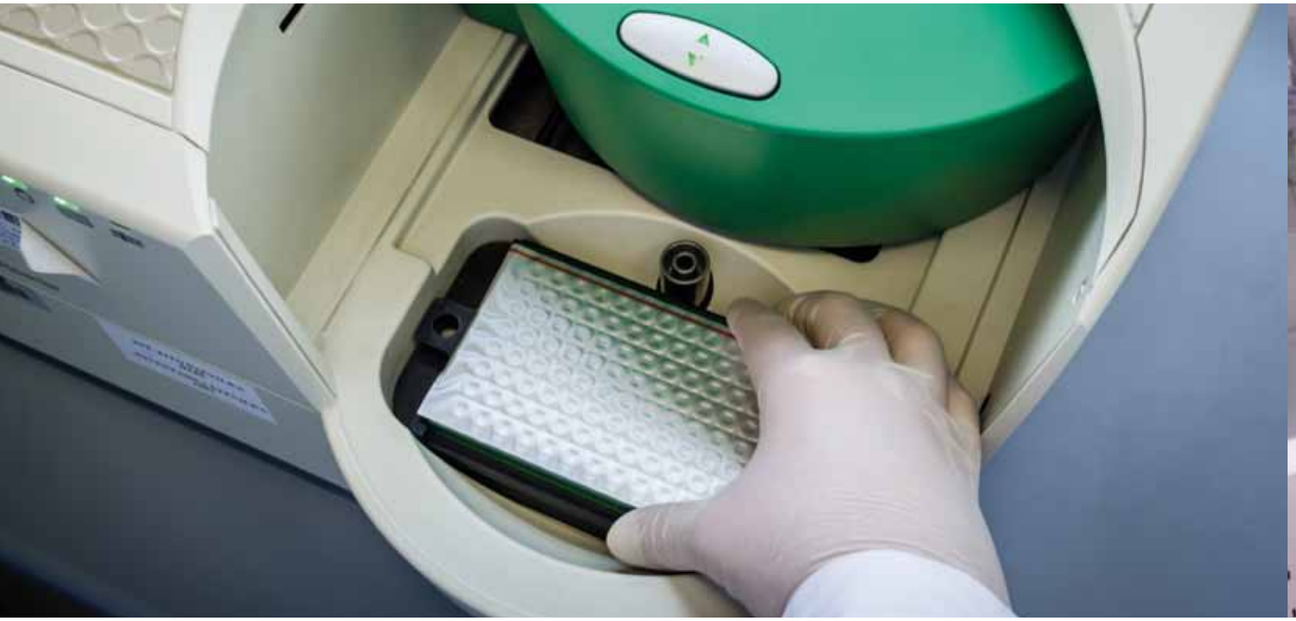
- Transmission electron microscope (TEM) (Philips CM100) with two CCD cameras (Gatan Orius SC200 and Gatan BioScan 792), co-owned by NIB and the Department of Biology at the Biotechnical Faculty of the University of Ljubljana;
- Confocal stereomicroscope (Leica TCS LSI);
- Real-time PCR instruments (ABI 7900HT Fast, Roche Light Cycler 480, ABI PRISM ViiA7 and ABI QuantStudio7);
- Digital PCR instruments (Biorad QX100, Biorad QX200 and Fluidigm BioMark HD);
- Robot for pipetting (Hamilton Microlab STARlet);
- Growth chambers for plant and tissue culture breeding (Kambič);
- Plant growth chambers for separate breeding (Kambič);
- Two quarantine greenhouses.

Additionally, it is possible to use:

- Spectrofluorimeters (SynergyMx, BioTek) and
- the system for the identification of microorganisms using fatty acid methyl ester analysis by gas chromatography (Sherlock Microbial Identification System) that is at the moment located at the Biotechnical Faculty of the University of Ljubljana.

The large infrastructural equipment of the IC MBS consists of:

- Sagita research vessel with modern navigation and research equipment, various samplers, an acoustic current meter and a modern multiparametric CTD probe;
- Vida oceanographic buoy with meteorological measuring instruments, multiparametric CTD probes and an acoustic current meter;
- a smaller vessel and
- the Wera high-frequency radar.



