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NACIONALNI INŠTITUT ZA BIOLOGIJO
NATIONAL INSTITUTE OF BIOLOGY

NACIONALNI INŠTITUT ZA BIOLOGIJO
NATIONAL INSTITUTE OF BIOLOGY
POROČILO O DELU 2011
ANNUAL REPORT 2011

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VSEBINA
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Prof. dr. Tamara Lah Turnšek, direktorica NIB.
Prof. Dr. Tamara Lah Turnšek, Director NIB.

SPREMNA BESEDA

Ob pregledu dela Nacionalnega inštituta za biologijo v letu 2011, želim ne le osvetliti samo delovanje inštituta v tem letu, ampak predvsem poudariti posebne dosežke in smeri delovanja. To se mi zdi pomembno predvsem zato, ker moramo kot že večkrat v preteklosti, poudarjati pomen in poslanstvo Nacionalnega inštituta za biologijo. Zaradi recesije, ki je predvsem globoko zarezala v znanost, izobraževanje in kulturo, se namreč porajajo politično osnovani dvomi prav o smiselnosti obstoja samostojnih javnih raziskovalnih zavodov.

Najprej mi je torej v veliko zadovoljstvo, da je bilo leto 2011 za NIB najbolj uspešno v svojem celotnem 52-letnem obstoju. To velja za vse poglede naše raziskovalne, razvojne, strokovne in pedagoške dejavnosti, predvsem pa za našo finančno uspešnost, ki je bila najboljša do sedaj! Slednja bi nam lahko omogočala širitev ostalih dejavnosti, v kolikor bi ta trend naraščal, žal pa so napovedi za 2012 in vnaprej dokaj zloglasne. V tem času obetajo še dodatno znižanje možnosti financiranja znanstvenih projektov s strani Javne agencije za raziskovalno dejavnost RS (ARRS), ki je dejansko upadla že preteklo leto. Sledenje smo uspeli kompenzirati s porastom mednarodnih raziskovalnih in drugih vrst pogodb. To kaže na visoko mednarodno priznanje kvalitete naših raziskovalcev na eni strani, a na drugi tudi posluh in vpetost raziskovalcev NIBa v reševanje gospodarskih in predvsem družbenih problemov. Naj poudarim, da je slednje srž poslanstva našega in drugih inštitutov, saj svoje znanstveno delo dejansko prenašajo v stroko in reševanje aktualnih problemov naše države. NIB je tu aktiven in uspešen seveda predvsem na področju okoljsko naravnanih problemov, od naraščajočih potreb smotrnega kmetijstva, kot je npr. problem varne hrane, do okolja, kjer naj omenim problem čistih voda, ohranitev in razvoj obalnega prostora in ne nazadnje tudi problemov klimatskih sprememb, kot jih odraža spremenjena biodiverziteta.

Žal se mnoga druga ministrstva, vključno z Ministrstvom za izobraževanje, znanost, kulturo in šport ne zavedajo ali pa ne prepoznavajo tega pomena javnih raziskovalnih inštitutov in predvsem dejstva, da brez odlične znanosti tudi lastne stroke, ki bi reševala probleme družbe ne bi imeli! Na drugi strani pa se nekaterim dozdeva, da je strokovno delovanje in sledenje naravnih fenomenov, ki jih dolgujemo s svojo zavezanostjo EU, in ki naj bi usmerjalo politiko na teh področjih, nekaj tako samoumevnega, da tega ni treba posebej financirati! Pri čemer seveda pozabljajo, da tega ne počne v zadovoljivi meri niti naše matično ministrstvo.

Naj bo torej ta Uvod kratko in jasno sporočilo našemu Ministrstvu za izobraževanje, znanost, kulturo in šport, Javni agenciji za raziskovalno dejavnost RS in bralcem glasno opozorilo, da s krčenjem javnih sredstev na področju znanosti in razvoja počasi, a zanesljivo režejo vejo, na kateri sedimo vsi! Še več, taka znanstveno raziskovalna politika, če se tako sploh še lahko imenuje, je v popolnem nasprotju s politiko razvitih držav Evrope in EU kot celote, ki v času recesije in finančne krize pospešeno vlaga v znanost, da čim prej požanje razvojno naravnano gospodarstvo.

Prof. dr. Tamara Lah Turnšek
Direktorica Nacionalnega inštituta za biologijo

FOREWORD

Looking back at the work carried out by the National Institute of Biology in 2011, let me shed some light on the activities of the Institute and highlight some of its special achievements and lines of action. I find it important due to the fact that the significance and mission of the National Institute of Biology need to be stressed as was the case many a time in the past. Recession has had a deep impact on science, education and culture; consequently, politically biased doubts arise as to whether the existence of independent public research institutes is justified at all.

It is therefore my great pleasure to say that 2011 was the very best year for the NIB in all of its 52 years of existence. It was marked by success in our research, development, professional and pedagogical activities. And most of all, it was a financial success which outranked that of all previous years! It would certainly allow us to expand other activities if this trend persisted. However, the prospects for 2012 and the subsequent years seem quite ominous. The years to come will see further reduction in possibilities of financing scientific projects by the Slovenian Research Agency (ARRS), which actually happened already in the past year. We tried to compensate for it by increasing international research and other types of contracts. This is an indicator of high international renown of our researchers on the one hand and of the commitment of NIB's researchers to contribute to the solution to economic and especially social problems on the other. The latter is the core of our mission and of the mission of other institutes, since they transfer their scientific efforts to the professional sphere and to solving topical problems of our country. The NIB plays an active and successful part in the field of environment related problems, from increasing needs for sustainable agriculture, such as the problem of safe food, to the environment, such as the issues of clean waters, maintenance and development of the littoral area and, last but not least, problems of climatic changes reflected in changed biodiversity.

Unfortunately, many other ministries including the Ministry of Education, Science, Culture and Sport are not aware of or do not recognise the importance of public research institutes and especially the fact that without genuine science there would be no sound profession capable of dealing with the problems of society. On the other hand, some individuals are of the opinion that professional activities and monitoring of natural phenomena - which are part of our commitment to the EU and which should guide the politics in these fields - are something self-evident requiring no special financing! Of course, they forget that even the ministry covering our field fails to do it to a sufficient extent.

This introduction is to send a short and clear message to our Ministry of Education, Science, Culture and Sport, the Slovenian Research Agency, and readers that cutting of public finance in the field of science and development slowly, yet reliably cuts the branch on which we all sit! Even more so, such scientific and research policy, if it may bear that name at all, is in total contrast to the policy of the developed European countries and the European Union as a whole that uses the time of recession and financial crisis to actively invest into science promoting a development-oriented economy.

Prof. Dr. Tamara Lah Turnšek
Director of the National Institute of Biology

POMEMBNI MEJNIKI V RAZVOJU INŠTITUTA

29. april 1960
Sprejet je bil Akt o ustanovitvi Inštituta za biologijo na Oddelku za biologijo Biotehniške fakultete Univerze v Ljubljani, v prostorih na Aškerčevi 12 v Ljubljani.

1969
Ustanovljena je bila Morska biološka postaja, ki je do leta 1980 delovala v prostorih stare družinske vile v Portorožu.

1975
Inštitut se je preoblikoval v enovito delovno organizacijo.

1980
Morska biološka postaja se je preselila v preurejene prostore tovarne Salvetti na obali pred Piranom.

1988
Ljubljanski del inštituta se je preselil v prostore na Karlovški 19 v Ljubljani.

25. marec 1994
Sprejet je bil Sklep o ustanovitvi javnega raziskovalnega zavoda Inštitut za biologijo, pod katerega sta se kot ustanovitelja podpisala Vlada RS in Univerza v Ljubljani.

1995 - 1998
Ljubljanski del inštituta se je postopoma selil v novo zgradbo Biološkega središča na Večni poti 111 v Ljubljani.

17. januar 1998
Inštitut se je preimenoval v Nacionalni inštitut za biologijo ali skrajšano NIB, ki ga je ustanovila Vlada RS.

2004 - 2006
Morska biološka postaja se je postopoma selila v novo zgradbo, zgrajeno na mestu stare.

DOSEDANJI DIREKTORJI

Prof. dr. Hubert Pehani
(Trebnje, 1.11.1900 - 24.2.1995) je bil prvi direktor Inštituta za biologijo in sicer od ustanovitve 29.4.1960 do leta 1966.

Prof. dr. Miran Vardjan
(Lož, 1.5.1919 – 15.10.2005) je Inštitut za biologijo vodil od 1966 do 1968.

Prof. dr. Franc Sušnik
(Prevalje, 28.12.1930 - 12.9.1996) je bil na čelu Inštituta za biologijo Univerze v Ljubljani med letoma 1968 in 1976.

Prof. dr. Matija Gogala
(Ljubljana, 11.2.1937) je bil direktor Inštituta za biologijo Univerze v Ljubljani od 1976 do 1979.

Dr. Milan Lovka
(Ljubljana, 12.2.1946) je Inštitut za biologijo vodil od 1979 do 1984.

Mag. Mitja Grosman
(Ljubljana, 5.1.1951) je Inštitut vodil od leta 1984 do 1988.

Prof. dr. Andrej Čokl
(Ljubljana, 16.6.1947) je bil direktor Inštituta za biologijo od leta 1988 do 1996.

Prof. dr. Tamara Lah Turnšek
(Ljubljana, 1.3.1947) vodi inštitut od leta 1996 dalje.

KEY MILESTONES IN THE DEVELOPMENT OF THE INSTITUTE

April 29, 1960 - Adoption of the Regulation on Establishment of the Institute of Biology at the Biology Department of the Biotechnical Faculty of University of Ljubljana, located at Aškerčeva 12 in Ljubljana.

1969
Establishment of the Marine Biological Station, which operated in an old family villa in Portorož until 1980.

1975
The Institute was reorganised to a joint working organisation.

1980
The Marine Biological Station was reallocated to refurbished premises of the Salvetti factory on the coast near Piran.

1988
The Ljubljana part of the Institute moved to premises on Karlovška 19 in Ljubljana.

March 25, 1994
Adoption of the Decision on Establishment of the Public Research Institution the Institute of Biology, jointly established by the Government of the RS and the University of Ljubljana.

1995 - 1998
The Ljubljana part of the Institute gradually moved to the new building of the Biological Centre on Večna pot 111 in Ljubljana.

January 17, 1998
The Institute was renamed the National Institute of Biology, short the NIB, established by the Government of the RS.

2004 - 2006
The Institute was renamed the National Institute of Biology, short the NIB, established by the Government of the RS.

PREVIOUS DIRECTORS

Prof. Dr. Hubert Pehani
(Trebnje, 1 November 1900 – 24 February 1995) was the first director of the Institute of Biology since its establishment on 29 April 1960 until 1966.

Prof. Dr. Miran Vardjan
(Lož, 1 May 1919 – 15 October 2005) was head of the Institute of Biology from 1966 to 1968.

Prof. Dr. Franc Sušnik
(Prevalje, 28 December 1930 – 12 September 1996) was the head of the Institute of Biology of the University of Ljubljana between 1968 and 1976.

Prof. Dr. Matija Gogala
(Ljubljana, 11 February 1937) was head of the Institute of Biology of the University of Ljubljana from 1976 to 1979.

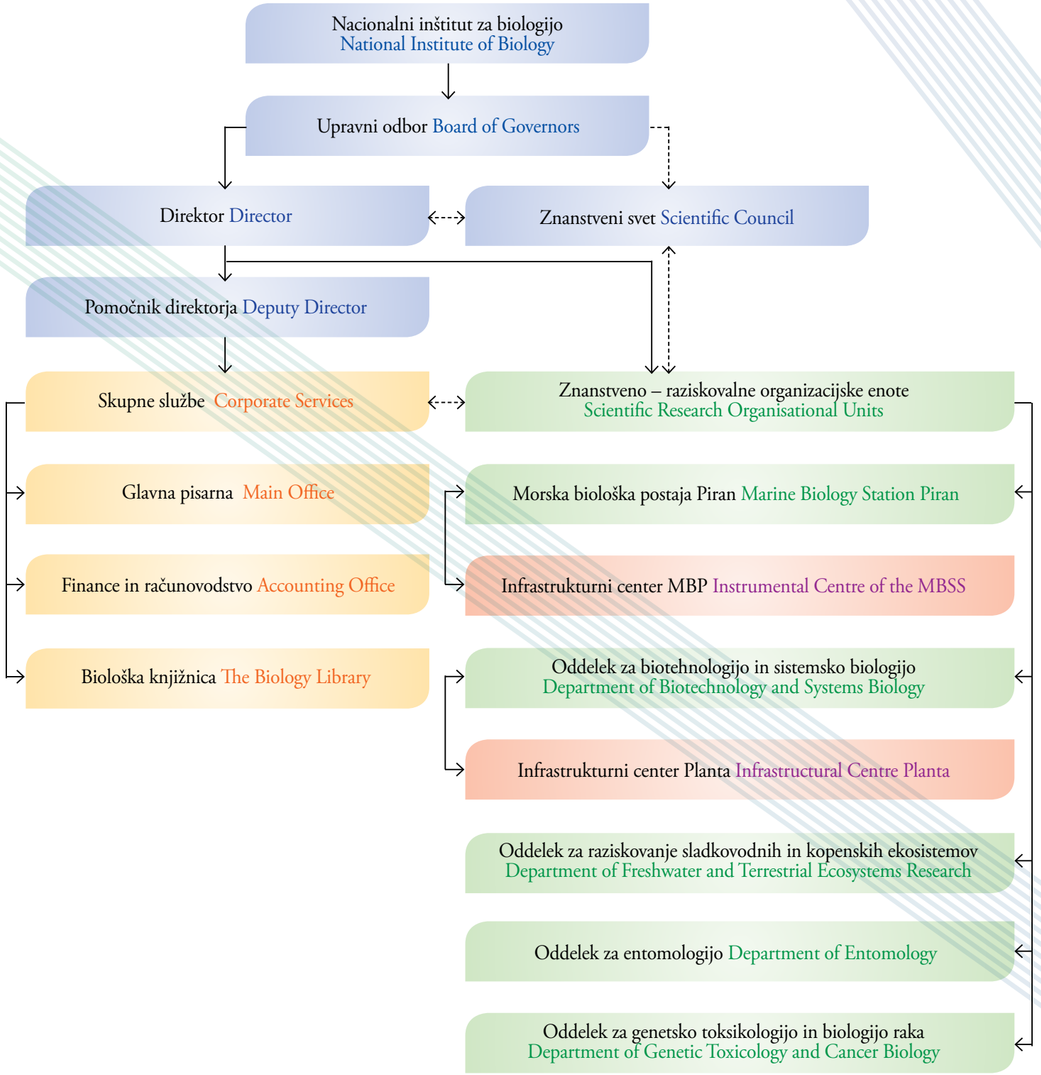
Dr. Milan Lovka
(Ljubljana, 12 February 1946) was head of the Institute of Biology from 1979 to 1984.

Mitja Grosman, MSc
(Ljubljana, 5 January 1951) was head of the Institute from 1984 to 1988.

Prof. Dr. Andrej Čokl
(Ljubljana, 16 June 1947) was director of the Institute of Biology from 1988 to 1996.

Prof. Dr. Tamara Lah Turnšek
(Ljubljana, 1 March 1947) is the director of the National Institute of Biology since the year 1996.

ORGANIZACIJSKA SHEMA ORGANIZATION SCHEME



VODSTVO INŠTITUTA
INSTITUTE MANAGEMENT

Direktorica
Director
Prof. dr. Tamara Lah Turnšek

Pomočnik direktorice
Deputy Director
Mag. Franc Potočnik

VODJE ODDELKOV
HEADS OF DEPARTMENTS

001
Morska biološka postaja Piran
Marine Biology Station Piran
Prof. dr. Vlado Malačič

002
Oddelek za raziskovanje sladkovodnih in kopenskih ekosistemov
Department of Freshwater and Terrestrial Ecosystems Research
Prof. dr. Anton Brancelj

003
Oddelek za biotehnologijo in sistemsko biologijo
Department of Biotechnology and Systems Biology
Prof. dr. Maja Ravnikar

004
Oddelek za entomologijo
Department of Entomology
Prof. dr. Andrej Čokl

005
Oddelek za genetsko toksikologijo in biologijo raka
Department of Genetic Toxicology and Cancer Biology
Prof. dr. Metka Filipič

Biološka knjižnica
The Biology Library
Barbara Černač

Skupne službe
Corporate Services
Mag. Franc Potočnik

Biološko središče.
The Biological Centre.

Oddelek za biotehnologijo in sistemsko biologijo in Oddelek za genetsko toksikologijo in biologijo raka.
Department of Biotechnology and Systems Biology and Department of Genetic Toxicology and Cancer Biology.

Morska biološka postaja Piran.
Marine Biology Station Piran.

ZNANSTVENI SVET
SCIENTIFIC COUNCIL

1. Prof. dr. Andrej Čokl, predsednik *President*
2. Prof. dr. Marina Dermastia, namestnica predsednika *Deputy*
3. Prof. dr. Tamara Lah Turnšek, direktorica *Director*
4. Prof. dr. Anton Brancelj
5. Prof. dr. Jadran Faganeli
6. Prof. dr. Metka Filipič
7. Dr. Gorazd Kosi
8. Prof. dr. Alenka Malej
9. Doc. dr. Patricija Mozetič
10. Prof. dr. Jana Žel

UPRAVNI ODBOR
BOARD OF GOVERNORS

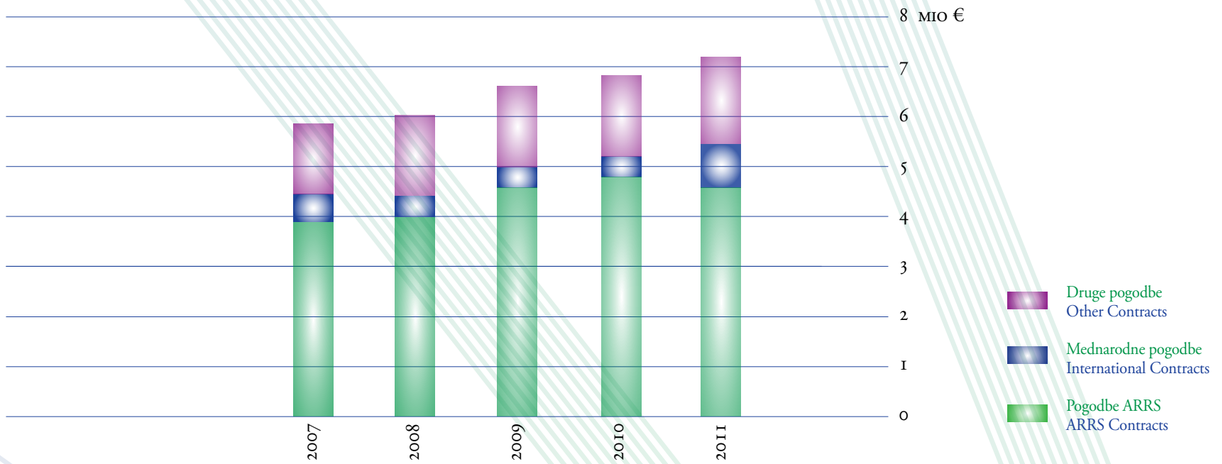
1. Prof. dr. Tine Valentinčič, predsednik / *President*, Biotehniška fakulteta Univerze v Ljubljani / *Biotecnical Faculty, University of Ljubljana*
2. Doc. dr. Branko Čermelj, Nacionalni inštitut za biologijo / *National Institute of Biology*
3. Prof. dr. Marina Dermastia, Nacionalni inštitut za biologijo / *National Institute of Biology*
4. Ivana Erjavec, Ministrstvo za kmetijstvo, gozdarstvo in prehrano / *Ministry of Agriculture, Forestry and Food of the Republic of Slovenia*
5. Dr. Viljem Harb, LEK farmacevtska družba d.d.
6. Dr. Bojan Jenko, Ministrstvo za visoko šolstvo, znanost in tehnologijo, Direktorat za znanost / *Ministry of Higher Education, Science and Technology, Directorate for Higher Education*
7. Dr. Darja Stanič Racman, Ministrstvo za okolje in prostor / *Ministry of the Environment and Spatial Planning*
8. Dr. Mateja Urlep, TikhePharma d.o.o.
9. Dr. Peter Venturini, HELIOS, Tovarna barv, lakov in umetnih smol Količevo, d.o.o.

Sestava Upravnega odbora NIB od 9.7.2010 dalje. / *Board of Governors since 9.7.2010.*

STRUKTURA FINANCIRANJA
FINANCING STRUCTURE

Vrsta financiranja / Type of Financing	v EUR 2007	2008	2009	2010	2011	Indeks Index 11/10	2011 Struktura Structure
Pogodbe ARRS[1] / ARRS Contracts[1]	3.904.903	4.014.495	4.654.896	4.705.303	4.449.760	95	61
Mednarodne pogodbe / International Contracts	570.118	379.406	298.877	277.285	1.073.662	387	15
Druge pogodbe / Other Contracts	1.423.144	1.618.070	1.764.208	1.835.134	1.784.468	97	24
Skupaj / Total	**5.898.165**	**6.011.971**	**6.717.981**	**6.817.722**	**7.307.890**	**107**	**100**

[1] Javna agencija za raziskovalno dejavnost RS = Slovenian Research Agency



OSNOVNA RAZISKOVALNA DEJAVNOST
MAIN RESEARCH ACTIVITIES

PROGRAMI ARRS
ARRS PROGRAMS

MBP P1-0237
Raziskave obalnega morja
Coastal Marine Research
Prof. dr. Alenka Malej

EKO P1-0255
Združbe, odnosi in komunikacije v ekosistemih
Communities, Relations and Communications in the Ecosystems
Prof. dr. Anton Brancelj

FITO P4-0165
Rastlinska fiziologija in biotehnologija
Plant Physiology and Biotechnology
Prof. dr. Maja Ravnikar

GEN P1-0245
Ekotoksikologija, toksikološka genomika in karcinogeneza
Ecotoxicology, Toxicogenomics and Carcinogenesis
Prof. dr. Tamara Lah Turnšek

MBP P1-0143
Kroženje snovi v okolju, snovna bilanca in modeliranje okoljskih procesov in ocena tveganja (skupaj z IJS / joint with IJS)
Cycling of Substances in the Environment, Mass Balances, Modelling of Environmental Processes and Risk Assessment
Prof. dr. Jadran Faganeli

ŠTEVILO PROJEKTOV
NUMBER OF PROJECTS

Vrsta pogodb Type of contract	2010	2011
ARRS	22	32
Mednarodne International	19	30
Gospodarstvo in druga javna služba The economy and other public service	70	70
Skupaj Total	110	110

MEDNARODNO SODELOVANJE INTERNATIONAL COOPERATION

Multilateralno mednarodno sodelovanje Multilateral international cooperation	Število projektov Number of projects 2010	Število projektov Number of projects 2011
6. Okvirni program 6th Framework Programme	3	2
7. Okvirni program 7th Framework Programme	5	9
Strukturni skladi Structural and Cohesion EU funds	2	5
Drugo Other (UNEP, IOI, IRMM, ...)	9	16
Skupaj Total	19	30

BILATERALNO SODELOVANJE BILATERAL COOPERATION

Bilateralno sodelovanje Bilateral cooperation	Število projektov Number of projects 2010	Število projektov Number of projects 2011
Avstrija Austria Republic	1	1
Brazilija Brazil	2	4
Republika Češka Chechz Republic	2	1
Črna gora Montenegro	2	2
Francija France	5	3
Hrvaška Croatia	4	2
Italija Italy	0	1
Japonska Japan	0	1
Kitajska China	0	1
Madžarska Hungary	1	1
Poljska Poland	2	2
Rusija Russia	1	1
Turčija Turkey	0	1
ZDA USA	3	2
Skupaj Total	23	24

EVROPSKI PROJEKTI
EU PROJECTS

6. OKVIRNI PROGRAM EU
6TH FRAMEWORK PROGRAMME

1. A Pan-European Infrastructure for Ocean and Marine Data Management (SEADATANET); 6.OP; 1.4.2006 - 31.3.2011 (nosilec/PI: V. Malačič)
2. Southern European Seas: Assessing and Modelling Ecosystem Changes (SESAME); 6. OP; 1.11.2006 - 30.4.2011 (nosilka/PI: A. Malej)

7. OKVIRNI PROGRAM EU
7TH FRAMEWORK PROGRAMME

1. Development of a New Diagnostic Tool Using DNA Barcoding to Identify Quarantin Organisms in Support of Plant Health (QBOL); 7.OP; 21.3.2009 - 20.3.2012, (nosilka/PI: M. Ravnikar)
2. Development and Pre-operational Validation of Upgraded Gmes marine Core Services and Capabilities (MyOCEAN); 7.OP; 1.1.2009 - 31.3.2012 (nosilec/PI: V. Malačič)
3. CO2 in Trieste Gulf (MARIE CURIE IRG); 7.OP; 1.6.2009 – 1.7.2011 (nosilca/PI: V. Malačič / D. Turk)
4. A Pan-European Species-directories Infrstructure (PESI); 7.OP; 1.5.2008 - 30.4.2011 (nosilec/PI: D. Tome)
5. Quarantine Pest Detection for Use by National Plant Protection Organizations (NPPO) and Inspection Services (Q-DETECT); 7.OP; 1.3.2010 - 28.2.2013 (nosilca/PI: M. Ravnikar, A. Čokl)
6. Cost-Effective Hand-Held Device for Rapid In-Field Detection of Flavenscence Doree Phytoplasma in Grapevines (VITISENS); 7. OP; 1.2.2011 – 31.1.2013 (nosilka/PI: M. Ravnikar)
7. Rationally Designed Aquatic Receptors Integrated in Label-free Biosensor Platforms for Remote Surveillance of Toxins and Pollutants (RADAR); 7.OP; 1.1.2011 – 31.12.2014 (nosilka/PI: V. Turk)
8. Fate and Effects of Cytostatic Pharmaceuticals in the Environment and the Identification of Biomarkers For an Improved Risk Assessment on Environmental Exposure (CytoThreat); 7.OP; 1.1.2011 – 31.12.2014 (nosilka/PI: M. Filipič)
9. Pan-European Infrastructure for Ocean and Marine Data Management (Seadatanet II); 7.OP; 1.10.2011 – 30.9.2015 (nosilec/PI: B. Čermelj)

PROJEKTI FINANCIRANI IZ STRUKTURNIH SKLADOV
STRUCTURAL AND COHESION EU FUNDS

Mednarodni
International

1. Sustainable Instruments for Lakes Management in the Alpine Space (SILMAS), ESSR – Alpine Space, 1.9.2009 – 31.8.2012 (nosilec/PI: A. Brancelj)
2. Water Management Strategies Against Water Scarcity in the Alps, (Alp-Water-Scarce); ESSR – Alpine Space, 1.10.2008 - 30.9.2011 (nosilec/PI: A. Brancelj)
3. Določanje novih biomarkerjev možganskih tumorjev - gliomov za diagnozo in kot nove tarče zdravljenja (GLIOMA) / Identification of New Glioma Biomarkers as Potential Diagnostic and Therapeutic Targets (GLIOMA); Program čezmejnega sodelovanja Slovenija – Italija; 1.11.2011 – 31.10.2014 (nosilka/PI: T. Lah Turnšek)

Domači
National

4. Kompetenčni center za biotehnološki razvoj in inovacije – KC BRIN / Competency Centre for Biotechnological Development and Innovation - CCB-DI; 15.12.2010 - 31.12.2013 (nosilka/PI: K. Gruden)
5. Center odličnosti za biosenzoriko, instrumentacijo in procesno kontrolo (CO BIK); ustanovljen 3.12.2009 / Centre of Excellence for Biosensors, Instrumentation and Process Control, established 3.12.2009

DRUGI MEDNARODNI PROJEKTI
OTHER INTERNATIONAL PROJECTS

ERA - NET projekti
ERA-NET Projects

1. INREMOS-SYSTHER, Orodja sistemske biologije pri raziskavah celične terapije in zdravil / Systems Biology Tools Development for Cell Therapy and Drug Development (SYSTER); ERA-NET, 1.11,.2006 – 28.2.2012 (nosilka/PI: T. Lah)
2. Development od Screening Methods for GMOs (GMOseek), ERA-NET, 1.6.2009 – 30.5.2011 (nosilec/PI: D. Morisset)
3. Targeted Precision Biocontrol and Pollination Enhancement in Organic Cropping Systems (BICOPOLL); ERA-NET, 1.11.2011 - 31.10.2014 (nosilec/PI: A. Čokl)
4. Marine Debris Removal and Preventing Further Litter Entry (Marine Clean); ECO_INNOVATION; 1.11.2011-31.10.2014 (nosilka/PI: J. France)
5. Validation Studies, EC, DG Joint Research Centre Institute for Health and Consumer Protection, I - 21027 Ispra , ITALY, 1.1.2011 - 31.12.2011 (nosilka/PI: J. Žel)
6. Stability Studies, EC, Joint research centre, Institute for Reference Materials and Measurements (IRMM), Geel, BELGIUM, 1.1.2011 - 31.12.2011 (nosilka/PI: J. Žel)
7. Proficiency Testing for Detection of Potato Brown, FARMA BIH, 2011 (nosilka/PI: T. Dreo)

COST projekti
COST Projects

8. COST 864, Zdravje pečkarjev: kombiniranje tradicionalnih in naprednih postopkov zdravstvenega varstva pri gojenju pečkarjev / Combining Traditional and Advanced Strategies for Plant Protection in Pome Fruit Growing
9. COST 873, Bakterijske bolezni koščičarjev in lupinarjev / Bacterial Diseases of Stone Fruits and Nuts
10. COST 929, Evropska mreža za okoljsko in prehrambeno virologijo / European Network for Environmental and Food Virology
11. COST FA 0807, Integrirano upravljanje fitoplazemskih epidemij pri različnih kmetijsko pomembnih rastlinah / Integrated Management of Phytoplasma Epidemics in Different Crop Systems
12. COST FA0804,Molekularno kmetijstvo: rastline kot proizvodna platforma za proteine visoke vrednosti / Molecular Farming: Plants as a Production Platform for High Value Proteins
13. COST FA0806, Kontrola rastlinskih virusov z uporabo RNA cepiv: novi ne-transgeni pristopi / Plant virus control employing RNA-based vaccines: A Novel Non-Transgenic Strategy
14. COST FA0603, Rastlinska proteomika v Evropi / Plant Proteomics in Europe (EUPP)
15. COST FA0605, Signalizacijska kontrola tolerance na abiotski stres in produkcija protistresnih snovi v rastlinah /The Signalling Control of Abiotic Stress Tolerance and Production of Stress Protective Compounds in Plants

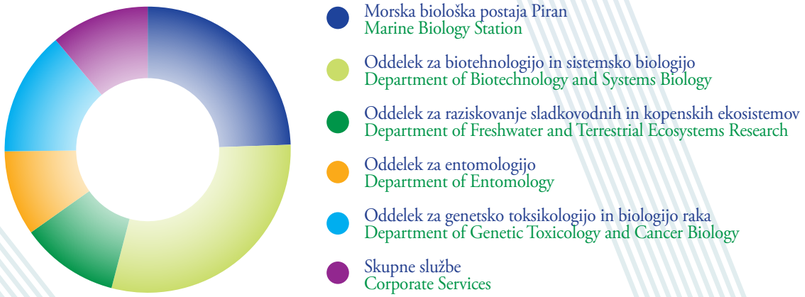
ŠTIPENDIJE
SCHOLARSHIPS

1. The Influence of Management Intensification of Agricultural Systems on White Stork Populations; UKF Grant; 23.5.2011 – 23.11.2011 (nosilec/PI: D. Tome)

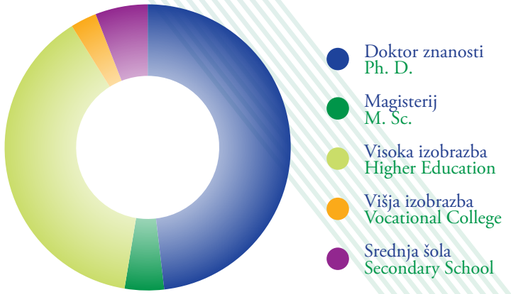
ŠTEVILO IN SESTAVA SODELAVCEV PO ENOTAH
NUMBER AND STRUCTURE OF STAFF BY UNITS

	Raziskovalci Scientific Staff	Mladi raziskovalci Young Researchers	Tehnični sodelavci Tehnicians	Administracija Administration	Skupaj Total
Morska biološka postaja Piran Marine Biology Station	20	7	6	0	33
Oddelek za raziskovanje sladkovodnih in kopenskih ekosistemov Department of Freshwater and Terrestrial Ecosystems Research	7	4	4	0	15
Oddelek za biotehnologijo in sistemsko biologijo Department of Biotechnology and Systems Biology	21	9	9	1	40
Oddelek za entomologijo Department of Entomology	8	5	0	0	13
Oddelek za genetsko toksikologijo in biologijo raka Department of Genetic Toxicology and Cancer Biology	10	5	4	0	19
Skupne službe Corporate Services	0	0	0	15	15
Skupaj Total	**66**	**30**	**23**	**16**	**135**

ŠTEVILO SODELAVCEV PO ENOTAH NA DAN 31.12.2011
NUMBER OF STAFF BY UNITS ON 31.12.2011



IZOBRAZBENA STRUKTURA NA DAN 31.12.2011
EDUCATIONAL STRUCTURE ON 31.12.2011



IZOBRAZBENA STRUKTURA ZAPOSLENIH
EMPLOYEES LEVEL OF EDUCATION

Na dan 31.12.2011 je bilo na Nacionalnem inštitutu za biologijo zaposlenih 135 sodelavcev, od tega 65 doktorjev znanosti, 6 magistrov, 52 z visoko izobrazbo, 4 z zaključeno višjo šolo ter 8 s srednješolsko izobrazbo. Število zaposlenih se je glede na stanje 31.12.2010 povečalo za 5,5 %.

On 31st of December 2011, we recorded 135 employees with the following degree of education: Ph.D. (65), Master degree (6), Bachelor degree (52), Vocational College (4), Secondary School (8). Number of employees increased by 5,5 % compared to the previous year.

DOKTORATI V LETU 2011
DOCTORAL THESES IN YEAR 2011

BOGUNOVIĆ, Branko.
Morski tokovi na vhodu v Tržaški zaliv = Water fluxes at the entrance to the Gulf of Trieste.
Mentor: Vlado Malačič.

ČEPIN, Urška.
Genetska raznolikost in določanje virusa pahljačavosti listov vinske trte (GFLV) = Genetic variability and detection of grapevine fanleaf virus (GFLV).
Mentorica: Maja Ravnikar.

DE GROOT, Maarten.
Razpoznavanje, proženje in lokalizacija pri hemipterih s pomočjo vibracijskih signalov = Recognition, search initiation and localization in hemipteran insects mediated by vibrational signals.
Mentor: Andrej Čokl.

MAVRIČ, Borut.
Favnistična in ekološka analiza makrozoobentoških združb mehkega dna in opredelitev ekološkega stanja slovenskega obalnega morja = Faunistic and ecological analysis of soft-bottom macrozoobenthic community and assessment of ecological qualiti status of Slovenian coastal sea.
Mentor: Lovrenc Lipej.

NIKOLIĆ, Petra.
Vzorci izražanja genov v listih vinske trte, okužene s fitoplazmo, povezano s počrnelostjo lesa = Gene expression patterns in grapevine leafs infected with phytoplasma associated with bois noir disease.
Mentorica: Marina Dermastia, somentorica: Kristina Gruden.

PAJK, Franja.
Ocena temperaturne občutljivosti različnih vrst iz rodu Daphnia = Estimation of thermal sensitivity of different species within the genus Daphnia.
Mentorja: Anton Brancelj in Tatjana Simčič.

PETKOVIĆ, Jana.
Mechanisms of toxicity and genotoxicity of TiO2 nanoparticles = Mehanizmi toksičnega in genotoksičnega delovanja nanodelcev TiO2.
Mentorica: Metka Filipič.

ROTTER, Ana.
Razvoj in implementacija orodij sistemske biologije: primer analize podatkov v rastlinski fiziologiji = Development and implementation of system biology tools: a case study of plant physiology data.
Mentorica: Kristsina Gruden.

STOPAR, Katja.
Genetska diferenciacija klobučnjaških meduz z analizo genetskih markerjev iz mitohondrijske in jedrne DNA = Genetic differentation of scyphozoan jellyfish revealed by analysis of mitochondrial and nuclear genetic markers.
Mentorica: Andreja Ramšak.

TINTA, Tinkara.
Struktura in funkcija bakterijske združbe v Tržaškem zalivu z aplikativnimi študijami = Bacterial community structure and function in the Gulf of Trieste with some application studies.
Mentorica: Valentina Turk.