Čitalec kapljic sistema QX200 za kapljično digitalno verižno reakcijo s polimerazo (foto: David Dobnik).
Droplet reader of QX200 system for droplet digital polymerase chain reaction (Photo: David Dobnik).

IC Planta je podpora raziskovalni dejavnosti, ministrstvom, inšpektoratom in drugim državnim organom, podjetjem in pedagoški dejavnosti. Vsa velika infrastrukturna oprema IC Planta je tehnološko izjemno zahtevna ter skrbno, redno in strokovno vzdrževana. Veliko infrastrukturno opremo IC Planta uporabljajo tudi uporabniki iz drugih organizacij. Za pogoste uporabnike so organizirani tečaji za uporabo opreme, mogoča pa je tudi uporaba opreme v obliki storitev in naročil analiz.

IC MBP je podpora raziskovalni in aplikativni dejavnosti za ministrstva in druge državne organe ter pedagoškim dejavnostim MBP. Tehnološko napredna oprema omogoča najsodobnejše raziskave na morju in uvršča IC MBP med vodilne raziskovalne centre na območju Sredozemlja. MBP je tudi Nacionalni podatkovni center za morske podatke (NODC). Infrastruktura IC MBP zagotavlja visoko kakovost podatkov o stanju na morju, ki so na voljo v skoraj realnem času.

V letu 2018 je veliko infrastrukturno opremo IP NIB uporabljalo 110 različnih uporabnikov, s čimer je IP NIB dosegel cilj, da ohranja izjemno veliko število uporabnikov svoje velike infrastrukturne opreme.

Tematike raziskav in analiz, za katere se je uporabljala velika infrastrukturna oprema IC NIB, so bile izjemno raznovrstne. Tako veliko število uporabnikov in raznovrstnost tematik kaže na izjemen pomen vsebine IP NIB za slovenski prostor, in sicer na zelo raznovrstnih področjih raziskovalnega dela ter aplikacij pri delu za podjetja, državne in vladne organe in resorje ter za pedagoško delo.

Velik prispevek IP NIB k izkoriščenosti infrastrukturne opreme se kaže tudi skozi podatek, da je v letu 2018 kar 30 % uporabnikov IP NIB prihajalo iz drugih RO.

IC NIB svojo veliko infrastrukturno opremo redno dopolnjuje in posodablja. V letu 2018 je IC Planta svojo opremo dopolnil z novo aparaturo za PCR v realnem času (ABI QuantStudio7). Aparatura za PCR v realnem času ABI 7900HT Fast ja namreč stara že 11 let, amortizirana in izrabljena, zaradi česar obstaja bojazen nepopravljive okvare. Z nakupom nove aparature za PCR v realnem času je IC Planta zagotovil svojim uporabnikom nemoteno izvedbo qPCR tudi v prihodnje. Poleg tega je IC Planta v letu 2018 svojo opremo nadgradil z nakupom novega sistema za spremljanje temperature v laboratorijih, hladilnikih in zamrzovalnikih. Zagotavljanje temperature v predpisanih območjih je ključno za uspešno izvajanje analiz v molekularni biologiji.

Del zbirke tkivnih kultur krompirja v rastni komori za gojenje tkivnih kultur (foto: David Dobnik).
Part of potato tissue culture collection inside the growth chamber for tissue culture breeding (Photo: David Dobnik).

IC Planta supports research activities, ministries, inspection and other state bodies, enterprises and educational activities. All IC Planta's large infrastructural equipment is technologically highly advanced and carefully, regularly and professionally maintained. IC Planta's large equipment is also used by other organisations. Training courses in equipment use are organised for frequent users, but it is also possible to use the equipment on a service-based system or for individual analysis orders.

The IC MBS supports research and applied activities for ministries and other state bodies as well as educational activities carried out at the MBS. The technologically advanced equipment enables state-of-the-art research at sea and places IC MBS among the leading centres in the Mediterranean. The MBS serves as the National Oceanographic Data Centre (NODC). The IC MBS's infrastructure ensures high-quality data on sea conditions that is available in near real-time.

In 2018, the IP NIB's large infrastructural equipment had 110 distinct users, with which the IP NIB achieved its objective to preserve an extremely high number of users of its large infrastructural equipment.