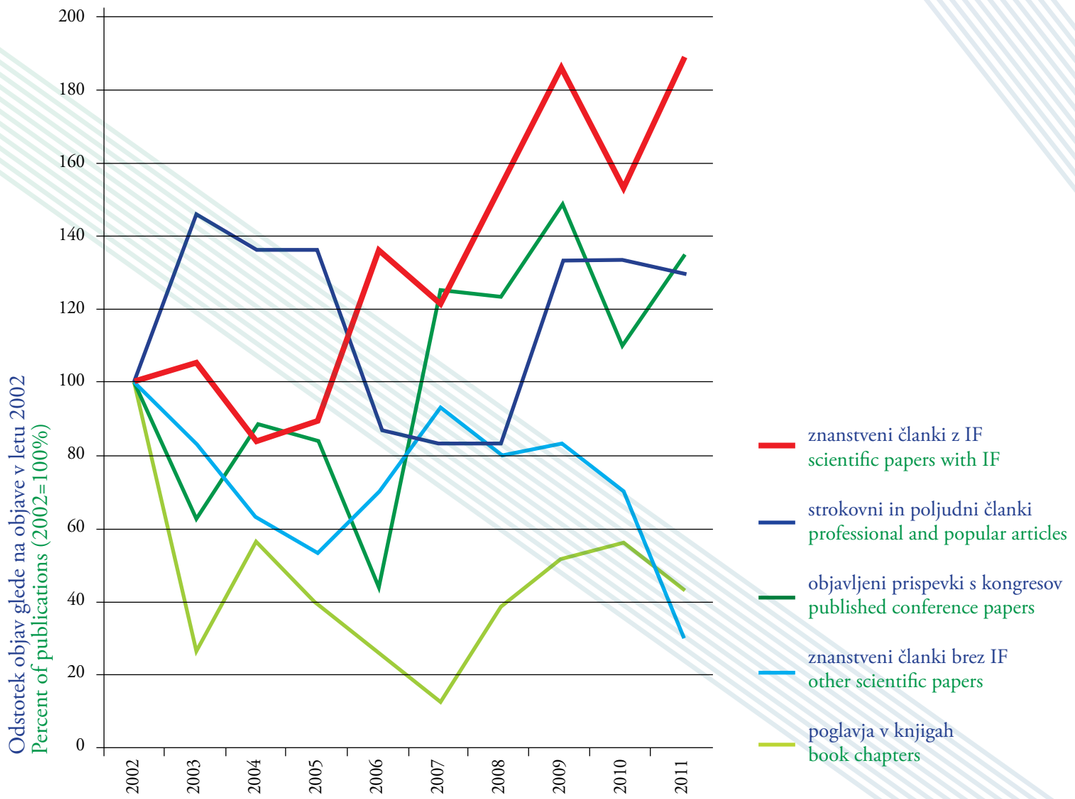
PREGLED OBJAVLJENIH DEL ZA LETA 2002 - 2011
OVERVIEW OF PUBLISHED PAPERS FOR YEARS 2002 - 2011

leta years

ZVRST DOKUMENTA TYPE OF DOCUMENT	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	skupaj total
znanstveni članki z IF scientific papers with IF	38	40	32	34	52	46	58	71	58	72	**501**
znanstveni članki brez IF other scientific papers	30	25	19	16	21	28	24	25	21	9	**218**
strokovni in poljudni članki professional and popular articles	51	32	45	43	22	64	63	76	56	69	**521**
objavljeni prispevki s kongresov published conference papers	30	44	41	41	26	25	25	40	40	39	**351**
povzetki s kongresov published conference paper abstracts	100	88	72	97	108	140	115	161	145	159	**1185**
poglavja v knjigah book chapters	23	6	13	9	6	3	9	12	13	10	**104**
knjige books		2	2	2	5	5	5	1	3	4	**29**
poročila reports	31	29	37	35	31	23	31	30	30	27	**304**
doktorska dela dissertation theses	2	5	6	2	7	6	3	4	7	8	**50**
magistrska dela master's theses	2	2	1	1		2				1	**9**
patenti patents				2	1				2	4	**9**
razno other	40	33	42	59	37	53	76	73	93	128	**634**
skupaj total	**347**	**306**	**310**	**341**	**316**	**395**	**409**	**493**	**468**	**530**	**3915**

Prispevki soavtorjev iz različnih oddelkov NIB so šteti enkrat
Papers are counted by the department of the first author

PREGLED OBJAVLJENIH DEL ZA LETA 2002-2011
OVERVIEW OF PUBLISHED PAPERS FOR YEARS 2002-2011



POUČEVANJE NA UNIVERZAH
UNIVERITY TEACHING

UNIVERZA V LJUBLJANI
UNIVERSITY OF LJUBLJANA

Biotehniška fakulteta
Biotechnical Faculty

Izr. prof. dr. Andrej Blejec
Prof. dr. Andrej Čokl
Prof. dr. Marina Dermastia
Prof. dr. Jadran Faganeli
Izr. prof. dr. Kristina Gruden
Prof. dr. Tamara Lah Turnšek
Doc. dr. Maruša Pompe Novak
Izr. prof. dr. Maja Ravnikar
Izr. prof. dr. Davorin Tome
Doc. dr. Al Vrezec
Izr. prof. dr. Jana Žel

Fakulteta za kemijo in kemijsko tehnologijo
Faculty of Chemistry and Chemical Technology

Izr. prof. dr. Kristina Gruden
Prof. dr. Tamara Lah Turnšek

Fakulteta za matematiko in fiziko
Faculty of Mathematics and Physics

Izr. prof. dr. Vlado Malačič

Fakulteta za pomorstvo in promet
Faculty of Martime Studies and Transport

Doc. dr. Oliver Bajt
Prof. dr. Jadran Faganeli
Doc. dr. Nives Kovač
Izr. prof. dr. Vlado Malačič
Prof. dr. Alenka Malej

Medfakultetni podiplomski študij Biomedicina
Inter-Faculty PhD Study of Biomedicine

Izr. prof. dr. Metka Filipič
Izr. prof. dr. Kristina Gruden
Prof. dr. Tamara Lah Turnšek

Medfakultetni študij Varstvo okolja
Inter-Faculty Study of Environmental Protection

Prof. dr. Jadran Faganeli
Prof. dr. Alenka Malej

UNIVERZA V MARIBORU
UNIVERSITY OF MARIBOR

Fakulteta za naravoslovje in matematiko
Faculty of Natural Sciences and Mathematics

Doc. dr. Damijan Denac
Prof. dr. Lovrenc Lipej
Izr. prof. dr. Davorin Tome

UNIVERZA V NOVI GORICI
UNIVERSITY OF NOVA GORICA

Visoka šola za vinogradništvo in vinarstvo
Faculty of Viticulture and Enology

Doc. dr. Maruša Pompe Novak
Izr. prof. dr. Maja Ravnikar
Izr. prof. dr. Valentina Turk

Fakulteta za znanosti o okolju
Faculty of Environmental Sciences

Prof. dr. Anton Brancelj
Dr. Meti Buh Gašparič
Prof. dr. Andrej Čokl
Izr. prof. dr. Metka Filipič
Doc. dr. Maruša Pompe Novak
Doc. dr. Andreja Ramšak
Dr. Tatjana Simčič
Izr. prof. dr. Davorin Tome
Izr. prof. dr. Valentina Turk
Doc. dr. Al Vrezec

UNIVERZA NA PRIMORSKEM
UNIVERSITY OF PRIMORSKA

Fakulteta za matematiko, naravoslovje in informacijske tehnologije
Faculty of Mathematics, Natural Sciences and Information Technologies

Doc. dr. Patricija Mozetič
Doc. dr. Andreja Ramšak

Pedagoška fakulteta Koper
Faculty of Education Koper

Doc. dr. Nives Kovač
Doc. dr. Patricija Mozetič

OSTALI VISOKOŠOLSKI ZAVODI
OTHER HIGHER EDUCATIONAL INSTITUTIONS

Visoka šola za varstvo okolja, Velenje
High School for Environmental Protection, Velenje

Dr. Anja Bubik
Izr. prof. dr. Bojan Sedmak

PREDAVANJA NA SEDEŽU INŠTITUTA
INSTITUTE COLLOQUIA

1. Prof. dr. Anton Brancelj, Oddelek za raziskovanje sladkovodnih in kopenskih ekosistemov, Nacionalni inštitut za biologijo: »Limnologi(ja) na strehi sveta / Limnology on the Roof of the World«; 3.3.2011
2. Prof. dr. Tom Riley, University of Western Australia: »Alternativne terapije za zdravljenje nalezljivih bolezni / Alternative Therapies for Infectious Diseases«; 26.5.2011
3. Prof. dr. Thorsten Assmann, Institute of Ecology, Leuphana University Lüneburg, Germany: »Vpliv globalnih sprememb na biologijo krešičev: pogled na gorske neleteče vrste / Global Change Biology of Ground Beetles: Insights from Wingless Species in Mountains«; 30.5.2011
4. Dr. Marco Pirotta, Life Technologies: »Naslednja generacija sekveniranja za vsak laboratorij: Semiconductor Ion Torrent PGM™ in SOLiD™ / Next-Generation Sequencing for any Lab: Semiconductor Ion Torrent PGM™ and SOLiD™ Sequencing«; 9.6.2011
5. Dr. Claude Meisch, National Natural History Museum of Luxembourg: »Raki dvoklopniki (Ostracoda, Crustacea): filogenetski razvoj in modeli razmnoževanja (spolno razmnoževanje, partenogeneza in »starodavni nespolniki«) / Crustacea Ostracoda: Their Phylogeny and Modes of Reproduction (Sexual Versus Parthenogenesis, Ancient Asexuals)«; 21.7.2011
6. Prof. dr. Henning Ulrich, Departamento de Bioquímica, Instituto de Química, Universidade de São Paulo, São Paulo, Brazil: »Aptameri in ribosomski priklopniki: struktura, funkcija in klinična uporaba / Aptamers and Riboswitches: Structure, Functions and Clinical Applications«; 6.9.2011
7. Dr. Rok Lenarčič, Oddelek za biotehnologijo in sistemsko biologijo, Nacionalni inštitut za biologijo: »Segregacija kromosomov med sporulacijo bakterije *Bacillus subtilis* / Chromosome Segregation in *Bacillus subtilis* During Sporulation«; 15.9.2011
8. Dr. Saša Novak, Odsek za nanostrukturne materiale, Institut Jožef Stefan: »Titanov oksid: znanec z različnimi obrazi / Titanium Oxide: an Acquaintance with Different Faces«; 29.9.2011
9. Dr. István Nagy, z Madžarskega centra za nove generacije sekvenciranja: »Uporaba tehnologije nove generacije sekvenciranja (NGS) za študije izražanja genov: Smo že dovolj daleč? / Application of Next Generation Sequencing Technology to Gene Expression Studies. Are we there yet?«; 30.9.2011
10. Tomaž Jevšnik, Ocean Orchids d.o.o.: »Potencial hortikulture pod steklom v Sloveniji / The Potential of Under-glass Horticulture in Slovenia«; 6.10.2011
11. Dr. Miguel Borges, EMBRAPA institut v Braziliji: »EMBRAPA- največji inštitut na področju kmetijstva, njegova dejavnost, vloga in poslanstvo / EMBRAPA – the Largest Institute in the Field of Agriculture, its Activities, Role and Mission«; 7.10.2011
12. Prof. dr. Andrej Čokl, dr. Meta Virant-Doberlet, dr. Nataša Stritih, dr. Alenka Žunič, dr. Maja Zorović in Danilo Bevk, sodelavci Oddelka za entomologijo na Nacionalnem inštitutu za biologijo: »Predstavitev raznolikosti raziskav na področju žuželk / Presentation of the diversity of entomological research«; 27.10.2011
13. Dr. Jana Žel, dr. Mojca Milavec, dr. Dany Morisset, dr. Damien Plan, dr. Guy Van den Eede in dr. Kristina Gruden: »Kako zanesljivo določamo GSO? / How to Reliably Test for GMOs?«; 9.12.2011
14. Martin Strel, poklicni maratonski plavalec in večkratni svetovni rekorder: »Svetovni veletoki in kvaliteta voda / The World's Major Rivers and Water Quality«; 15.12.2011

PREDAVANJA NA MBP PIRAN
COLLOQUIA AT MBS PIRAN

1. Izr. prof. dr. Lovrenc Lipej (MBP-NIB): »Circalittoral Biocenoses and Precoralligenous Formations in Slovenia«, 15.04.2011
2. Prof. dr. Antonio Stefanon, (Ca' Foscari University of Venice, Department of Environmental Science, Venezia, Italy): »Circalittoral Biocenoses and Precoralligenous Formations in Slovenia«, 15.04.2011
3. Prof dr. Sandra Casellato, (University of Padova, Department of Biology, Padova, Italy): »The Northern Adriatic Coralligenous in the Gulf of Venice«, 15.04.2011
4. Dr. Daniele Curiel, (SELC Soc. Coop., Marghera, Venezia, Italy): »The Tegnue of the Gulf of Venice: role of bioindicators«, 15.04.2011
5. Dr. Annalisa Falace, (University of Trieste, Department of Life Sciences, Trieste, Italy): »The Phytobenthos of the Rocky Outcrops in the Northern Adriatic«, Morska biološka postaja, NIB, Piran, 15.04.2011
6. Dr. Diego Borme, (OGS National Institute of Oceanography and Experimental Geophysics, Sgonico (TS), Italy): »Pietro and Bardelli Rocky Outcrops: a Preliminary Study«, 15.04.2011
7. Dr. Diego Borme, (OGS National Institute of Oceanography and Experimental Geophysics, Sgonico (TS), Italy): »Precoralligenous Epibenthic Community Settled on Artificial Reefs in the Gulf of Trieste (Northern Adriatic Sea): a Three Years Study«, 15.04.2011
8. Dr. Andre Carrara Morandini (University of Sao Paolo): »Cnidarian Research at University of São Paulo (Brazil), with Emphasis on Scyphomedusae«, 29.07.2011
9. Dr. Petar Kružić (Laboratory for Marine Biology, Department of Zoology, Faculty of Science, University of Zagreb): »Ecology of Stony Corals in the Adriatic«, 16.10.2011
10. Dr. Miroslav Gačić (Istituto nazionale di Oceanografija e di Geofisica Sperimentale): »Impact of Decadal Inversions of the Lonian Circulation on Thermohaline and Biogeochemical Properties of Adjacent Basins«, 19.12.2011

NAGRADE IN PRIZNANJA
AWARDS AND RECOGNITIONS

Dr. Ana Rotter:
Štipendija nacionalnega programa Za ženske v znanosti 2011, ki jo podeljujejo L'Oreal Slovenija, Slovenska nacionalna komisija za UNESCO in Slovenska znanstvena fundacija, februar 2011.

Dr. Ana Rotter:
National Scholarship Program for Women in Science 2011, awarded by L'Oreal Slovenia, Slovenian National Commission for UNESCO and the Slovenian Science Foundation, February 2011.

Marko Petek s sodelavci:
Rektorjeve nagrade za naj-inovacijo Univerze v Ljubljani za poslovni načrt za podjetje, ki se ukvarja s prodajo multifunkcionalnih magnetnih nanodelcev za aplikacije v biomedicini, december 2011.

Marko Petek with co-workers:
Rector Prize for the best innovation of the University of Ljubljana for a business plan for the company, which sales multifunctional magnetic nanoparticles for applications in biomedicine, December 2011.

Dr. Jana Petković:
Krkina nagrada za posebne dosežke 2011.

Dr. Jana Petković:
Krka Prize for outstanding achievements in 2011.

Dr. Jana Petković:
Nagrada Nacionalnega inštituta za biologijo za izjemno doktorsko delo na področju raziskovalne dejavnosti inštituta, november 2011.

Dr. Jana Petković:
The award of the National Institute of Biology for an extraordinary doctoral thesis in the field of research activities of the Institute, November 2011.

Prof. dr. Alenka Malej,
Velika nagrada Miroslava Zeia za raziskovalno delo ved o življenju in okolju, Ljubljana, november 2011.

Prof. Dr. Alenka Malej:
Grand Award of Miroslav Zei for research work in the field of life and environmental sciences, November 2011.

Dr. Mateja Grego, Janez Forte:
»Med morjem in kopnim«; priznanje Prometej znanosti za odličnost v komuniciranju Morski biološki postaji NIB Piran za kratki dokumentarni film (http://vimeo.com/29424010), december 2011.

Dr. Mateja Grego, Janez Forte:
"Between the land and the sea"; Prometheus Award for excellence in science communication for a short documentary film created at the Marine Biology Station Piran NIB (http://vimeo.com/29424010), December 2011.

Svečana podelitev nagrad in priznanj Miroslava Zeia, 7.11.2011.
Solemn awards ceremony of Miroslav Zei, 7.11.2011.

Svečana podelitev nagrad in priznanj Miroslava Zeia, 7.11.2011.
Solemn awards ceremony of Miroslav Zei, 7.11.2011.

Pomembni dogodki

SVEČANA PODELITEV NAGRAD IN PRIZNANJ NACIONALNEGA INŠTITUTA ZA BIOLOGIJO

V Biološkem središču na Večni poti 111 v Ljubljani, je v ponedeljek, 7. novembra 2011, potekala že druga svečana podelitev nagrad in priznanj Nacionalnega inštituta za biologijo, poimenovanih po prof. dr. Miroslavu Zeiu, ki je bil med ustanovitelji inštituta. Lani je Nacionalni inštitut za biologijo (NIB) obeležil 50-letnico svojega delovanja in ob tej priložnosti prvič v zgodovini NIB-a podelil nagrade in priznanja prof. dr. Miroslava Zeia, posameznikom za njihove izjemne dosežke na področju osnovnih in uporabnih raziskav s področja ved o življenju ter uresničevanja vizij in poslanstva NIB.

Svečane podelitve se je udeležil tudi minister za kmetijstvo, gozdarstvo in prehrano, mag. Dejan Židan, ki je v svojem slavnostnem nagovoru izpostavil globalen pomen virov hrane in še posebej varne hrane, predvsme zaradi naraščajoče naseljenosti našega planeta. Varna hrana je tudi eden izmed pomembnih področij pri katerih NIB sodeluje z ministrtvom za prehrano. Pod širokim pojmom zdrava hrana se skriva mnogo aktivnosti. Vsem so poznani izpostavljeni primeri gensko spremenjenih organizmov (GSO), kjer NIB pospešeno razvija znanje in tehnologije, kako odkrivati neželene GSO, pomaga MKGP pri pripravi ukrepov in smernic za sobivanje in kontrolo hrane. Nič manj pomemben vidik zdrave hrane je skrb za pitno vodo, od poznavanja ekosistemov iz katerih se napaja, pa vse do odkrivanja strupov, mutagenov in različnih človeku in rastlinam škodljivih mikroorganizmov, pa vse do razvoja metod čiščenja. Nove poti trgovanja in podnebne spremembe povzročajo hitro naseljevanje novih povzročiteljev bolezni in podirajo ravnovesja v ekosistemih. Minister je sodelavcem NIBa zahvalil za dosedanje sodelovanje in jih pozval, da še naprej pomagajo pri kriznih in perečih vprašanjih v državi kot je predvsem nedavno grozeča epidemija trsne rumenice, pomori čebel, hrušev ožig itd., ki groze tudi slovenskemu gospodarstvu.

Na svečani podelitvi so bile podeljene naslednje nagrade NIB:

Veliko nagrado Miroslava Zeia za raziskovalno delo na področju ved o življenju in okolju je prejela prof. dr. Alenka Malej.

Prof. dr. Alenka Malej *je vodilna raziskovalka na področju ekologije obalnih voda in morske biologije, ki ga je uspešno umestila v evropski in sredozemski prostor. Njena osnovna raziskovalna dejavnost je vezana na morski plankton z usmerjenostjo na ekologijo in biologijo želatinoznega planktona. Izsledke svojih znanstvenih raziskav je objavila v znanstvenih člankih, ki so bili citirani več kot 700-krat. Kot vodja Morske biološke postaje Piran Nacionalnega inštituta za biologijo je več kot dvajset let koordinirala multidisciplinarno delo skupine in vodila kar 23 mednarodnih projektov s področja raziskav in monitoringa morja. Je dolgoletna nacionalna*

Prof. dr. Alenka Malej, dobitnica velike nagrade Miroslava Zeia.
Grand Award of Miroslava Zei was received by
Prof. Dr. Alenka Malej.

Doc. dr. Rade Injac, dobitnik nagrade Miroslava Zeia.
Award of Miroslava Zei was received by Assist.
Prof. Dr. Rade Injac.

Prof. dr. Jure Piškur, dobitnik nagrade Miroslava Zeia.
Award of Miroslava Zei was received by Prof. Dr. Jure Piškur.

Important Events

SOLEMN AWARDS CEREMONY OF THE NATIONAL INSTITUTE OF BIOLOGY

On Monday, November 7, 2011, a second solemn awards ceremony of the National Institute of Biology was held at the Biological Centre on Večna pot 111 in Ljubljana. The awards are named after Prof. Dr. Miroslav Zei, who was among the founders of the Institute. Last year, the National Institute of Biology (NIB) celebrated its 50th anniversary and for the first time in its history gave awards of Prof. Dr. Miroslav Zei to individuals for their extraordinary achievements in fundamental and applicable research in the field of life sciences and in the field of realising the vision and mission of NIB.

The solemn ceremony was also attended by the Minister of Agriculture, Forestry and Food, Dejan Židan, MSc. In his solemn address, he exposed the global importance of food sources and especially safe food especially due to the increasing population of our planet. Safe food is also one of important fields, in which NIB co-operates with the Ministry of Food. The term healthy food has many underlying activities. The cases of genetically modified organisms (GMO) are widely known and NIB is very active in developing know-how and technologies used in detecting undesired GMOs, helps the Ministry of Agriculture, Forestry and Food in preparing measures and directives for co-existence and food control. A not less important aspect of healthy food is care for drinking water, which extends from knowing eco-systems, from which it originates, through discovering poisons, mutagens and various microorganisms harmful to humans and plants, to developing the methods of cleaning. New commercial ways and climatic changes cause a quick introduction of new pathogens and destroy the balance in ecosystems. The Minister thanked the associates of NIB for their co-operation in the past and asked them for further assistance in critical an acute issues in the country, like the threatening epidemic of grapevine yellows, mass bee deaths, fireblight etc., which present a threat to Slovene economy as well.

NIB awarded the following awards:

Grand Award of Miroslav Zei for research work in the field of life and environmental sciences was received by Prof. Dr. Alenka Malej.

Prof. Dr. Alenka Malej *is head researcher in the field of ecology of littoral waters and sea biology. Her basic research activity concerns sea plankton with orientation to ecology and biology of gelatinous plankton. The results of her scientific studies were published in scientific articles that were quoted more than 700 times. As Head of the Marine Biology Station Piran of the National Institute of Biology she has co-ordinated multidisciplinary work of the group for over twenty years and managed as many as 23 international projects in the field of sea research and monitoring.*

koordinatorka programa Mediterranean Action Plan pri Okoljskem programu Združenih Narodov in predsednica Nacionalnega odbora medvladne oceanografske komisije pri UNESCu. Od leta 1985 je bila članica številnih koordinacijskih odborov za zaščito in opazovanje jadranskega in sredozemskega morja in bila leta 2010 imenovana v ekspertno skupino za pripravo paragrafa 180 za resolucijo Generalne skupščine OZN o oceanih in pomorskem pravu. Bila je gostujoča raziskovalka in profesorica na številnih uglednih morskih inštitucijah in mednarodnih šolah. Kot vabljena predavateljica ali organizatorka je sodelovala na številnih mednarodnih znanstvenih srečanjih. Odločilno je prispevala k podpisu sporazuma o sodelovanju med Nacionalnim inštitutom za biologijo in vodilno francosko raziskovalno in medicinsko univerzo - Univerzo Pierre et Marie Curie. Za svoj prispevek k podpisu sporazuma je prejela medaljo omenjene univerze. Profesorica Malejeva je za svoje znanstveno raziskovalno delo leta 1989 skupaj s sodelavcema dr. Jadranom Faganelijem in dr. Nedo Fanuko prejela nagrado sklada Borisa Kidriča, katere naslednice so Zoisove nagrade za znanstvene dosežke.

Nagrado Miroslava Zeia za izjemne dosežke na področju raziskovalne dejavnosti inštituta sta prejela prof. dr. Jurij Piškur in doc. dr. Rade Injac.

*Glavna raziskovalna področja **prof. dr. Jurija Piškurja**, rednega profesorja molekularne genetike na Oddelku za biologijo, Univerze v Lundu na Švedskem pokrivajo metabolizem prekurzorjev nukleinskih kislin, gensko zdravljenje, primerjalno genomiko in molekularno evolucijo kvasovk. Prof. Piškur je v zadnjih 5 letih objavil 46 člankov, od skupno več kot 120-ih, med katerimi so tudi objave v najuglednejših znanstvenih revijah. Več njegovih odkritij je bilo patentiranih, je soavtor treh knjig in soustanovitelj treh spin-off biotehnoloških podjetij. Posebno priznanje njegovim raziskovalnim dosežkom predstavlja njegova izvolitev leta 2005 v Kraljevo fiziografsko društvo v Lundu, eno od švedskih kraljevih akademij. Kljub temu, da profesor Piškur že več kot 25 let živi in znanstveno deluje v tujini, ves čas vzdržuje strokovne in osebne stike z domovino. Od leta 2010 tako deluje v Odboru za znanost pri Svetu za Slovence po svetu kot posvetovalno telo Vlade RS. Od leta 2009 pa sodeluje z laboratorijem za mikrobiologijo Morske biološke postaje Nacionalnega inštituta za biologijo na področju raziskav morskih mikroorganizmov pri adaptacijah na spremenjene okoljske dejavnike.*

***Docentu dr. Radetu Injacu** je uspelo z inovativnim znanstvenim pristopom in uporabo najsodobnejših farmakoloških in analiznih metod dokazati potencialno uporabo fulerenola kot organoprotektiva pri terapiji rakavih obolenj z doksorubicinom. S svojim delom je postavil temelje za številne nadaljnje raziskave farmakološke uporabnosti fulerenolov ter narediti pomemben korak k implementaciji tovrstnih učinkovin v klinično prakso. O znanstveni odličnosti njegovih raziskav priča 34 znanstvenih člankov v zadnjih petih letih, ki so bili že več 240-krat citirani. Njegovo poznavanje farmacevtske tehnologije se odraža v štirih mednarodnih patentnih prijavah.*

Nagrado Nacionalnega inštituta za biologijo za izjemno doktorsko delo na področju raziskovalne dejavnosti inštituta je prejela dr. Jana Petković.

*V letošnjem letu je Nacionalni inštitut za biologijo prvič podelil tudi nagrado za izjemno doktorsko delo, zagovarjano v preteklem študijskem letu, prejela pa jo je **dr. Jana Petković**. Izsledki izbrane doktorske naloge Jane Petković, z naslovom Mehanizmi toksičnega in genotoksičnega delovanja nanodelcev titanovega oksida, so bili objavljeni v 5 znanstvenih člankih in poglavju v knjigi, izdani pri mednarodni založbi. Na treh člankih in poglavju je bila prva avtorica. Dva članka sta bila objavljena v najprestižnejših revijah s področja. Za svoje doktorsko delo je Jana Petković prejela tudi letošnjo Krkino nagrado.*

Na prireditvi so bili svečano imenovani tudi vsi mladi sodelavci NIB, ki so v obdobju od 1. januarja 2010 do 30. septembra 2011 pridobili doktorske nazive:

Dr. Irena Bertoncelj, dr. Branko Bogunović, dr. Urška Čepin, dr. Maarten De Groot, dr. Duška Delić, dr. Mateja Grego, dr. Saša Kenig, dr. Urška Koce, dr. Polona Kogovšek, dr. Borut Mavrič, dr. Petra Nikolić, dr. Franja Pajk, dr. Jana Petković, dr. Manca Pirc, dr. Anja Pucer, dr. Tomaž Rijavec, dr. Ana Rotter in dr. Alenka Žunič.

Dr. Jana Petković, dobitnica Nagrade NIB za izjemno doktorsko delo.
Award of NIB for an extraordinary doctoral thesis was received by Dr. Jana Petković.

Minister za kmetijstvo, gozdarstvo in prehrano, mag. Dejan Židan.
Minister of Agriculture, Forestry and Food, Dejan Židan, MSc.

Svečano imenovanje novih doktorjev znanosti.
At the ceremony the new doctors of science were presented.

She has been a national co-ordinator of the programme Mediterranean Action Plan at the Environmental Programme of the United Nations for years and the President of the National Committee of the Intergovernmental Oceanographic Commission of UNESCO. Since 1985, she has been member of numerous co-ordinating committees for the protection and monitoring of the Adriatic and Mediterranean Sea and was appointed to an expert group in 2010 for the preparation of paragraph 180 for the resolution of the General Assembly of UNO on oceans and maritime law. She was a visiting researcher and teacher at respectful maritime institutions and international schools. She participated in numerous international scientific meetings as invited lecturer or organiser. She had a decisive role in signing a co-operation agreement between the National Institute of Biology and the leading French research and medical university Pierre et Marie Curie. She was awarded a medal of the mentioned university for her contribution to the signing of the agreement. Together with her colleagues Dr. Jadran Faganeli and Dr. Neda Fanuko, Professor Malej received an award of the Boris Kidrič fund. This fund is now called Zois awards for scientific achievements.

The prize of Miroslav Zei for extraordinary achievements in the field of research activity of the institute was given to Prof. Dr. Jurij Piškur and Assist. Prof. Dr. Rade Injac.

*The main research fields of **Prof. Dr. Jurij Piškur**, full professor of molecular genetics at the Department of Biology at the University of Lund in Sweden cover metabolism of nucleic acid precursors, genetic treatment, comparative genomics and molecular evolution of yeasts. In the past 5 years Prof. Piškur published 46 articles out of a total of more than 120, among which also publications in the most respected scientific journals. Some of his discoveries were patented, he is co-author of three books and co-founder of three spin-off biotechnological companies. A special acknowledgement of his research achievements is his 2005 election to the Royal Fisiographic Society in Lund, one of the Swedish royal academies. Although Professor Piškur has lived and scientifically worked abroad for over 25 years, he has maintained professional and personal contacts with his home country. Since 2010, he has been active in the Committee for Science of the Council for Slovenes Abroad as a consulting body of the Government of the Republic of Slovenia. Since 2009, he has been co-operating with the laboratory for microbiology of the Maritime Biology Station of the National Institute of Biology in the field of research of maritime microorganisms in adapting to modified environmental factors.*

*With his innovative scientific approach and use of the latest pharmacological and analysis methods **Assist. Prof. Dr. Rade Injac** managed to prove a potential use of fulerenol as an organ-protective agent in the therapy of cancer diseases with doxyrubicine. His work has set foundations for numerous further research of pharmacological applicability of fulerenols and made an important step towards implementation of active ingredients of this type in medical practice. His scientific research is excellent, which is shown in 34 scientific articles in the past five years, which have been quoted more than 240 times. His knowledge of pharmaceutical technology is reflected in four international patent applications.*

Srečanje mladih raziskovalcev in njihovih mentorjev Nacionalnega inštituta za biologijo in Oddelka za biologijo Biotehniške Fakultete UL.
Meeting of young researchers and their mentors from the National Institute of Biology and the Department of Biology at the Biotechnical Faculty UL.

Mladi raziskovalci Nacionalnega inštituta za biologijo in Oddelka za biologijo Biotehniške Fakultete UL.
Young researchers of the National Institute of Biology and the Department of Biology at the Biotechnical Faculty UL.

Prof. dr. Gregor Anderluh, prodekan Oddelka za biologijo BF in prof. dr. Tamara Lah Turnšek, direktorica NIB.
Prof. Dr. Gregor Anderluh, Vice Dean of the Department of Biology and Prof. Dr. Tamara Lah Turnšek, Director NIB.

V BIOLOŠKEM SREDIŠČU POTEKALO SREČANJE MLADIH RAZISKOVALK IN RAZISKOVALCEV TER NJIHOVIH MENTORJEV IZ NIB IN OBBF

V Biološkem središču v Ljubljani, je 7. Marca 2011, dan pred praznikom ob dnevu žena, potekalo prvo skupno srečanje mladih raziskovalk in raziskovalcev ter njihovih mentoric in mentorjev iz Nacionalnega inštituta za biologijo in Oddelka za biologijo Biotehniške fakultete Univerze v Ljubljani.

Nacionalni inštitut za biologijo in Oddelek za biologijo Biotehniške fakultete Univerze v Ljubljani imata že v svojem poslanstvu navedeno, da je ustvarjanje novega temeljnega znanja na področju biologije in sorodnih naravoslovnih ter okoljskih ved in prenašanje tega znanja v uporabo za izboljšanje kvalitete življenja, za podporo okoljskim politikam in za razvoj znanosti, eden izmed temeljev njunega delovanja. Raziskovanje in izobraževanje na področju ved o življenju in naravi nalaga obema institucijama veliko odgovornost, da ustvarjata strokovne in znanstvene podlage in krepita družbeno klimo za trajno harmonično sožitje med človekom in naravo.

Tako sta obe instituciji ponosni, da lahko med svojimi vrstami pozdravita vsako leto več mladih raziskovalk in raziskovalcev. Na **Nacionalnem inštitutu za biologijo** se izobražuje že **38 mladih raziskovalk in raziskovalcev**, od katerih se jih 33 izobražuje v skladu s pogodbo z Javno agencijo za raziskovalno dejavnost, 5 pa jih prihaja iz gospodarstva**.** Na **Oddelku za biologijo** se podiplomsko izobražuje **22 mladih raziskovalk in raziskovalcev.**

Z namenom, da bi se mladi raziskovalci obeh institucij, ki delujeta pod skupno streho Biološkega središča, med seboj bolje spoznali, predstavili svoje raziskovalno delo ter navezali stike za bodoča projektna in pedagoška sodelovanja, je 7. marca 2011 potekalo srečanje mladih raziskovalk in raziskovalcev ter njihovih mentorjev.

Dogodek sta s slavnostnim nagovorom otvorila **prof. dr. Tamara Lah Turnšek, direktorica NIB** in **prof. dr. Gregor Anderluh prodekan Oddelka za biologijo BF.** Predstavila sta Projekt 2000 mladih raziskovalcev, ki je eden od instrumentov znanstvene politike Agencije za raziskovalno dejavnost. Program zelo uspešno poteka že od leta 1985 in je izdatno prispeval k dvigu raziskav, kadrovskemu pomlajevanju raziskovalnih skupin na inštitutih, pedagoškemu delu na univerzah, krepitvi visokokvalificiranih zdravnikov - raziskovalcev na klinikah in povečanju kadrovskega potenciala za potrebe drugih uporabnikov iz javnega in zasebnega sektorja.

V nadaljevanju so nam svoje raziskovalno delo s kratkim predavanjem predstavili mladi raziskovalci, ki so v zadnjem letu svojega podoktorskega študija.

The award of the National Institute of Biology for an extraordinary doctoral thesis in the field of research activities of the Institute was given to Dr. Jana Petković.

For the first time in the history, the National Institute of Biology awarded a prize for an extraordinary doctoral thesis defended in the past academic year. This year's award was given to ***Dr. Jana Petković.*** *The results of her doctoral thesis with the title Mechanisms of Toxic and Genotoxic Activity of Titanium Oxide Nanoparticles were published in five scientific articles and a chapter in a book published by an international publishing house. She was the first author of three articles and the mentioned chapter. Two articles were published in the most eminent journals from this field. Jana Petković was also awarded a Krka Prize for her doctoral thesis.*

At the ceremony, all young researchers of NIB who obtained PhD titles in the period from January 1, 2010 to September 30, 2011 were presented:

Dr. Irena Bertoncelj, Dr. Branko Bogunović, Dr. Urška Čepin, Dr. Maarten De Groot, Dr. Duška Delić, Dr. Mateja Grego, Dr. Saša Kenig, Dr. Urška Koce, Dr. Polona Kogovšek, Dr. Borut Mavrič, Dr. Petra Nikolić, Dr. Franja Pajk, Dr. Jana Petković, Dr. Manca Pirc, Dr. Anja Pucer, Dr. Tomaž Rijavec, Dr. Ana Rotter and Dr. Alenka Žunič.

MEETING OF YOUNG RESEARCHES AND THEIR MENTORS FROM NIB AND DBFB AT THE BIOLOGY CENTRE

On 7 March 2011, just one day prior to the day dedicated to women, the first joint meeting of young researchers and their mentors from the National Institute of Biology and the Department of Biology at the Biotechnical Faculty of the University of Ljubljana took place at the Biology Centre in Ljubljana.

The creation of new fundamental knowledge in the field of biology and similar nature- and environment-related sciences and facilitating this knowledge in order to improve the quality of life, to support environmental policies and to provide the development of science present the core mission of the National Institute of Biology and the Department of Biology at the Biotechnical Faculty of the University of Ljubljana. Research and education in the field of sciences related to life and nature put great responsibility on both institutions in order to create professional and scientific foundations and strengthen the social climate for permanent harmonic symbiosis between the man and nature.

Both institutions are proud of the fact to be able to welcome an increasing number of young researchers every year. **38 young researchers** study at the **National Institute of Biology**; 33 of them study in accordance with the contract concluded with the Slovenian Research Agency, 5 of them work in the economy sector. **22 young researchers** at the **Department of Biology** are post-graduate students.

With the main aim to enable young researchers from both institutions, which operate within the scope of the Biology Centre, to get to know each other better, present their research work and make contacts for future project and pedagogical cooperation, the meeting of young researchers and their mentors took place on 7 March 2011.

The event was solemnly opened by **Prof. Dr. Tamara Lah Turnšek, Director of NIB**, and **Prof. Dr. Gregor Anderluh, Vice Dean of the Department of Biology at the Biotechnical Faculty**. They presented the 2000 Young Researchers Project, which is one of the science policy instruments of the Slovenian Research Agency. The programme has been successfully in progress since 1985 and has significantly contributed to stimulating research, promoting the participation of younger researches in research groups at the institutes, promoting pedagogical work at universities and stimulating the increase in the number of highly qualified medical practitioners – researchers at clinics and also increasing the HR potential for the requirements of other public and private sectors carriers.

At the meeting, young researchers who are in their final year of postdoctoral study, presented their research work by giving short lectures.

Iz Nacionalnega inštituta za biologijo so se nam predstavili:

- **Maarten de Groot:** ***Being a young researcher in Slovenia - a Dutch perspective***. Mentorica: dr. Meta Virant Doberlet.
- **Tjaša Kogovšek:** ***Trofična ekologija klobučnjaških meduz v obalnem morju***. Mentorica: prof. dr. Alenka Malej
- **Petra Nikolič:** ***Skrivnostni svet fitoplazem.*** Mentorica: prof. dr. Marina Dermastia.
- **Franja Pajk:** ***Thermal sensitivity of water fleas.*** Mentorica: dr. Tatjana Simčič.
- **Jana Petković:** ***Snack with TiO2 - the decision is yours***. Mentorica: prof. dr. Metka Filipič.

Iz Oddelka za biologijo Biotehniške fakultete Univerze v Ljubljani so se nam predstavili:

- **Domen Jaklič**: ***Antimicrobial activity of larval excretions/secretions of the blowfly, Lucilia sericata*** Mentorica: prof. dr. Nina Gunde Cimerman.
- **Špela Mechora**: ***Vsebnost selena v vodnih rastlinah.*** Mentorica: dr. Mateja Germ.
- **Rok Tkavc**: ***Mikrobne združbe solinskega raka Artemia sp. in izbranih solinskih mikrobnih preprog.*** Mentorica: prof. dr. Nina Gunde Cimerman.
- **Ana Zovko**: ***Biological activities of synthetic analogues of poly-APS.*** Mentor: prof. dr. Tom Turk.

Predstavili sta se tudi nagrajenki in dobitnici štipendije programa »za Ženske v znanosti» za leto 2011, ki jo podeljujejo L'Oreal Slovenija, Slovenska nacionalna komisija za UNESCO in Slovenska znanstvena fundacija.

To sta bili mladi raziskovalki:

- **Biserka Bakrač** iz Oddelka za biologijo s predavanjem: ***Specifična vezava ekvinatoksina II, citolitičnega proteina iz morske vetrnice Actinia equina, na sfingomielin.*** Mentor: prof. dr. Gregor Anderluh in
- **Ana Rotter** iz NIB, ki se nam je predstavila s predavanjem: ***Systems biology at NIB-FITO: what and how we have learned.*** Njena mentorica je prof. dr. Kristina Gruden.

NJ. EKSC. G. SUN RONGMIN, AMBASADOR LJUDSKE REPUBLIKE KITAJSKE IN ATAŠEJKA NA KITAJSKEM VELEPOSLANIŠTVU GA. ZHANG YUYUE OBISKALA NIB

Nacionalni inštitut za biologijo je v petek 25. februarja 2011, na povabilo direktorice NIB prof. dr. Tamare Lah Turnšek, obiskal Njegova ekscelenca gospod SUN Rongmin, ambasador Ljudske Republike Kitajske in atašejka na Kitajskem veleposlaništvu gospa Zhang Yuyue.

Srečanje, ki so se ga poleg direktorice in kitajskih gostov udeležili tudi vodje enot Nacionalnega inštituta za biologijo, je bilo namenjeno predstavitvi raziskovalnega dela NIB, njegove vpetosti v mednarodni prostor in obstoječa dolgoletna sodelovanja s kitajskimi znanstveniki in ustanovami. Sodelovanje med obema državama na področju naravoslovnih in okoljskih znanosti poteka že nekaj let, v obliki izvajanja bilateralnih projektov, ki so sofinancirani s strani Javne agencije za raziskovalno dejavnost, katerega rezultati so skupni znanstveni članki, izmenjave uveljavljenih raziskovalcev in študentov, ter strokovno izobraževanje. Udeleženci srečanja pa so bili enotni, da si v prihodnosti želijo tovrstno znanstveno sodelovanje še okrepiti in razširiti na druga področja delovanja NIBa ter predvsem spodbujati izmenjavo doktorandov med obema državama.

Njegova ekscelenca gospod Sun Rongmin, ambasador Ljudske Republike Kitajske in prof. dr. Tamare Lah Turnšek.
His Excellency Mr. Sun Rongmin, Ambassador of the People's Republic of China and Prof. Dr. Tamara Lah Turnšek, Director NIB.

Njegova ekscelenca gospod Sun Rongmin, ambasador Ljudske Republike Kitajske in atašejka na Kitajskem veleposlaništvu gospa Zhang Yuyue.
His Excellency Mr. Sun Rongmin, Ambassador of the People's Republic of China and Mrs. Zhang Yuyue, the China Embassy Attaché.