The subjects of research and analyses carried out by the IC NIB's large infrastructural equipment were extremely diverse. The large number of users and the diversity of subjects demonstrate the exceptional significance of IP NIB-based content for the Slovenian area in a wide variety of research work fields and applications in work for companies, state and government bodies, line ministries and for pedagogical work.

The IP NIB's large contribution to the utilisation of the infrastructural equipment is reflected in the fact that in 2018 as many as 30% of IP NIB users came from other research organisations.

The IC NIB regularly supplements and updates its large infrastructural equipment. In 2018, IC Planta supplemented its equipment with the addition of a new real-time PCR instrument (ABI QuantStudio7). This was because the ABI 7900HT Fast real-time PCR instrument is 11 years old, fully depreciated and worn out, leading to concerns it may malfunction irreparably. By purchasing the new real-time PCR instrument, IC Planta has ensured that its users will continue to benefit from uninterrupted implementation of qPCR in the future. Furthermore, IC Planta upgraded its equipment in 2018 through the purchase of a new temperature monitoring system for laboratories, refrigerators and freezers. Ensuring that temperatures stay within the prescribed ranges is crucial for performing analyses successfully in molecular biology.

Pregled senzorjev na oceanografski boji Vida (foto: arhiv NIB). Senzors inspection on the oceanographic buoy Vida (Photo: NIB archive).

V letu 2018 je bilo glavno načrtovano opravilo IC MBP remont oceanografske boje Vida, ki se izvede vsakih pet let. Zaradi objektivnih razlogov se je remont začel v novembru in se bo zaključil v letu 2019. Bojo smo izvlekli na kopno, z nje pobrali vso opremo in ponovno prepleskali trup. Na koncu obnove trupa smo vso opremo ponovno namestili na bojo. Prepotrebna obnova in nadgradnja programske in strojne opreme je trajala nekoliko dlje, bila pa je nujna, če želimo, da bo na boji nameščena elektronika ustrezala novim procesorskim zmogljivostim naslednjih pet let. Redno vzdrževanje ostale velike opreme IC MBP je potekalo po načrtih, večjih vlaganj v novo opremo pa IC MBP v letu 2018 ni imel.

IP NIB je tudi v letu 2018 zagotavljal sodelovanje med raziskovalci različnih raziskovalnih programov, projektov in institucij ter tudi povezovanje raziskovalcev z uporabniki raziskav iz vrst drugih proračunskih uporabnikov in industrije ter stik s pedagoškim procesom. IP NIB je v letu 2018 prav tako pomenil osnovo za sodelovanje pri evropskih in drugih mednarodnih projektih. Z moderno in dobro vzdrževano (v skladu z ISO 17025) raziskovalno opremo IP NIB so se izvajali tudi projekti, katerih naročniki so bila podjetja, ki pričakujejo dokazila o nadzoru kakovosti za izvajanje storitev. Oprema IC NIB je bila tudi podpora tehnološkemu razvoju in razvoju metod ter izvajanju specializiranih analiz.

Analize in meritve v hiperslanih okoljih solin vzdolž slovenske obale (foto: arhiv NIB).
Analyses and measurements in hypersaline environments in the saltworks along the Slovenian coast (Photo: NIB archive).

In 2018, the main planned task at the IC MBS was the repair of the Vida oceanographic buoy, which is done every five years. For objective reasons, the repair started in November and will be completed in 2019. We took the buoy ashore, removed all of its equipment and repainted its hull. After the hull was repainted, we reinstalled all of its equipment. The much needed renewal and upgrade of the hardware and software took a little longer but was necessary if we want the electronics installed on the buoy to support new processor capabilities for the next five years. The regular maintenance of the other large IC MBS equipment went according to plan. There were no major investments in new equipment at the IC MBS in 2018.

In 2018, the IP NIB continued to ensure cooperation among the researchers of various research programmes, projects and institutions as well as the networking of researchers with the research users from among other budget users and the industry and contact with the pedagogical process. The IP NIB continued to serve as the basis for cooperation in European and other international projects in 2018. The modern and well-maintained (pursuant to ISO 17025) IP NIB research equipment was also used to carry out other projects for companies that expect evidence of quality control for the provision of services. IC NIB equipment also served as support for technological development, the development of methods and the performance of specialised analyses.