Srečanje Njegove ekscelence gospoda Sun Rongmina z direktorico in vodji oddelkov NIB.
Meeting His Excellency Mr. Sun Rongmin with Director and Heads of the Departments of the NIB.

Presentations made by the young researchers from the National Institute of Biology:

- **Maarten de Groot:** ***Being a young researcher in Slovenia - a Dutch perspective.*** Mentor: Dr. Meta Virant Doberlet.
- **Tjaša Kogovšek:** ***Trophic ecology of jellyfish in the coastal waters.*** Mentor: Prof. Dr. Alenka Malej.
- **Petra Nikolič:** ***The mysterious world of phytoplasma.*** Mentor: Prof. Dr. Marina Dermastia.
- **Franja Pajk:** ***Thermal sensitivity of water fleas.*** Mentor: Dr. Tatjana Simčič.
- **Jana Petković:** ***Snack with TiO2 - the decision is yours.*** Mentor: Prof. Dr. Metka Filipič.

Presentations made by the young researchers from the Department of Biology at the Biotechnical Faculty of the University of Ljubljana:

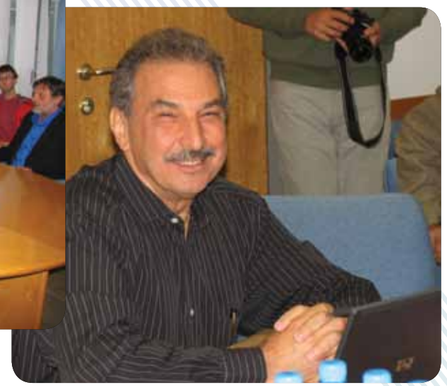
- **Domen Jaklič:** ***Antimicrobial activity of larval excretions/secretions of the blowfly, Lucilia sericata.*** Mentor: Prof. Dr. Nina Gunde Cimerman.
- **Špela Mechora:** ***Selenium content in water plants.*** Mentor: Dr. Mateja Germ
- **Rok Tkavc:** ***Microbial populations of brine shrimp, Artemia sp., and selected brine microbial mats.*** Mentor: Prof. Dr. Nina Gunde Cimerman.
- **Ana Zovko:** ***Biological activities of synthetic analogues of poly-APS.*** Mentor: Prof. Dr. Tom Turk.

This year, two young researchers and award winners who have been granted the scholarship within the "For Women in Science" programme, provided by L'Oreal Slovenia, the Slovenian National Commission for UNESCO and the Slovenian Science Foundation, also presented their work:

- **Biserka Bakrač** from the Department of Biology giving a lecture on: ***Specific binding of equinatoxin II, cytolytic protein from beadlet anemone, Actinia equin, to sphingomyelin.*** Mentor: Prof. Dr. Gregor Anderluh.
- **Ana Rotter** from NIB, who presented a lecture on: ***Systems biology at NIB--FITO: what and how we have learned.*** Her mentor is Prof. Dr. Kristina Gruden.

Obisk Njene ekscelence gospe Débore Vainer Barenboim, veleposlanice Brazilije.
Visit of Her Excellency Mrs. Débora Vainer Barenboim, Ambassador of the Federative Republic of Brazil.

Predavanje dr. Miguela Borgesa z EMBRAPA instituta v Braziliji.
Lecture of Dr. Miguel Borges from the Institute EMBRAPA in Brazil.



Dr. Miguel Borges z EMBRAPA instituta v Braziliji.
Dr. Miguel Borges from the Institute EMBRAPA in Brazil.

NIB JE OBISKALA NJE. EKSC. GOSPA DÉBORA VAINER BARENBOIM, VELEPOSLANICA BRAZILIJE

V petek, 7. oktobra 2011 je na Nacionalnem inštitutu za biologijo potekalo predavanje dr. Miguela Borgesa z EMBRAPA instituta v Braziliji: »EMBRAPA- največji inštitut na področju kmetijstva, njegova dejavnost, vloga in poslanstvo«, ki se ga je udeležila tudi Njena ekscelenca gospa Débora Vainer Barenboim, veleposlanica Brazilije s sodelavko gospo Carolino Fonseca.

Na predavanju je dr. Miguel Borges, vodja Oddelka za genetske resurse in biotehnologijo na Embrapa inštitutu in svetovno priznani raziskovalec na tem področju, predstavil institut EMBRAPA, ki je s svojimi več kot 8000 raziskovalci največji kmetijski institut na svetu, s svojo dejavnostjo pa je prisoten ne samo v Braziliji, ampak v celotni Južni Ameriki in v velikem delu Afrike. Embrapa inštitut in posebej skupina, ki jo vodi dr. Miguel Borges je izrazito odprta za sodelovanje in ponuja veliko možnosti za navezavo stikov. Oddelek za entomologijo Nacionalnega inštituta za biologijo z njimi sodeluje že vrsto let.

Pomen inštituta Embrapa za Brazilijo in v svetu je izpostavila tudi Njena ekscelenca gospa Débora Vainer Barenboim, veleposlanica Brazilije in pohvalila sodelovanje Nacionalnega inštituta za biologijo z brazilskimi znanstvenimi ustanovami ter izrazila podporo pri nadaljnjih aktivnostih našega inštituta na področju bilateralnega projektnega sodelovanja.

HIS EXCELLENCY MR. SUN RONGMIN, AMBASSADOR OF THE PEOPLE'S REPUBLIC OF CHINA AND MRS. ZHANG YUYUE, THE CHINA EMBASSY ATTACHÉ VISITED NIB

His Excellency Mr. Sun Rongmin, Ambassador of the People's Republic of China and Mrs. Zhang Yuyue, the China Embassy Attaché visited the National institute of biology (NIB), on Friday 25th of February 2011, upon the invitation of the Prof. Dr. Tamara Lah Turnšek, Director of the NIB.

The meeting was, besides the Director and the Guests from the China Embassy attended also the Heads of the Units of the National Institute of Biology, was devoted to the presentations of research of the NIB scientists, their integration in the international area and to the presentation of the existing long term cooperation with the Chinese scientists and institutions. Cooperation between the Republic of Slovenia and the People's Republic of China in the field of natural and environmental sciences has been already running for several years. Some bilateral projects, financed by the Slovenian Research Agency have already been implemented. The results of those cooperation are joint scientific papers, exchange of established researchers and students, and professional training. Participants of the meeting agreed that this kind of scientific cooperation between the two countries are important and support their further strengthening. They agreed to consolidate science cooperation also in other fields of NIB's activities in the future and to especially promote the exchange of young researchers between the two countries.

NIB VISITED HER EXCELLENCY MRS. DÉBORA VAINER BARENBOIM, AMBASSADOR OF THE FEDERATIVE REPUBLIC OF BRAZIL

On Friday, the 7th October 2011 was on the National Institute of Biology held the lecture "EMBRAPA – the largest institute in the field of agriculture, its activities, role and mission" of Dr. Miguel Borges from the Institute EMBRAPA in Brazil. The lecture was also participated by Her Excellency Mrs. Débora Vainer Barenboim, Ambassador of the Federative Republic of Brazil and Mrs. Carolina Fonseca.

In the lecture Dr. Miguel Borges, Head of genetic resource and biotechnology on the Institute EMBRAPA and an internationally well known researcher in this field, presented the Institute EMBRAPA, which is with its more than 8000 researchers, the largest agricultural institute in the world. With its activity is present not only in Brazil but throughout Latin America and in much of Africa. The Institute Embrapa, and particularly the group led by Dr. Miguel Borges is very open for collaboration and offers many opportunities for contact. Department of Entomology of the National Institute of Biology cooperates with them for many years.

Her Excellency Mrs. Débora Vainer Barenboim, Ambassador of the Federative Republic of Brazil also highlighted the importance of ithe nstitute Embrapa in Brazil and abroad, and praised the cooperation of the National Institute of Biology with the Brazilian scientific institutions and expressed support for further activities of our institute in the field of bilateral cooperation project.

1.0
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Otvoritev razstave risb in slik študentke biologije Maje Marčič od Onevu Zemlje.
Opening of the exhibition of drawings and paintings by biology student Maja Marčič on the Earth Day.

Z leve: Prof. dr. Gregor Anderluh, prodekan Oddelka za biologijo BF, prof. dr. Tamara Lah Turnšek, direktorica NIB, slikarka Maja Marčič in umetnik Zmago Modic.
From the left: Prof. Dr. Gregor Anderluh, Vice Dean of the Department of Biology, Prof. Dr. Tamara Lah Turnšek, Director NIB, young artist Maja Marčič and artist Zmago Modic.

Dejavnost

Skupne službe so organizacijska enota, ki je zadolžena za izvajanje naslednjih funkcij in aktivnosti: finance in računovodstvo, kadrovske zadeve, nabave in javna naročila, administrativna podpora projektnemu vodenju, splošne zadeve, urejanje informacijskih in računalniških sistemov, administrativne zadeve za organe upravljanja in podobno.

V okviru Skupnih služb deluje tudi Biološka knjižnica, ki je v upravljanju tako Nacionalnega inštituta za biologijo kot tudi Oddelka za biologijo Biotehniške fakultete Univerze v Ljubljani.

Z leve: Prof. dr. Jana Žel, vodja GSO skupine, prof. dr. Tamara Lah Turnšek, direktorica NIB in gostujoča raziskovalka dr. Gurinder Jit Randhawa iz National Research Centre on DNA Fingerprinting, National Bureau of Plant Genetic Resources, New Delhi, India.
From the left: Prof. Dr. Jana Žel, Head of GMO group, Prof. Dr. Tamara Lah Turnšek, Director NIB and visiting researcher Dr. Gurinder Jit Randhawa from the National Research Centre on DNA Fingerprinting, National Bureau of Plant Genetic Resources, New Delhi, India.

Dan odprtih vrat NIB - Obisk Oddelka za entomologijo, 5.10.2011
Open day on NIB - Visit of the Department of Entomology, 5.10.2011

Dan odprtih vrat NIB - Obisk Oddelka za biotehnologijo in sistemsko biologijo, 5.10.2011.
Open day on NIB - Visit of the Department of Biotechnology and Systems Biology, 5.10.2011.

Tiskovna konferenca ob izidu knjige »Kako zanesljivo določamo GSO?«, 9.12.2011.
Press conference on new book »How to reliably test for GMOs?«, 9.12.2011.

Activities

The Corporate Services are the organisational unit in charge of providing support to research organisational units. Their main activities are finance and accounting, human resources, procurement, administration support for project management, general affairs, management of IT and computer systems, administrative affairs for management bodies and similar duties.

The Biology Library is also part of the Corporate Services and is managed jointly by the National Institute of Biology and the Biology Department of the Biotechnical Faculty University of Ljubljana.

2.0

Oddelek Morska biološka postaja Piran – MBP
Department Marine Biology Station Piran - MBS

0105-001

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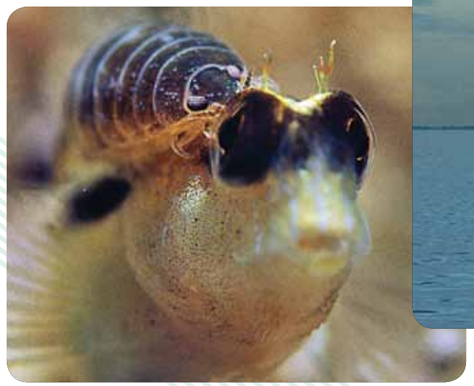
* delovno razmerje prenehalo v letu 2011 / employment ended in 2011

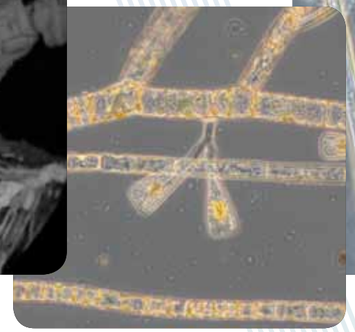


Ribja uš na črnoboki babici
Fish lice on a longstriped blenny

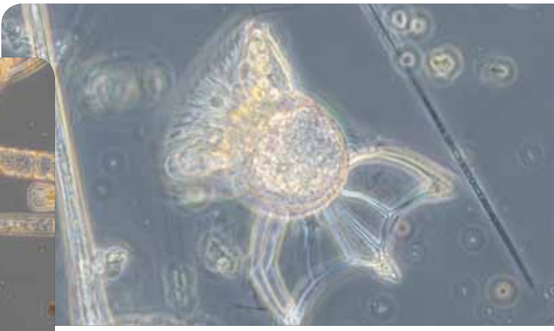
Oceanografska boja Vida
Oceanographic buoy Vida

Polipi uhatega klobučnjaka (*Aurelia aurita*)
Moon jellyfish polyps (*Aurelia aurita*)

Kristal solnega cveta (vrstični elektronski mikroskop, SEM)
Salt flower crystal (scanning electron microscope, SEM)



Nitasta rjava alga z epifitsko kremensko algo
Filamentous algae with epiphytic diatom



Oklepni bičkar *Ornithocercus magnificus*
Dinoflagellate *Ornithocercus magnificus*

Raziskovalna dejavnost

Morska biološka postaja (MBP) je kot osrednja enota za te vsebine v slovenskem prostoru v 2011 nadaljevala s temeljnimi in uporabnimi multidisciplinarnimi raziskavami polzaprtih in priobalnih morskih sistemov. Raziskave so vključevale analize značilnosti mikrobnih združb, primarne produkcije in planktona, bentoških združb in habitatnih tipov, genomike izbranih organizmov, fotokemičnih procesov ter biokemijskih procesov kroženja ogljika, študije populacijske dinamike meduz ter cirkulacije obalnih morij. V 2011 smo pričeli z delom na dveh novih evropskih projektih ter na nacionalnem aplikativnem projektu. Nadaljevali smo z raziskavami ter razvojem metod za izvajanje bodočega monitoringa v skladu z evropsko zakonodajo ter z izvajanjem nacionalnega monitoringa. Neprekinjeno so potekale meritve meteoroloških, oceanografskih in bioloških parametrov (morski opazovalni sistem), dopolnjena z opazovanji in numeričnimi simulacijami oceanografskih razmer v Koprskem zalivu.

Raziskovalni program P1-0237 »Raziskave obalnega morja«

L. 2011 smo nadaljevali z intenzivnim terenskim delom na morju, predvsem v Tržaškem zalivu, v manjši meri pa tudi južnem Jadranu. Ob oceanografski boji, kjer nam senzorji na boji zagotavljajo kontinuirano spremljanje tokov in nekaterih oceanografskih in meteoroloških parametrov, redno, dvakrat mesečno, analiziramo značilnosti planktona (avtotrofni in heterotrofni mikrobni plankton, mikro- in mezozooplankton); poleg tega smo v 24-urnem ciklusu ugotavljali spremenljivost izbranih planktonskih parametrov.

V letu 2011 smo zaključili dvoletni ciklus meritev fotosinteznih lastnosti fitoplanktona in primarne produkcije ter raziskavo sezonske dinamike bakterijske združbe in dominantnih filogenetskih skupin. Ob oceanografski boji smo v sodelovanju z Univerzo na Dunaju izvedli in situ poskuse z bentoškimi komorami, katerih cilj so bile raziskave odziva bentoških organizmov na nizke koncentracije kisika. V 24-urnem ciklusu smo analizirali oceanografske značilnosti Koprskega zaliva in opravili meritve tokov z gibajočim plovilom. V Luki Koper so mesečno potekale meritve in analiza populacijske dinamike polipov uhatega klobučnjaka.

Nadaljevalo se je terensko delo za opredelitev bentoških habitatnih tipov z uporabo potapljaških opazovalnih metod, razvili smo novo nedestruktivno metodo za oceno stanja cirkalitorala z uporabo posebnih sani in video kamere. Nadaljevali smo tudi raziskave prostorske porazdelitve in vsebnosti izbranih onesnažil v morju. Zaključili smo meritve in vzorčenja v kristalizacijskih bazenih Sečoveljskih solin in opredelili biološke in kemične sestavine solinskega blata in petole.

Nadaljevali smo z laboratorijskimi ter *in situ* poskusi za opredelitev eko-fizioloških značilnosti fitoplanktona, za oceno vplivov organske snovi odmrlih meduz na mikrobno združbo ter za razjasnitev vplivov pogojev okolja in vrst hrane na polipe uhatega klobučnjaka. Razvili smo novo metodo

Research Activity

In 2011 the Marine biology Station (MBP) continued with basic and applied multidisciplinary research of semi-closed and coastal marine systems; MBP is a central research institution for these kinds of studies in Slovenia.

The studies that were carried out comprised: analysis of characteristics of microbial communities, primary production and plankton, benthic communities and habitats, genomics of selected organisms, photochemical processes as well as biochemical processes of a carbon cycle, studies on the population dynamics of jellyfish, and the circulation of the coastal sea.

In 2011 we started working on two new European Union research projects, and on one national Slovene applied science project. We have continued with research and with developing methods for performing the future monitoring in accordance with the European legislation and with the Slovenian national monitoring program.

On a continuous basis, we carried out the observations of meteorological, oceanographical, and biological parameters (marine observing system), supplemented with observations and numerical simulations of the oceanographic conditions in the Koper Bay.

Research Programme P1-0237 »Coastal Marine Research«

In 2011 we have continued with our intense field work on the sea, mostly in the Trieste Bay, and to a lesser degree in the South Adriatic Sea. At the oceanographic buoy that is equipped with sensors which assure continuous monitoring of currents as well as some other oceanographic and meteorological parameters we analyse on the regular basis (two times a month) the properties of plankton (autotrophic and heterotrophic microbial plankton, and micro- and zooplankton); besides these analyses we also performed a 24-hour cycle estimate of the variability of the specific plankton parameters.

In 2011 we have completed a two year cycle of measurements of the photosynthetic properties of phytoplankton and the primary production, and the study of seasonal dynamics of the bacterial communities and their predominant phylogenetic groups. In collaboration with the Vienna University we have performed *in situ* studies using benthic chambers with the objective of studying the response of benthic organisms to the low oxygen concentrations. In a 24 hour cycle we have analysed the oceanographic properties in the Koper Bay, and have performed the measurements of the currents from a moving ship. In Koper harbour we have carried out measurements and analyses of the polyp population dynamics of a moon jellyfish.

Spuščanje kamere na "podvodnih sanehh"
Video camera mounted on underwater skis

Sortiranje zbranega materiala
Sorting the collected material

Pavja babica (*Salaria pavo*)
Peacock blenny (*Salaria pavo*)

barvanja harpaktikoidnih kopepodov, ki obarva le žive organizme. Na naravnih vzorcih fitoplanktona in izoliranih celicah treh potencialno toksičnih vrst roda *Dinophysis,* so bile v sodelovanje z Veterinarsko fakulteto v okviru CRP projekta (01V41085) opravljene prve analize lipofilnih toksinov z LC-MS metodo.

Eksperimentalno terensko in laboratorijsko delo smo nadgrajevali z modeliranjem. Začeli smo razvijati metode podatkovnega rudarjenja, prilagojene prostorskim in časovnim značilnostim oceanografskih podatkov. Osredotočili smo se na Lagrangejevo sledenje namišljenih delcev v hitrostnih poljih, ki so rezultat oceanografskih meritev ter numeričnega modeliranja. S pomočjo povezovalnih pravil smo konstruirali več--nivojske usmerjene grafe z različno gradacijo v prostoru in času.

Analizirali smo sezonska nihanja mikrobne združbe in na osnovi denaturacijske gradientne gelske elektroforeze in 16S rRNA klonskih knjižnic razvrstili bakterijske združbe v 'zimsko' in 'poletno' skupino.

Testirali smo hipotezo ali imata meroplanktonski vrsti *Aurelia aurita* in *Rhizostoma pulmo* enak filogeografski vzorec v evropskih morjih. Z analizo mrež haplotipov smo dokazali, da se vrsti razlikujeta v filogeografskih vzorcih in da med nekaterimi kriptičnimi vrstami uhatega klobučnjaka ni genskega pretoka (*Aurelia* sp. 8 in *Aurelia* sp. 5 iz Jadranskega morja ter med populacijami v Baltiku, Severnem in Črnem morju). Za *R. pulmo* nismo našli signala, ki bi nakazoval genetsko strukturiranost populacij v Sredozemskem morju.

Nadaljevali smo s pripravo, aplikacijo in testiranjem metodologij za oceno ekološkega in okoljskega stanja s poudarkom na zahtevah evropskih direktiv (Vodne direktive in Okvirne direktive o morski strategiji). Nadaljevali smo z razvojem indeksa za oceno stanja habitatnih tipov v mediolitoralu in infralitoralu, ki temelji na analizi treh ekoloških dejavnikov in sicer: vegetacijske odeje, prostorske heterogenosti in gostote obrežnih rib ustnač.

Ovrednotili smo stanje obrežne ribje združbe in uporabili ustnače kot indikatorske vrste, ker so z obrežno vegetacijo povezane na več nivojih (prehranjevalni, gnezditveni in bivalni aspekt). Nadgradili smo indeks za oceno stanja morskih travnikov kolenčaste cimodoceje v obalnem pasu ter indeks za oceno hidromorfološke spremenjenosti kamnitega obalnega pasu.

Glavni dosežki v letu 2011

V letu 2011 smo zaključili obsežno analizo časovnih serij biomas in sestave fitoplanktona in zooplanktona ter pomembnejših podpornih fizikalno-kemičnih parametrov. Usmerili smo se v prepoznavanje velikih sprememb v zadnjih dveh desetletjih (1989-2009), ki jih v primeru statistične značilnosti zaznavamo kot spremembo režima v ekosistemu ('regime shift'). Taka sprememba je bila v Tržaškem zalivu opažena v obdobju 2002/2003 na več nivojih: na abiotskih dejavnikih ekosistema in v pelaški združbi.

We have continued our field work focused on the determination of the benthic habitat types, using diving observation techniques; we have developed a new non-destructive method for the assessment of the circalittoral zone using a specially adapted sled carrying a video recorder. We have also continued with the research of the spatial distribution and content of selected pollutant in the sea. We have completed the measurements and sampling in the salt crystallization basins in Sečovlje salt pans, and have determined the biological and chemical components of the salt pan mud and the petola.

We have continued with laboratory and *in situ* experiments for determination of the eco-physiological properties of plankton, for assessment of the impact of organic matter from dead jellyfish on the microbial community, and for clarification of the impact of environmental conditions and food types on the common jellyfish polyps. We have developed a new method for staining the *harpacticoid copepods* which enables a selective staining of living organisms only. In collaboration with the Veterinary Faculty of the University of Ljubljana in frame of a joint CRP research project (01V41085), and using the LC-MS method, we have carried out the first analysis of the lipophilic toxins from natural samples of phytoplankton, and from the isolated cells of three potentially toxic species from the genus *Dinophysis*.

The experimental work has been complemented with the modelling. We have started developing the methods for data mining that are adapted to the spatial and temporal characteristics of the oceanographic data. We have focused on the virtual Lagrangian particles tracking in the velocity fields that are the result of real oceanographic measurements and the numerical modelling. Using the connection rules we have constructed multi-level computational grids with different temporal and spatial gradation.

We have analyzed the seasonal fluctuations in microbial communities, and have grouped the bacterial associations into »winter« and »summer« group, based on denaturing gradient gel electrophoresis that can rapidly display the bacterial diversity contained in 16S rDNA clone libraries.

We have tested the hypothesis of weather the two meroplanktonic species *Aurelia aurita* in *Rhizostoma pulmo* have same phylogeographic patterns in the European seas. Using the haplotypes network method we have proved that the two species distinguish themselves in their phylogeographic patterns, and that there is no gene flow among some cryptic species of the common jellyfish (*Aurelia* sp. 8, and *Aurelia* sp. 5 from the Adriatic Sea, and among the populations in the Baltic Sea, North Sea, and the Black Sea). No genetic structure was detected in *R. pulmo* over the Mediterranean Sea.

We have continued with preparation, application, and testing of the methodologies for assessment of the ecological and environmental status as required by the European directives (EU Water Framework Directive, and the Marine Strategy Framework Directive). We have continued developing the index for status assessment of habitat types in the mediolittoral and infralittoral that is based on the analysis of three ecological factors as follows: vegetation cover, spatial heterogeneity, and coastal blennioid fish.

We have estimated the status of the coastal fish association, and we have used the blennioid fish species as indicator species because they are linked with the coastal vegetation at multiple levels (food, nesting, and inhabiting aspects). We have upgraded the index for assessment of the status of the little Neptune sea grass beds in the shore area, as well as the index of assessment of hydromorphological alteration of the rocky shore area.

Important Achievements in 2011

In 2011 we have completed an extensive analysis of the temporal series of biomass and the compositions of phytoplankton and zooplankton, as well as the most important physical and chemical parameters. We have focused on the identification of big changes in the last two decades (1989-2009) that in case of statistical significance we can detect as a regime shift in the ecosystem. Such shift has been observed in the Trieste Bay in the period of 2002/2003 at multiple levels: in the abiotic factors of the ecosystem, and in the pelagic associations.

The changes in the water regimes of the tributaries that flow into the Trieste Bay (the most important being the river Soča) have lead to the decreased concentrations of nutrient salts and consequently to the decrease in the phytoplankton biomass due to the changed ratios among the main groups of the phytoplankton and due to the decreased diatom algae bloom; in the latest period of time, also the mesozooplankton biomass had decreased significantly. These results have been reported at two international conferences, and a scientific publication has been prepared that was accepted in print and published in the year 2012.

Spremembe v vodnem režimu pritokov v Tržaški zaliv (najpomembnejši je reka Soča) so vodile do upada koncentracij hranilnih soli ter posledično do zmanjšanja fitoplanktonske biomase zaradi spremenjenih razmerij glavnih skupin fitoplanktona in upada diatomejskih cvetenj, v zadnjem obdobju je značilno upadla tudi mesozooplanktonska biomasa. Rezultate smo predstavili na dveh mednarodnih konferencah in pripravili članek, ki je bil sprejet v tisk ter natisnjen v letu 2012.

Aplikativni dosežki

OPREDELITEV OKOLJSKEGA STANJA MORJA IN ANALIZA PREVLADUJOČIH PRITISKOV IN VPLIVOV V SKLADU Z OKVIRNO DIREKTIVO O MORSKI STRATEGIJI

V projektni nalogi smo pripravili strokovne podlage za začetno presojo okoljskega stanja morja z elementi iz Tabel 1 in 2 Priloge III Okvirne direktive o morski strategiji (Člen 8). Vse države članice morajo o tem poročati v letu 2012. Znanstveno delo smo zato povezali s potrebami implementacije te pomembne direktive. Za oceno stanja morja smo testirali metode, ki so bile predlagane na nivoju Sredozemlja, nadgradili smo tiste, ki se niso izkazale za primerne za naše okolje ter nadaljevali z razvojem metod za tiste biološke elemente, kjer ni bilo do sedaj še nič razvitega.

Nadgradili smo tudi indeks za oceno stanja travnikov kolenčaste cimodoceje (Cymodocea nodosa) ter indeks za oceno hidromorfološke spremenjenosti kamnitega obalnega pasu. Razvili smo video-metodo s posebnimi sanmi, ki bo omogočila spremljanje habitatnih tipov v cirkalitoralu, kjer smo našli pet novih vrst alg za slovensko morje (*Hydrolithon boreale, Lithothamnion minervae, L. philippii, L. sonderi in Neogoniolithon brassica-florida*). Pri raziskavah ihtiofavne smo nadaljevali s proučevanjem redkih in ogroženih funkcionalnih skupin, kot so hrustančnice, pozornost smo namenili tudi albinizmu pri skatih.

Z rezultati naloge smo prispevali k razumevanju procesov in sprememb v slovenskem morju, kar je zelo pomembno za predvidevanje negativnih posledic in za pravočasno ukrepanje.

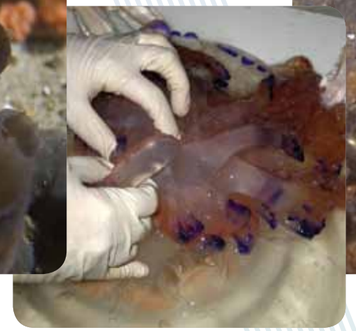
Sodelovanje z različnimi uporabniki

V 2011 smo sodelovali z Ministrstvom za okolje in prostor, Ministrstvom za kmetijstvo, gozdarstvo in prehrano ter Inštitutom za vode, ki so uporabniki naših raziskav na področju biodiverzitete, zagotavljanja kakovosti morske hrane in določanja ekološkega stanja vodnih teles slovenskega morja. Redno teče tudi sodelovanje z Agencijo RS za okolje na področju spremljanja kakovosti morja, vnosov onesnaženja s kopnega in obdelave podatkov z oceanografske boje VIDA. Nadaljevali smo sodelovanje z Nacionalno komisijo za UNESCO na področju opazovalnih sistemov ter prenosu znanosti v izobraževanje ter z Javnim podjetjem Okolje d.o.o. Piran pri monitoringu izpusta prečiščenih odplak v morje. Vzpostavili smo sodelovanje z upravljalcem solin v Sečovljah, sodelovali smo z naravnim parkom Strunjan.

Raziskovalna infrastruktura

V 2011 smo nadaljevali z uporabo obstoječe raziskovalne infrastrukture za terensko delo, kamor sodita 11,5 m dolgo plovilo *Sagita* ter manjše, a okretnejše 7 metrsko plovilo *Karolina*. V 2011 smo izvedli nakup novega akustičnega merilnika tokov, ki je enostavno in inventivno pritrjen na plovilo *Sagita* ter meri tokove med gibanjem plovila. Z njim smo tudi izvedli prve 24-urne meritve v Koprskem zalivu. Na oceanografski boji *Vida* smo izpopolnili meritve koncentracije kisika in odpravili težave obrasti z bentoškimi algami, sicer pa smo uporabljali neprekinjene meritve oceanografskih, meteoroloških in ekoloških parametrov. Uporabili smo sistem za meritve različnih parametrov v morskem sedimentu. V biološkem, mikrobiološkem, molekularno biološkem in kemijskem laboratoriju skupina razpolaga s potrebno opremo, v l. 2011 smo pridobili nov HPLC (tekočinski kromatograf z visoko ločljivostjo) instrument za določevanje pigmentov fitoplanktona.

Rakovica na plaščarju
Crab on a tunicate



Vzorčenje morskega klobuka (*Rhisostoma pulmo*)
Sampling a barrel jellyfish (*Rhisostoma pulmo*)

Fotografiranje je neinvazivna metoda popisovanja
Photography is a noninvasive describing method

Application Accomplishments

DETERMINATION OF THE ENVIRONMENTAL STATUS OF THE SEA AND THE ANALYSIS OF THE PREVAILING PRESSURES AND IMPACTS, ACCORDING TO THE MARINE STRATEGY FRAMEWORK DIRECTIVE.

In frame of project tasks we have prepared expert basis for the initial estimation of the environmental status of the sea with the elements in Tables 1 and 2 of the Appendix III of the Marine Strategy Framework Directive (Article 8). All member states must issue a report about the environmental status of the sea in the year 2012. Therefore, we have adapted our scientific work in order to meet the requirements for the implementation of this directive. For the estimation of the status of the sea we have tested the methods that were suggested at the Mediterranean level, and we have upgraded those that proved to be suitable for our specific environment; we have continued developing the methods for the biological elements that did not have any developed methods available.

We have upgraded the index for assessment of the status of the little Neptune sea grass (*Cymodocea nodosa*) beds in the shore area, as well as the index of assessment of hydromorphological alteration of the rocky shore area. We have developed a video method using a specially adapted sled carrying a video recorder for the observation of the habitat types in the circa littoral where we discovered five algae species that are new findings in the Slovenian sea (*Hydrolithon boreale, Lithothamnion minervae, L. philippii, L. sonderi in Neogoniolithon brassica-florida*). We have continued with the studies of ichtyofauna by studying rare and endangered functional groups such as cartilaginous fish; we have focused our attention to phenomena such as the albinism in rays.

The results of our studies contributed to the understanding of processes and changes in the Slovenian sea, which are both important for predicting the negative consequences and for taking actions in a timely fashion.

Collaboration with Various Users

In 2011 we have collaborated with the Ministry of Environment and Spatial Planning, Ministry of Agriculture, Forestry and Food and with the Institute for Water of the Republic of Slovenia, who are all employing our research studies in the areas of biodiversity, assurance of seafood quality, and determination of the ecological status of the water bodies of the Slovenian sea. On the regular basis we also collaborate with the Environment Agency of the Republic of Slovenia in the areas of monitoring the quality of the sea, land-based pollution, and the data analysis from the oceanographic buoy VIDA. We have continued our collaboration with the Slovenian National Commission for UNESCO in the areas of observational systems and the transfer of science into education, and with the Public Enterprise Okolje d.o.o. Piran with the monitoring of sea quality near the treated sewage outfall. We have established collaboration with the management of

Dan odprtih vrat MBP: vzorčevalna rozeta
Open day on MBS: sampling rosette

Klobučnjaška meduza mesečinka (*Pelagia noctiluca*)
Scyphomedusa mauve stinger (*Pelagia noctiluca*)

Mednarodno sodelovanje

Skupina ima zelo aktivno in razvejano mednarodno sodelovanje. L. 2011 so raziskovalci programske skupine sodelovali pri izvajanju petih projektov okvirnih programov EU, sodelovali smo pri projektu COST. Poleg tega sta bila l. 2011 pridobljena še dva nova projekta 7. okvirnega programa EU, ki se začenjata v l. 2012. Mednarodno sodelovanje vključuje tudi program Agencije ZN za okolje (UNEP MAP – Sredozemski akcijski načrt), International Ocean Institute in sodelovanje pri CIESM (Sredozemski komisiji za znanstveno raziskovanje morja). Sodelovali smo tudi v šestih bilateralnih projektih (Brazilija, Črna Gora, Francija, Hrvaška, Rusija) ter projektu NSF-NCEAS ZDA. Raziskovalka programske skupine pa je sodelovala na transatlantski ekspediciji španskega ministrstva za znanost Malaspina.

Tematike mednarodnega sodelovanja so pestre in vključujejo morske opazovalne sisteme, želatinozni plankton, razvoj senzorjev za detekcijo onesnaženja in onesnaženje morja z odpadki. L. 2011 je potekala tudi mednarodna analiza koraligenih formacij v severnem Jadranu, ki je bila predstavljena na konferenci EMBS 46, v Rovinju, septembra 2011. Veliko je tudi sodelovanja posameznih raziskovalcev s kolegi v tujini, kar se odraža v skupnih objavah.

Raziskovalci programske skupine so aktivni člani v različnih mednarodnih in nacionalnih (vladnih in/ali strokovnih) telesih, imeli so vabljena predavanja doma in v tujini.

Izobraževalne dejavnosti in promocija znanosti

V letu 2011 so štirje kandidati z uspešnim zagovorom disertacije zaključili doktorski študij pod mentorstvom članov programske skupine. Člani programske skupine so bili tudi mentorji/člani komisij kandidatom iz tujine (Irska in ZDA - doktorandoma, nizozemskemu in italijanskim magistrskim študentom); uspešno je bilo zaključenih tudi sedem diplomskih del na slovenskih univerzah.

Ob Svetovnem dnevu oceanov je MBP organizirala dan odprtih vrat in uspešno predstavila svojo dejavnost skozi paleto delavnic za osnovno - in srednješolce ter ostale zainteresirane obiskovalce. Prijavljeni so se lahko udeležili dveh delavnic od šestih organiziranih: Življenje pod mikroskopom, Raznovrstnost morskih organizmov, Priprava na potop, Delo na raziskovalnem plovilu, Zanimiva kemija in Fotografska delavnica. Na delavnicah in predavanju je bilo okoli 170 udeležencev, največ otrok in mladine v starosti od 6. do 17. leta. Kreativni pristop s soudeležbo obiskovalcev je sodobna in aktivna oblika približevanja vsebin znanstvenega raziskovanja predvsem mladi - šolski populaciji - katera si tako lažje oblikuje svoje bodoče študijske in poklicne usmeritve. Med obiskom smo snemali dogajanje, ki je predstavljeno v kratkem filmu »Otroci na

Sečovlje salt pans, and have collaborated with the Nature Park Strunjan.

Research Infrastructure

In 2011 we have continued using the existing research infrastructure for our field work; this infrastructure comprises 11,5 m long research vessel Sagita and a smaller and more agile 7 meter long research vessel Karolina. In 2011 we have purchased a new acoustic sea current measuring device that is attached in a simple and inventive way to the ship Sagita in order to measure the sea currents while the ship is moving.

International Collaboration

The research group has established a very active and widespread network of the international collaboration. In 2011 the researchers of the program group have been active in carrying out five research projects within the European framework programs, and have participated in a COST project. Additionally, we have been granted two new projects within the EU 7th Framework Program that will start in 2012. International collaboration also includes the program of the United Nations Environment programme (UNEP MAP – Mediterranean action plan), International Ocean Institute, and collaboration within CIESM (Mediterranean Science Commission for scientific marine research). We have also participated in six bilateral joint research projects (with Brazil, Croatia, France, Monte Negro, and Russia), and in the NSF-NCEAS project of the United States of America. Our female research staff member has participated at the transatlantic expedition Malaspina that was organized by the Spanish Ministry of Science and Innovation.

The themes of the international collaborations are diverse and include marine observation systems, gelatinous plankton, development of sensors for detecting pollution and the pollution of the sea by littering. In 2011 an international analysis was conducted on the coraligenic formations in the Northern Adriatic Sea that was presented at the EMBS46 conference in Rovinj in September 2011. There were numerous other forms of collaboration carried out by the researchers of our program group with their colleagues abroad which is well reflected in joint scientific publications.

The researchers of our program group are active members in various international and national (governmental and/or professional) bodies; they have conducted numerous invited lectures at home as well as abroad.

Educational Activities and the Promotion of Science

In 2011 four doctoral candidates have successfully defended their research theses as results of the completion of their doctoral degree studies under the supervision of the members of our program group. The members of the program group also mentored several postgraduate students abroad or have served as members on their research thesis committees (two doctoral candidates from Ireland and USA, respectively; master's degree candidate from the Netherlands and several others from Italy); additionally, seven bachelor degree students have completed their research theses that were supervised by our program group members, and the candidates have graduated from different Slovenian universities in 2011.

To commemorate World Oceans Day, MBP organized an open door day at the MBP station and has successfully presented its activities through a number of workshops adapted for primary and secondary school children as well as for other interested visitors of all ages. The visitors could sign up for two out of total six available workshops: Life under the microscope; Diversity of marine organisms; Preparation for diving; Work on the marine research vessel; Interesting chemistry; and Photography workshop. Approximately 170 visitors, mostly school children of ages between six and seventeen, attended the lectures and workshops. A creative approach with the engagement of visitors is a contemporary and interactive manner of bringing the contents of the scientific research closer to the general public, especially to the young population still in school, because it informs and facilitates the process of their future educational and professional choices.

During the occasion we have recorded the events and have compiled them in a short film »Children at the Marine Biology Station Piran«. The visitors kept coming throughout the year: altogether in 2011 we had 663 visitors; 30 were pre-school children, 416 elementary school children, 130 students from abroad, and 55 adult visitors. Also commemorating the World Oceans Day we have organized a public lecture by Valentina Turk, Mikro morje (Micro Sea) in The House of Experiments in Ljubljana.

Morski biološki postaji Piran«. Prav tako so se vrstili obiski med letom: v letu 2011 nas je obiskalo 663 oseb, od tega 30 predšolskih otrok, 416 osnovnošolcev, 32 srednješolcev, 130 tujih študentov in 55 odraslih oseb. Poleg tega je bilo ob Svetovnem dnevu oceanov organizirano poljudno predavanje Mikromorje v Hiši eksperimentov v Ljubljani.