7.0

BIOLOŠKA KNJIŽNICA

THE BIOLOGY LIBRARY

Ilustracija iz Von Haeckel, *Ernst. Kunstformen der Natur.* – Leipzig, Wien: Bibliographisches Institut, 1904 (Zbirka redkih in dragocenih knjig Biološke knjižnice, foto: Barbara Černač).
Illustration from Von Haeckel, *Ernst. Kunstformen der Natur.* – Leipzig, Wien: Bibliographisches Institut, 1904 (Rare and valuable books collection, The Biology Library, Photo: Barbara Černač).

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BIOLOŠKA KNJIŽNICA

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VODJA

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SODELAVCI
STAFF
Glavač, Lučka
Writzl, Petra

Ilustracija iz Frideric Guilelm Hemprich, Christian Godofred Ehrenberg. *Symbolae physicae seu Icones et descriptionesmammalium quae exitinere per africam borealem et asiam occidentalem.* – [S. l.] : Berolini, 1830 (Zbirka redkih in dragocenih knjig Biološke knjižnice, foto: Barbara Černač).
Illustration from Frideric Guilelm Hemprich, Christian Godofred Ehrenberg. *Symbolae physicae seu Icones et descriptionesmammalium quae exitinere per africam borealem et asiam occidentalem.* – [S. l.] : Berolini, 1830 (Rare and valuable books collection, The Biology Library, Photo: Barbara Černač).

Biološka knjižnica je specialna in visokošolska javno dostopna knjižnica. Delujemo v okviru Nacionalnega inštituta za biologijo in Oddelka za biologijo Biotehniške fakultete Univerze v Ljubljani ter se kot podporna in servisna služba vključujemo v raziskovalne in pedagoške dejavnosti obeh ustanov. Naša knjižnična zbirka obsega več kot 79.700 znanstvenih knjig, znanstvenih revij, zaključnih del študija … Naši tipični uporabniki so raziskovalci, univerzitetni predavatelji in študentje s področja biologije in sorodnih ved. Na voljo smo tudi najširši javnosti (raziskovalcem in študentom drugih ved, novinarjem, prevajalcem …). Delujemo na dveh lokacijah: v Biološkem središču v Ljubljani in na Morski biološki postaji Piran.

STORITVE

- **hranjenje, vzdrževanje in dopolnjevanje knjižnične zbirke**;
- **zagotavljanje spletnega dostopa do e-revij, e-knjig in baz podatkov**: dogovori in sodelovanje z nabavnimi konzorciji, tehnično urejanje dostopov, oddaljeni dostop do e-virov;
- **vzdrževanje in dopolnjevanje knjižničnega kataloga** v sistemu Cobiss;
- **izposoja** gradiva notranjim in zunanjim uporabnikom, sprejemanje rezervacij in naročil gradiva (tudi prek spletne storitve »Moja knjižnica«);
- **medknjižnična izposoja**: dobava gradiva iz knjižnic v Sloveniji in tujini;
- **pomoč in informacijska podpora** našim uporabnikom;
- **informacijske storitve**: izdelovanje analiz citiranosti, statistik in letnih poročil za oceno raziskovalne uspešnosti;
- **referenčne storitve**: iskanje literature v Cobissu in drugih katalogih, na spletu (v bazah podatkov, e-revijah, repozitorijih …), izvajanje retrospektivnih poizvedb …;
- **bibliografije raziskovalcev in ocenjevanje raziskovalne uspešnosti**: izdelovanje bibliografij raziskovalcev v sistemu Cobiss in sodelovanje pri vrednotenju raziskovalne uspešnosti v sistemu Sicris za zaposlene v obeh matičnih ustanovah;
- **izobraževanje uporabnikov** o uporabi knjižnice in samostojnem iskanju informacij po naši knjižnični zbirki in elektronskih informacijskih virih;
- **tehnični pregled oblike zaključnih del študentov** Oddelka za biologijo Biotehniške fakultete Univerze v Ljubljani in **pregled nalog s protiplagiatorskim programom** Turnitin;
- **tehnični pregled znanstvenih knjig** v pripravi za objavo;
- **svetovanje kandidatom za izvolitev v habilitacijskih postopkih** in tehnični pregledi njihovih vlog;
- **svetovanje avtorjem pri objavljanju v odprtem dostopu**;
- **vnosi objav v polnem besedilu v repozitorij Nacionalnega inštituta za biologijo (DiRROS) in Repozitorij Univerze v Ljubljani (RUL)** ob spoštovanju avtorskega prava in zahtev založnikov;
- **izmenjava revij** za **Acta Biologica Slovenica** (nekdanji Biološki vestnik) in **Natura Sloveniae** s številnimi slovenskimi in tujimi partnerskimi ustanovami;
- **vzdrževanje spletnega mesta in Facebook profila** za več informacij o Biološki knjižnici in dogajanju v slovenski biologiji;
- **čitalnica**: 67 mest za tihi študij;
- **dostop do računalnikov, možnost povezave v brezžično omrežje** (Eduroam).