Lanskoletna tema ob Svetovnem dnevu oceanov je zaobsežena v geslu '*Mladi-novi val sprememb*'. Za to priložnost so sodelavci *Morske biološke postaje Piran* pripravili kratek film z naslovom **»Med morjem in kopnim«.** Film je bil postavljen na ogled ob svetovnem dnevu oceanov - v sredo, 8. junija 2011 - na internetne strani Vimeo in Youtube. Poslanstvo vključenih naravoslovnih ustvarjalcev je ozaveščanje najširše javnosti o čudesih, ki jih skriva naša mala Slovenija. V filmu je predstavljen naš obrežni – bibavični - pas med morjem in kopnim, ki je dostopen skoraj vsakemu otroku. Film je prejel Prometejevo nagrado za promocijo v znanosti. Na DVDju, ki nosi naslov **»Otrok in morje«** pa sta predstavljena oba filma (naklada 2200 DVD). Filma sta na ogled tudi na spletni strani Morske biološke postaje.

Najpomembnejše objave v letu 2011

KOMPETITIVNA ADSORPCIJA IN FOTORAZGRADNJA SALICILATA IN OKSALATA NA GETITU

Delo obravnava eno od možnih poti razgradnje organskih snovi v naravnem morskem okolju. Getit je prevladujoča oblika železovih mineralov v morskih sedimentih. Pod vplivom sončne svetlobe lahko v prisotnosti tega minerala nastajajo hidroksilni radikali, ki so med najpomembnejšimi znanimi oksidanti. Za ta proces je nujna prisotnost organskih ligandov, ki z adsorpcijo na površino getita omogočijo fotoredukcijo Fe ionov. V tem delu so predstavljeni rezultati adsorpcije in nadaljnje fotorazgradnje dveh v naravnem okolju prisotnih karboksilnih kislin na mineral getit. To je prva stopnja procesa, ki lahko vodi do razgradnje drugih organskih snovi, tudi onesnažil, v naravnih vodah.

RAZVOJ INDEKSOV ZA OCENO STANJA MORJA

V zadnjih letih je bilo razvitih več multimetričnih indeksov, ki kombinirajo tako diverzitetne indekse, kot tudi indekse na podlagi indikatorskih organizmov, s katerimi naj bi dobili boljši vpogled v odziv bentoških združb na gradiente obremenitev. Da bi razumeli vpliv različnih odzivov meril diverzitete na odziv multimetričnih indeksov, smo za več različnih mediteranskih ekosistemov z različno stopnjo vsebnosti organske snovi izračunali več različnih biotskih, tudi multimetričnih, indeksov. Pri diverzitetnih indeksih ni bilo enoznačnega odziva na vsebnost organske snovi, še posebej pri manjših vsebnostih, medtem ko smo med indeksi na podlagi indikatorskih organizmov in vsebnostjo organske snovi ugotovili precejšnjo korelacijo.

RAZLIKOVANJE TAKSONOMSKIH SKUPIN MORSKIH ALG Z UPORABO SPEKTROSKOPIJE ZAKASNJENE FLUORESCENCE

Predstavili smo metodo in situ spremljanja sprememb v sestavi fitoplanktonske združbe v morskem okolju. Metoda temelji na spektrih zakasnjene fluorescence, ki smo jih analizirali s programsko opremo CHEMTAX, katera se običajno uporablja za določevanje fitoplanktonske združbe na osnovi vsebnosti barvil določenih s HPLC analizo. Zakasnjena fluorescenca (DF) se lahko meri le v živih celicah in z zakasnjeno fluorescenco vzbujeni spektri so specifični za posamezne skupine fitoplanktona. Vzbujane spektre zakasnjene fluorescence (DFS) in s HPLC metodo določeno sestavo fitoplanktonskih barvil mešanic smo analizirali s programsko opremo CHEMTAX. Moč napovedovanja DFS-CHEMTAX metode je bila primerljiva s HPLC-CHEMTAX metodo.

Last year's theme of the World Oceans Day was depicted in a slogan 'The young - new wave of changes'. The members of the Marine Biology Station Piran have produced a short film for the occasion, titled »Between the land and the sea«. The film was available for viewing on a World Oceans Day, Wednesday, June 8 2011 at the internet site Vimeo on YouTube. A mission conveyed by the participating producers of the film was the awareness of the broadest public of the wonders hidden in our small country Slovenia. The film shows our coastal - tidal - area between the land and the sea that is accessible to almost every child. The film was awarded a Prometheus award for the promotion of science. We have issued and distributed a volume of 2200 DVDs titled »The child and the sea« that contain both films. The films can also be viewed through the Marine Biology Station website.

Main Publications in 2011

COMPETITIVE ADSORPTION AND PHOTODEGRADATION OF SALICYLATE AND OXALATE ON GOETHITE

The work targets one of the possible degradation pathways of organic compounds in the natural marine environment. Goethite is the prevailing species of iron minerals in marine sediments. The hydroxyl radicals, one of the most efficient oxydizing agents, are formed in the presence of this mineral under the influence of solar light. The presence of organic ligands, which enable the photoreduction of iron ions after the adsorption on the goethite surface, is necessary for this process. Results of the absorption on goethite and subsequent photodegradation of two naturally occurring carboxylic acids are presented in this work. This is the first step of a process, which can lead to the degradation of other organic compounds, including pollutants, in the natural waters.

RESPONSE OF DIFFERENT BIOTIC INDICES TO GRADIENTS OF ORGANIC ENRICHMENT IN MEDITERRANEAN COASTAL WATERS

In last few years various multimetric indexes that combine diversity indexes as well as indexes that are based on indicator organisms were developed to get an insight into how benthic communities react to the disturbance gradients. In order to understand the impact of various diversity measurements on the response of the multimetric indexes, we have calculated a number of different biotic as well as multimetric indexes for a set of different Mediterranean ecosystems with different ranges of the organic matter contents. While only equivocal response on the content of the organic matter was obtained when using diversity indexes, especially in case of small contents, a significant correlation was noted between the indexes based on the indicator organisms and the content of the organic matter.

DIFFERENTIATION AMONG TAXONOMIC GROUPS OF MARINE ALGAE USING DELAYED FLUORESCENCE SPECTROSCOPY

We have presented an *in situ* method for monitoring the changes in the composition of the phytoplankton association in the marine environment. The method is based on the delayed fluorescence spectra analysed using CHEMTAX software that is used for determining the phytoplankton communities based on their pigment contents measured by HPLC. The advantages of the Delayed fluorescence (DF) are that it can be measured only in living cells, and the spectra induced by a delayed fluorescence are specific for the individual groups of phytoplankton. Using CHEMTAX software we have analysed induced delayed fluorescence spectra (DFS), and also the HPLC data on the composition of the phytoplankton pigment mixtures. The power of prediction in case of DFS-CHEMTAX method was comparable to the HPLC-CHEMTAX method.

RAZISKOVALNI PROGRAM, KI GA FINANCIRA JAVNA AGENCIJA ZA RAZISKOVALNO DEJAVNOST REPUBLIKE SLOVENIJE
RESEARCH PROGRAM FINANCED BY SLOVENIAN RESEARCH AGENCY

- Raziskave obalnega morja / *Coastal marine research* (P1-0237), vodja programa / *the research programme leader* prof. dr. Alenka Malej.
- Kroženje snovi v okolju, snovna bilanca in modeliranje okoljskih procesov ter ocena tveganja / *Cycling of substances in the environment, mass balances, modelling of environmental processes and risks assessment* (P1-0143), vodja programa / *the research programme leader* prof. dr. Milena Horvat.

RAZISKOVALNI PROJEKTI, KI JIH FINANCIRA JAVNA AGENCIJA ZA RAZISKOVALNO DEJAVNOST REPUBLIKE SLOVENIJE
RESEARCH PROJECTS FINANCED BY SLOVENIAN RESEARCH AGENCY

- Povezave med organsko snovjo in kovinami, s posebnim poudarkom na Hg, v obalnem morju (Tržaški zaliv) / Organic matter - metal interactions, with special reference to Hg, in coastal waters (Gulf of Trieste, northern Adriatic Sea) (J1-2136), nosilec projekta/*principal investigator* prof. dr. Jadran Faganeli.
- Vpliv cirkulacije v široko odprtih zalivih in pomorskega prometa na transport sedimenta / *Influence of circulation and maritime traffic on sediment transport in wide open bays* (L2-4147), nosilec projekta/*principal investigator* prof. dr. Vlado Malačič.
- Geni, ki pogojujejo aromatiko vina / *Genes behind aroma compounds in wine* – (J4-4300) nosilec projekta/*principal investigator* prof. dr. Jure Piškur.

MEDNARODNI RAZISKOVALNI PROJEKTI
INTERNATIONAL RESEARCH PROJECTS

- Southern European Seas: Assessing and Modelling Ecosystem changes (SESAME,EU FP6, 2007-2011), nosilka projekta/*principal investigator* prof. dr. Alenka Malej.
- A Pan-European infrastructure for ocean and marine data management (SeaDataNet, EU FP6, 2007-2011) nosilec projekta / *principal investigator* prof. dr. Vlado Malačič.
- Development and Pre-operational Validation of Upgraded Gmes Marine Core Services and Capabilities (MyOcean, EU FP7, 2008-2012) nosilec projekta / *principal investigator* prof. dr. Vlado Malačič
- Rationally Designed Aquatic Receptors integrated in label-free biosensors platforms for remote surveillance of toxins and pollutants (RADAR, EU FP7, 2011-2013) nosilka projekta / *principal investigator* prof. dr. Valentina Turk.
- Marine debris removal and preventing further litter entry (MarineClean, EU CIP Eco-Innovation, 2011-2013) nosilka projekta / *principal investigator* dr. Janja Francé.
- Low dissolved oxygen events in the Northern Adriatic: *in situ* experimental insights into benthic responses before, during and post-anoxia, (The Austrian Science Fund P21542-B17, 2011-2013) nosilka / principal investigator dr. Mateja Grego

BILATERALNI RAZISKOVALNI PROJEKTI
BILATERAL RESEARCH PROJECTS

- BI-US/11-12-044: Dejavniki kontrole mikrobnih in biogeokemijskih pretvorb živega srebra v porečju Soče in Tržaškem zalivu / Factors controling microbial tranformations and biogeochemistry of mercury in the Soca River System and the Gulf of Trieste (northern Adriatric) (slovensko-ameriško sodelovanje), nosilec projekta / *principal investigator* prof. dr. Jadran Faganeli.
- BI-ME/10-11-7: Dinamika vodnih mas v severnem in južnem Jadranu in razširjanje onesnažil ter odziv biomarkerjev / Dynamics of Northern and Southern Adriatic Sea in relation to pollutants spreading and response of biomarkers *(slovensko-črnogorsko sodelovanje),* nosilec projekta / *principal investigator* prof. dr. Vlado Malačič.
- BI-BR/10-12-005: Biofizikalni modeli in filogeografija ključnih vrst meduz (Cnidaria) v obalnih območjih Slovenije in Brazilije / Biophysical models and phylogeography of medusozoan (Cnidaria) keystone species in the shelf system of Slovenia and Brasil (slovensko-brazilsko sodelovanje), nosilka projekta / *principal investigator* prof. dr. Alenka Malej.
- BI-HR/10-11-022: Planktonska trofična dinamika v obalnih vodah severnega in južnega Jadrana: primerjalna študija / Comparative research of plankton trophic dynamics of coastal waters of the northern and southern Adriatic (slovensko-hrvaško sodelovanje) **,** nosilka projekta / *principal investigator* prof. dr. Alenka Malej.
- BI-FR/10-11-PROTEUS-016: Trofične interakcije in povezanost populacij želatinoznega planktona / Trophic interactions and connectivity of gelatinous plankton (slovensko-francosko sodelovanje) nosilka projekta / *principal investigator* prof. dr. Alenka Malej.
- BI_RU/10-11-014: Škodljiva cvetenja želatinoznih organizmov v severnem Jadranu in Črnem morju: verjetnost pojavljanja v povezavi s klimatskimi spremembami / Comparative analysis of gelatinous plankton outbreaksin the Adriatic and Black seas (slovensko-rusko sodelovanje), nosilka projekta / *principal investigator* prof. dr. Alenka Malej.

COST RAZISKOVALNI PROJEKTI
COST RESEARCH PROJECTS

- EMBOS COST Action ES1003 Development and implementation of pan-European Marine Biodiversity Observatory System, nosilka projekta/ *principal investigator* prof. dr. Alenka Malej.

CILJNI RAZISKOVALNI PROJEKTI
TARGER RESEARCH PROJECTS

- CRP Konkurenčnost Slovenije 2006-2013: Virusna in mikrobiološka kontaminacija školjk ter prisotnost morskih biotoksinov v školjkah / Viral and microbiological contamination of bivalves and presence of marine biotoxins in bivalves (V4-1085), pridruženi / *joint partners.*
- CRP Konkurenčnost Slovenije 2006-2013: Raziskovanje bioloških in ekoloških značilnosti ter sezonske dinamike nekaterih gospodarsko pomembnih vrst rib v Portoroškem ribolovnem rezervatu / Determining biological and ecological characteristics and seasonal dynamics of certain commercially important fish species in the Portorož Fisheries Reserve (V4-1071), pridruženi / *joint partners.*
- CRP Konkurenčnost Slovenije 2006-2013: Neobiota Slovenije: Invazivne tujerodne vrste v Sloveniji ter vpliv na ohranjanje biotske raznovrstnosti in trajnostno rabo virov / *Neobiota of Slovenia: Invasive alien species and their impact on biodiversity and sustainable use of resources in Slovenia* (V1-1089), pridruženi / joint partners.

RAZVOJNI PROJEKTI
DEVELOPMENT PROJECTS

- Načrt upravljanja z morskim okoljem. Opredelitev okoljskega stanja morja in analiza prevladujočih pritiskov in vplivov v skladu z Okvirno direktivo o morski strategiji (Marine Strategy Framework Directive). 2. FAZA v letu 2011.(Inštitut za vode RS). Nosilka: dr. Martina Orlando Bonaca
- Program opredelitve ekološkega stanja morja v skladu z Vodno direktivo (2006/60/ES) v letih 2011/2012 (Inštitut za vode RS). Nosilka: dr. Janja Francé
- Spremljanje ekološkega in kemijskega stanja morja (Agencija RS za okolje), nosilka doc. dr. Patricija Mozetič
- Spremljanje kakovosti vode za življenje morskih školjk in morskih polžev (Agencija RS za okolje), nosilka doc. dr. Patricija Mozetič
- Program spremljanja kakovosti morja in vnosov onesnaženja s kopnega v skladu z Barcelonsko konvencijo (Ministrstvo za okolje in prostor, Agencija RS za okolje), nosilka prof. dr. Valentina Turk
- Izvajanje monitoringa toksičnega fitoplanktona (Ministrstvo za kmetijstvo, gozdarstvo in prehrano, Veterinarska uprava RS), nosilka doc. dr. Patricija Mozetič

DRUGI RAZISKOVALNI PROJEKTI
OTHER RESEARCH PROJECTS

- Raziskave in izobraževanje o morju ter razvoj in operacionalizacija opazovalnega sistema (UNESCO – IOC), nosilka prof. dr. Alenka Malej

ORGANIZACIJA ZNANSTVENIH IN STROKOVNIH SREČANJ
ORGANIZATION OF SCIENTIFIC AND PROFESSIONAL MEETING

- *Circalittoral biocenoses and precoralligenous formations in Slovenia : [on] First Meeting on the coralligenous biocoenosis in the Northern Adriatic, MBS NIB, Piran, April 15th 2011*. LIPEJ, Lovrenc, ORLANDO-BONACA, Martina, MAVRIČ, Borut [COBISS.SI-ID 2370127]
- *2. kolokvij iz genetike, Piran, 16. september 2011*. Ljubljana: Slovensko genetsko društvo, 2011. POTOČNIK, Uroš, RAMŠAK, Andreja ISBN 978-961-90534-6-1. [COBISS.SI-ID 257517568]

OBISKI IN ŠTUDIJSKA IZPOLNJEVANJA NA TUJIH RAZISKOVALNIH INŠTITUCIJAH
VISITS AND SCIENTIFIC STUDIES AT INSTITUTIONS ABROAD

- Valentina Turk, Centre Suisse d'Electronique et de Microtechnique, Švica (24.-26.01.2011)
- Tinkara Tinta, Scripps Institution of Science, UC San Diego, USA (21.02-13.03.2011)
- Alenka Malej, Universidade de Saõ Paulo, Instituto de Biosciencias, Brazilija (19.-25.03.2011)
- Valentina Turk, otok Mljet, Hrvaška v sodelovanju z Institutom za more in priobalje, Dubrovnik, Hrvaška (04.-07.04.2011)
- Alenka Malej, Tjaša Kogovšek, Generalni skupščini projekta SESAME, Atene (04.-08. 04.2011)
- Andreja Ramšak, Institut za biologijo mora Kotor (25.-30.04. 2011)
- Alenka Malej, Tjaša Kogovšek, Vlado Malačič, Université Marseille, Francija (16.-23.06.2011)
- Alenka Malej, Zasedanje MED POL UNEP-MAP, Rodos, Grčija (24.-28.05.2011)
- Patricija Mozetič, Malaspina 2010, sodelovanje na španski raziskovalni ekspediciji z BIO Hesperides, Caratgena de Indias (Kolumbija) – Cartagena (Španija) (15.06.-15.07.2011)
- Alenka Malej in TinkaraTinta, otok Mljet, Hrvaška v sodelovanju z Institutom za more in priobalje, Dubrovnik, Hrvaška (12.-14.09.2011)
- Alenka Malej, komisija za zagovor doktorata, University College of Cork, Irska (18.-21.09.2011)
- Alenka Malej, Valentina Turk, P.P. Shirshov Institute of Oceanology, Russian Academy of Science, Moskva (02.-08.10.2011)
- Andreja Ramšak, Universidade de Saõ Paulo, Instituto de Biosciencias (19.11.-08.12.2011)
- Večja skupina raziskovalcev MBP, obisk treh ustanov**:** Istituto di Biologia Marina di Trapani (Consorzio Universitario della Provincia di Trapani), Riserva Naturale Orientata delle Saline di Trapani e Paceco in IAMC-CNR di Capo Granitola (14.-18.12.2011)

OBISKI IZ TUJINE
VISITORS FROM ABROAD

- Tamara Shiganova in Alexander Mikaelyan, P.P. Shirshov Institute of Oceanology, Russian Academy of Sciences, Moskva, Rusija, 3.-10.07.2011
- Andre C. Morandini, Universidade de Saõ Paulo, Instituto de Biosciencias, 25.07.-06.08.2011
- Lucilia S. Miranda, Universidade de Saõ Paulo, Instituto de Biosciencias, 25.07.-06.08.2011
- Michael Stachowitsch, 29.07-10.08.2011
- Bettina Riedel, 29.07-10.08.2011
- Ivo Gallmetzer, 29.07-10.08.2011
- Alexandra Haselmair: 29.07-10.08.2011
- Marita Blasnig: 29.07-10.08.2011
- Dewi Langlet, Laboratoire des Bio-Indicateurs Actuels et Fossiles Université d'Angers - Département de Géologie, Angers, France, 29.07-10.08.2011
- Eduard Metzger, Laboratoire des Bio-Indicateurs Actuels et Fossiles Université d'Angers - Département de Géologie, Angers, France, 03.-10.08.2011
- Petar Kružić, Sveučilište u Zagrebu, Prirodoslovno matematički fakultet, 15.-16.09.2011 in 04.-26.11.2011
- Milena Mitrić, Institut za biologijo mora Kotor, 10.-25.10.2011
- Sara Backović, Institut za biologijo mora Kotor, 10.-25.10.2011
- Rodolfo Metalpa, International Atomic Energy Agency-Marine Environment Laboratories, Principality of Monaco, 24.-26. 11.2011

ČLANSTVA V ODBORIH MEDNARODNIH ORGANIZACIJ, DELOVNIH TELES, EKSPERTNIH SKUPINAH
MEMBERSHIP OF INTERNATIONAL BOARDS AND EXPERT GROUPS