The Biology Library is a special and a higher education public access library. We operate as part of the National Institute of Biology and the Department of Biology at the Biotechnical Faculty of the University of Ljubljana, where we participate as a support and service department in the research and educational activities of both institutions. Our collection includes over 79,700 scientific books, scientific journals, study theses, etc. Our typical users include researchers, university lecturers and students from the field of biology and related sciences. The Library is open to the general public (researchers and students of other sciences, journalists, translators, etc.). We are situated at two locations: at the Biology Centre in Ljubljana and at Marine Biology Station Piran.

SERVICES

- **storing, maintaining and updating of the Library's collection;**
- **providing online access to e-journals, e-books and databases**: agreements and collaboration with purchasing consortia, technical set-up of accesses, remote access to e-resources;
- **maintaining and updating the Library's catalogue** in the Cobiss system;
- **loaning** materials to internal and external users, accepting reservations and orders for materials (including via the My Library online service);
- **interlibrary loans**: the supply of materials from libraries in Slovenia and abroad;
- **help and information support** for our users;
- **information services**: making citation rate analyses, statistics and annual reports for evaluating research performance;
- **reference services**: literature lookups in the Cobiss and in other catalogues, online (in databases, e-journals, repositories, etc.), performing retrospective queries, etc.;
- **researchers' bibliographies and research performance evaluations**: preparing researchers' bibliographies in the Cobiss system and participation in the evaluation of research performance in the Sicris system for the employees in both parent institutions;
- **training of users** in how to use the Library and how to independently search for information in our library collection and electronic information resources;
- **technical review of the format of the final theses of students** of the Department of Biology at the Biotechnical Faculty of the University of Ljubljana and **checking the theses with the Turnitin plagiarism detection software;**
- **technical review of scientific books** in preparation for publication;
- **advising candidates for appointment in habilitation procedures** and technical reviews of their applications;
- **advising authors in regard to open-access publishing**;
- **entering full-text publications in the National Institute of Biology's repository (DiRROS) and the Repository of the University of Ljubljana (RUL)**, while respecting copyright law and the publishers' requirements;
- **exchanging journals** for **Acta Biologica Slovenica** (formerly Biološki vestnik) and **Natura Sloveniae** with numerous Slovenian and foreign partner institutions;
- **maintaining the website and the Facebook profile** for more information on the Biology Library and the developments in Slovenian biology;
- **reading room**: 67 places for quiet study;
- **computer access, possibility of connecting to a wireless network** (Eduroam).

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KRATKI ZNANSTVENI PRISPEVEK
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3.0

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KRATKI ZNANSTVENI PRISPEVEK
SHORT SCIENTIFIC ARTICLE

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4.0

GEN - ODDELEK ZA GENETSKO TOKSIKOLOGIJO IN BIOLOGIJA RAKA

DEPARTMENT OF GENETIC TOXICOLOGY AND CANCER BIOLOGY

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5.0

EKOS- ODDELEK ZA RAZISKAVE ORGANIZMOV IN EKOSISTEMOV

DEPARTMENT OF ORGANISMS AND ECOSYSTEMS RESEARCH

IZVIRNI ZNANSTVENI ČLANEK
ORIGINAL SCIENTIFIC ARTICLE

1 ABT, Isabelle, DERLINK, Maja, MABON, Romain, VIRANT-DOBERLET, Meta, JACQUOT, Emmanuel. Integrating multiple criteria for the characterization of Psammotettix populations in European cereal fields. *Bulletin of entomological research*, ISSN 0007-4853, 2018, vol. 108, iss. 2, str. 185-202, doi: 10.1017/S0007485317000669. [COBISS.SI-ID 4385103]

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KRATKI ZNANSTVENI PRISPEVEK
SHORT SCIENTIFIC ARTICLE

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PUBLISHED SCIENTIFIC CONFERENCE CONTRIBUTION

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UREDNIK
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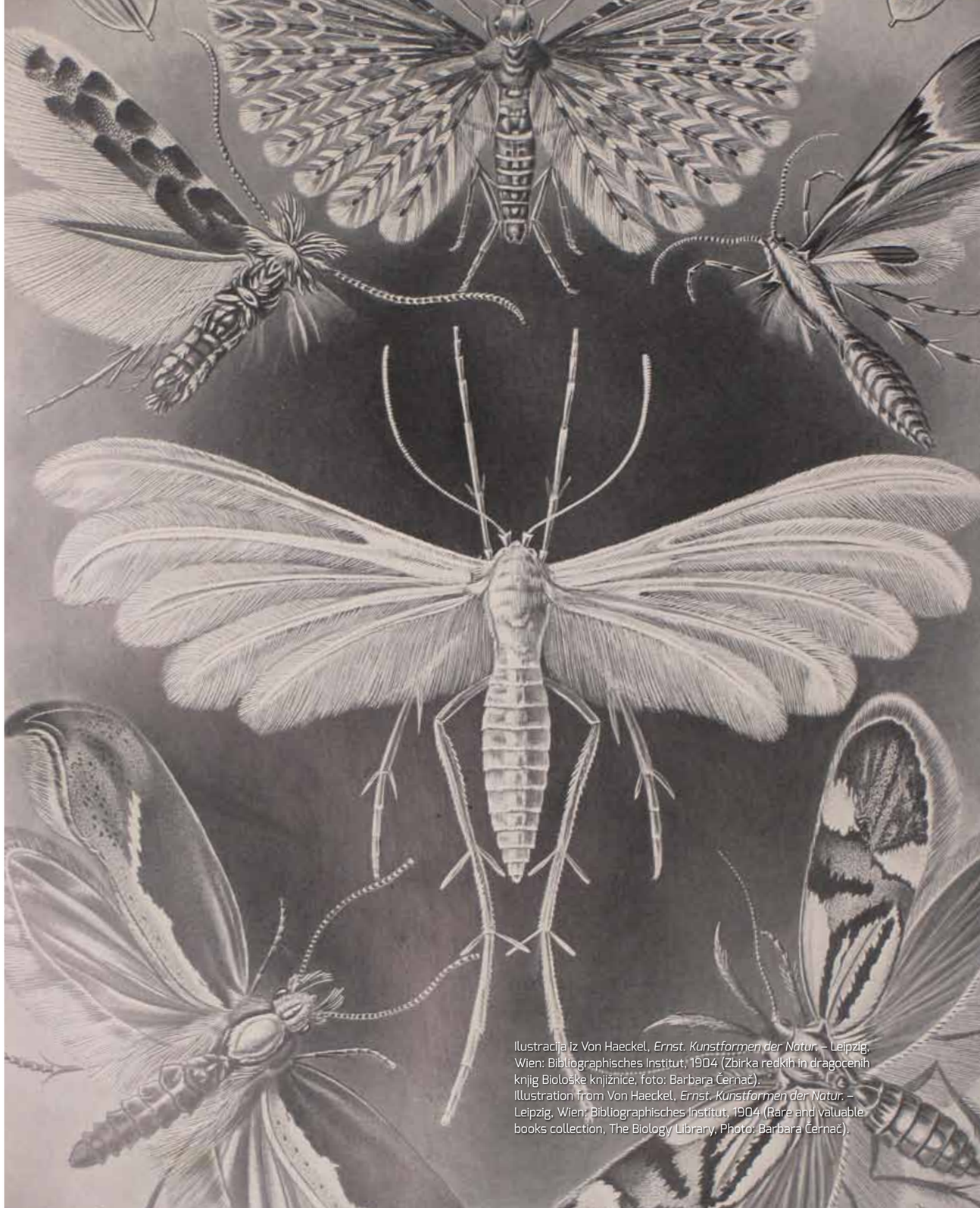

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