- Flander Putrle V., članica ekspertne skupine za »De-contamination of the Mediterranean Sea« , MIRA Project WF7
- Flander Putrle V., članica Management Committee za European Marine Biodiversity Observatory System (EMBOS)
- Malačič V., član, Vladna komisija za oblikovanje stališč do problematike plinskih terminalov v Tržaškem zalivu
- Malačič V., član, Izvršilni odbor Slovenske zveze za geodezijo in geofiziko
- Malej A., članica, Bureau Central CIESM (Commission international pour l'Exploration Sci ntifique de la Mer Méditerrannée), Monaco
- Malej A., članica, Nacionalna komisija za UNESCO in predsednica NO IOC
- Malej A., nacionalna koordinatorica MED POL, Mediterranean Action Plan, Atene
- Malej A., WG Global Jellyfish Blooms, National Center for Ecological Analysis and Synthesis, NSF, ZDA
- Mozetič P., članica, Intergovernmental Panel on Harmful Algal Blooms (IOC-UNESCO)
- Mozetič P., članica, MedGIG for EU WFD
- Ramšak A., članica ekspertne skupine za biomonitoring vodnega okolja pri Ministrstvu za zdravje, Urad Republike Slovenije za kemikalije
- Turk V., članica, Upravni odbor Slovenskega mikrobiološkega društva (SMD)

DRUGA DELA
OTHER ACTIVITIES

- GREGO, Mateja. *Otrok in morje = A child and the sea*. Piran: National Institute of Biology, Marine Biology Station; Sv. Peter: Terra Viva, 2011. 1 video DVD, barve, zvok. ISBN 978-961-92543-7-0. [COBISS.SI-ID 257656832]

SODELUJOČE ORGANIZACIJE
COOPERATING INSTITUTIONS

Domače
National

- Inštitut J. Stefan
- Kemijski inštitut, Ljubljana
- Inštitut za Vode RS
- Inštitut za fizikalno biologijo, Ljubljana
- Mednarodni center za promocijo podjetij, (ICPE), Ljubljana
- Univerza v Novi Gorici
- Univerza v Ljubljani
- Univerza v Mariboru
- Univerza na Primorskem
- Zavod za ribištvo Slovenije

Tuje
International

- Co-ordinating Unit, Mediterranean Action Plan, Atene, Grčija
- Sveučilište u Dubrovniku, Hrvaška
- Institut za oceanografiju i ribarstvo Split, Hrvaška
- Institut R. Bošković, CIM Rovinj, Zagreb, Hrvaška
- International Ocean Institute, Malta
- Istituto di biologia del mare, Benetke, Italija
- Osservatorio Alto Adriatico, ARPA FVG, Trst, Italija
- Osservatorio Geofisico Sperimentale, Trst, Italija
- P.P. Shirshov Institute of Oceanology, RAS, Moskva, Rusija
- SCRIPPS Instutute of Oceanology, University of California, San Diego, ZDA
- Universit degli Studi di Trieste, Italija
- University of Vienna, Avstrija
- University of Ghent, Marine Biology Section, Belgium
- Universidade de Sao Paulo, Sao Paulo, Brazilija
- Universite de la Méditerranée, Marseille, Francija
- Department of Biological Sciences University of Massachusetts, Lowell, USA
- Thayer School of Engineering, Dartmouth College, NH, USA
- Department of Cell and Organism Biology, Lund University, SE-22362 Lund, Sweden

UREDNIŠKI ODBORI
EDITORS

- *Acta Adriatica*. Malej, Alenka (članica uredniškega odbora 1999-). Split: Institut za oceanografiju i ribarstvo, 1932-. ISSN 0001-5113. [COBISS.SI-ID 5792514]
- *Acta biologica slovenica*. Malej, Alenka (članica uredniškega odbora 1997-). [Tiskana izd.]. Ljubljana: Društvo biologov Slovenije, 1997-. ISSN 1408-3671. [COBISS.SI-ID 68526592]
- *Annales. Series historia naturalis*. Lipej, Lovrenc (odgovorni urednik 1994-, član uredniškega odbora 1994-), Mozetič, Patricija (urednica 1999-, članica uredniškega odbora 1999-). Malej, Alenka (članica uredniškega odbora 1994-), Orlando, Martina (članica uredniškega odbora 2009-), Koper: Zgodovinsko društvo za južno Primorsko: Znanstveno raziskovalno središče Republike Slovenije = Capodistria: Società storica del Litorale: Centro di ricerche scientifiche della Repubblica di Slovenia = Koper: Science and Research Centre of the Republic of Slovenia, 1994-. ISSN 1408-533X. http://www.zrs-kp.si/SL/Zaloznistvo/annales/annali_naturali.htm. [COBISS.SI-ID 71951360]
- *Geologija*. Faganeli, Jadran (član uredniškega odbora 2005-). [Tiskana izd.]. Ljubljana: Geološki zavod: Slovensko geološko društvo, 1953-. ISSN 0016-7789. http://www.geologija-revija.si/. [COBISS.SI-ID 5636866]
- *National geographic junior*. Lipej, Lovrenc (član uredniškega odbora 2003-). [Slovenska izd.]. Ljubljana: Rokus, 2003-. ISSN 1581-6869. [COBISS.SI-ID 124339712]
- *Potapljač*. Lipej, Lovrenc (član uredniškega sveta 2009-). Murska Sobota: Tiskarna AIP Praprotnik, 2002-. ISSN 1580-853X. [COBISS.SI-ID 117052928]
- HORVAT, Milena (ur.), SAKAMOTO, Mineshi (ur.), FAGANELI, Jadran (ur.). *International Workshop Mercury in Contaminated Sites: Characterization, Impacts and Remediation, Marine Biology Station, Piran, Slovenia, 10.-14. October 2010*. Ljubljana: Jožef Stefan Institute, Department of Environmental Sciences, 2011. 1 optični disk (CD-ROM). ISBN 978-961-264-028-6. [COBISS.SI-ID 254333952]
- POTOČNIK, Uroš (ur.), RAMŠAK, Andreja (ur.). *2. kolokvij iz genetike, Piran, 16. september 2011*. Ljubljana: Slovensko genetsko društvo, 2011. 1 USB ključ, barve. ISBN 978-961-90534-6-1. [COBISS.SI-ID 257517568]

NAGRADE IN PRIZNANJA
AWARDS

- Alenka Malej, *velika nagrada Miroslava Zeia za raziskovalno delo ved o življenju in okolju*, Ljubljana, 7. 11. 2011
- Mateja Grego, Janez Forte. *Med morjem in kopnim : priznanje Prometej znanosti za odličnost v komuniciranju Morski biološki postaji NIB Piran za kratki dokumentarni film*. Ljubljana, december 2011. http://vimeo.com/29424010. [COBISS.SI-ID 2485071

PREDAVANJA IN SEMINARJI
LECTURES AND SEMINARS

- FLANDER PUTRLE Vesna., *National Report for Slovenia : [presentation] Expert group meeting on de-contamination of the Mediteranean Sea, MIRA Project WF7, Casablanca, 28.-30. 11.2011*.
- FLANDER PUTRLE Vesna., Predstavitev dela raziskovalcev MBP, značilnosti ter občasni pojavi v Tržaškem zalivu. Za učence, dijake in študente iz Slovenije in tujine, večkrat letno.
- KOGOVŠEK, Tjaša, TINTA, Tinkara, TURK, Valentina, MALEJ, Alenka. *Trophic ecology of selected scyphozoan jellyfish in the coastal waters : [na] SESAME final scientific conference, Atene, Grčija, 04.-08.04.2011.*
- MALEJ, Alenka, KOGOVŠEK, Tjaša, RAMŠAK, Andreja, SIOKU-FRANGOU, Ioanna, ZERVOUDAKI, S.. *A collective rhitm of Discomedusae (Scyphozoa) outbreaks in the Mediterranean? : SESAME final scientific conference, Atene, Grčija, 07.04.2011.*
- MALEJ, Alenka. *Gelatinous plankton research at the Marine Biology Station Piran (NIB, Slovenia). University College of Cork, Irska, 20.09.2011.*
- TURK, Valentina. *Mikromorje : poljudno predavanje v Hiši eksperimentov, 08.06.2011.*

PEDAGOŠKA DEJAVNOST IN MENTORSTVA
TEACHING AND MENTORSHIP

Dodiplomski študij
Graduate Studies

- Biologija okolja, Univerza v Novi Gorici / Fakulteta za znanosti o okolju, (doc. dr. Andreja Ramšak)
- Mikrobiologija okolja in bioremediacija, Univerza v Novi Gorici / Fakulteta za znanosti o okolju, (izr. prof. dr. Valentina Turk)
- Osnove mikrobiologije, Univerza v Novi Gorici / Visoka šola za vinogradništvo in vinarstvo, (izr. prof. dr. Valentina Turk)
- Zoologija, Univerza v Novi Gorici / Fakulteta za znanosti o okolju, (izr. prof. dr. Lovrenc Lipej)
- Varstvo okolja v prometu, Univerza v Ljubljani / Fakulteta za pomorstvo in promet, (doc. dr. Oliver Bajt, prof. dr. Jadran Faganeli)
- Snovi v transportu, Univerza v Ljubljani / Fakulteta za pomorstvo in promet, (prof. dr. Jadran Faganeli)
- Mehanika in hidrodinamika, Univerza v Ljubljani / Fakulteta za pomorstvo in promet, (izr. prof. dr. Vlado Malačič)
- Varstvo narave in biodiverziteta v Sredozemlju, Univerza na primorskem / Fakulteta za humanistične študije, (izr. prof. dr. Lovrenc Lipej)
- Geomikrobiologija, Univerza v Ljubljani / Biotehniška fakulteta, (prof. dr. Jadran Faganeli)
- Naravoslovje: biologija, Univerza na Primorskem / Pedagoška fakulteta Koper, (doc. dr. Patricija Mozetič)
- Naravoslovje: kemija, Univerza na Primorskem / Pedagoška fakulteta Koper, (doc. dr. Nives Kovač)

Podiplomski študij
Postgraduate Studies

- Ekologija morja, Univerza v Ljubljani / Medfakultetni študij Varstvo okolja (prof. dr. Jadran Faganeli, prof. dr. Alenka Malej, izr. prof. dr. Lovrenc Lipej, izr. prof. dr. Vlado Malačič)
- Biogeokemijska kroženja, Univerza v Ljubljani / Medfakultetni študij Varstvo okolja (prof. dr. Jadran Faganeli)
- Promet in okolje, Univerza v Ljubljani / Fakulteta za pomorstvo in promet (doc. dr. Oliver Bajt, prof. dr. Jadran Faganeli)
- Onesnaževanje morja, Univerza v Ljubljani / Fakulteta za pomorstvo in promet (doc. dr. Oliver Bajt, prof. dr. Jadran Faganeli)
- Korozija v morju, Univerza v Ljubljani / Fakulteta za pomorstvo in promet (prof. dr. Jadran Faganeli)
- Oceanografija in meteorologija, Univerza v Ljubljani / Fakulteta za pomorstvo in promet (izr. prof. dr. Vlado Malačič)
- Morski viri, Univerza v Ljubljani / Fakulteta za pomorstvo in promet, (izr. prof. dr. Lovrenc Lipej), 2010
- Morska ekologija, Univerza v Ljubljani / Fakulteta za pomorstvo in promet (prof. dr. Alenka Malej)
- Ecologia del benthos, Universit degli studi di Trieste, (izr. prof. dr. Lovrenc Lipej)

Diplomska dela
Graduate Theses

- BEMBIČ, Klavdij. *Načrt prevzema ladijskih odpadkov in ostankov tovora za pristanišča v Mestni občini Koper : diplomska naloga*. Portorož: 2011. IX, 64 str., ilustr. [COBISS.SI-ID 2257763]
- BOŽIČ, Boštjan. *Tovorni cestni promet in onesnaževanje okolja : diplomska naloga*. Portorož: 2011. VI, 55 str., ilustr. [COBISS.SI-ID 2238819]
- CANKAR, Sabina. *Zavarovana območja v obalno-kraškem prostoru : stanje in perspektive : diplomsko delo*. Koper: 2011. 97 f.,, zvd. http://share.upr.si/fhs/PUBLIC/diplomske/Cankar-Sabina.pdf. [COBISS.SI-ID 2404687]
- ČEBOKLI, Nejc. *Notranja logistika nevarnih snovi v podjetju TKK Srpenica in skrb za varstvo okolja : diplomska naloga*. Portorož: 2011. V, 68 str., [3] f. pril., ilustr. [COBISS.SI-ID 678984]

- GENOV, Tilen. *Ekologija velike pliskavke (Tursiops truncatus) v severnem Jadranu : diplomsko delo : univerzitetni študij = Ecology of the bottlenose dolphin (Tursiops truncatus) in the northern Adriatic : graduation thesis : university studies.* Ljubljana: 2011. IX, 93 f., pril., graf. prikazi. [COBISS.SI-ID 2433615]
- HAMACHER, Loretta. *Biomarkers of environmental pollution measured in Mytilus galloprovincialis : report.* Berufskolleg Hilden des Kreises Mettmann 2011. 20 str., ilustr. [COBISS.SI-ID 2558799]
- HOČEVAR, Luka. *Najpomembnejše nesreče tankerjev in njihov vpliv na okolje : diplomska naloga.* Portorož: 2011. V, 52 str., ilustr. [COBISS.SI-ID 2240867]
- JERMAN, Helena. *Vpliv biokemične sestave meduz na kroženje organske in anorganske snovi v morju : diplomsko delo.* Nova Gorica: 2011. XIII, 54 str., ilustr. http://www.ung.si/~library/diplome/OKOLJE/69Jerman.pdf. [COBISS.SI-ID 1951995]
- OCVIRK, Lana. *Ločeno zbiranje trdnih odpadkov v R Sloveniji : diplomska naloga.* Portorož: 2011. III. 75 str., ilustr. [COBISS.SI-ID 2271075]
- REIFEGERSTE, Julian. *Genetic differentiation in Aurelia aurita (Scyphozoa) revealed by ITS regions : report.* Berufskolleg Hilden des Kreises Mettmann 2011. 30 str., ilustr. [COBISS.SI-ID 2506063]
- ROZMAN, Ajda. *Encimska razgradnja organsko vezanega fosforja v morskih makroagregatih : diplomsko delo, univerzitetni študij = Enzymatic hydrolysis of organic phosphorus in marine macroaggregates : graduation thesis, university studies*, (Biotehniška fakulteta, Enota medoddelčnega študija mikrobiologije, Ljubljana, Diplomske naloge, 484). Ljubljana: 2011. XIII, 60 f., [5] f. pril., graf. prikazi, tabele. [COBISS.SI-ID 3930232]

Magistrska dela
Master's Theses

- CATENACCI, Luca. *Photographic monitoring on polyps of Aurelia aurita (Cnidaria: Scyphozoa) and study of environmental variables that affect their density in the Gulf of Triest : Tesi sperimentale in ecologia marina : [=master of science thesis] : Corso di Laurea specialistica in biologia marina.* Trst: [marec 2011]. 73 str., pril.,[27] f., ilustr., tabele. [COBISS.SI-ID 2368591]
- PELIZZARI, Maura. *Feedeing of Aurelia sp. polyps and ephyrae under laboratory conditions: preliminary results : elaborato di laurea : Corso di Laurea magistrale in biologia marina.* Padova: 2011. 76 str., pril.,[15] f., ilustr., tabele. [COBISS.SI-ID 2443087]
- ROELOFS, Marleen. *Functional and structural responses of harpacticoid copepods to anoxia in the Northern Adriatic: an experimental approoach : 2010-2011 : [=master of science thesis].* Ghent: [M. Roelofs], [junij 2011]. 28 str., ilustr., tabele. [COBISS.SI-ID 2415183]

Doktorska dela
Doctoral Theses

- BOGUNOVIĆ, Branko. *Water fluxes at the entrance to the Gulf of Trieste : dissertation.* Nova Gorica: 2011. XVIII, 114 str., http://www.ung.si/~library/doktoranti/okolje/18Bogunovic.pdf. [COBISS.SI-ID 1821435]
- MAVRIČ, Borut. *Favnistična in ekološka analiza makrozoobentoških združb mehkega dna in opredelitev ekološkega stanja slovenskega obalnega morja : doktorska disertacija = Faunistic and ecological analysis of soft-bottom macrozoobenthic community and assessment of ecological qualiti status of Slovenian coastal sea : dissertation thesis.* Ljubljana: 2011. VII, 66 [COBISS.SI-ID 755319]
- STOPAR, Katja. *Genetska diferenciacija klobučnjaških meduz z analizo genetskih markerjev iz mitohondrijske in jedrne DNA : doktorska disertacija = Genetic differentation of scyphozoan jellyfish revealed by analysis of mitochondrial and nuclear genetic markers : doctoral dissertation.* Ljubljana: 2011. XII, 92 f., [33] f. pril., ilustr. [COBISS.SI-ID 752503]
- TINTA, Tinkara. *Bacterial community structure and function in the Gulf of Trieste with some application studies : dissertation.* Nova Gorica: 2011. XII, 130, [23] str. pril., ilustr. http://www.ung.si/~library/doktorati/okolje/22Tinta.pdf. [COBISS.SI-ID 2059003]

ČLAN KOMISIJE ZA ZAGOVOR DOKTORATA
MEMBER OF THE COMMITTEE FOR THE DEFENSE OF THE DOCTORAL THESIS

- BAXTER, Emily. *Gelatinous zooplankton in Irish waters: ecology and role in the gill disorders of marine-farmed salmon : thesis for the degree of Doctor of philosophy.* University of Cork: 2011. 132 str., ilustr., tabele. [COBISS.SI-ID 2532687]

Ustno odprtino brizgačev (ali morskih kumar) obdaja venec lovk.
Oral cavity of sea cucumbers is sorrounded with tentacles

Hidromeduza Aequorea
Hydromedusa Aequorea

Ostriga poraščena s polipi uhatega klobučnjaka
Oyster overgrown with moon jellyfish polyps

2.1

Instrumentalni center Morske biološke postaje Piran
Marine Biology Station Piran – Instrumental Centre

0105-001

VODJA HEAD

doc. dr. Branko Čermelj, univ.dipl.ing.geol., višji strokovno - raziskovalni sodelavec

STROKOVNI VODJA RESEARCH LEADER

prof. dr. Vlado Malačič, dipl. fiz., znanstveni svetnik

NASLOV ADDRESS

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SI-6330 Piran

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cermelj@mbss.org
URL: www.nib.si

RAZISKOVALCI SCIENTIFIC STAFF

1. mag. Boris Petelin, univ.dipl.ing.gradb., strokovno - raziskovalni sodelavec

TEHNIČNI SODELAVCI TECHNICIANS

1. Mira Avčin, projektna sodelavka*
2. Janez Forte, vodilni strokovni sodelavec
3. Tihomir Makovec, strokovni sodelavec - vodja potapljaške baze
4. Marko Tadejević, vodilni tehnično - strokovni sodelavec

* delovno razmerje prenehalo v letu 2011/ employment ended in 2011

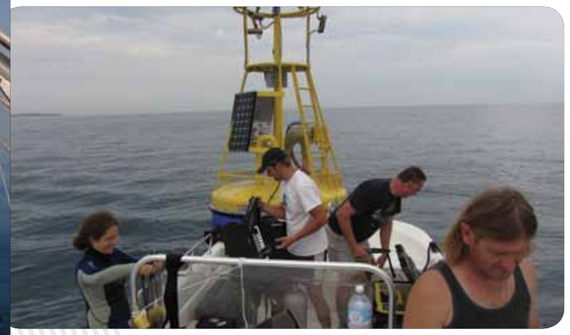
Oceanografska boja »Vida« za meritve oceanografskih, meteoroloških in ekoloških parametrov.
Oceanographic buoy »Vida« for measuring oceanographic, meteorological and ecological parameters.

Raziskovalno plovilo PI-3930 (Carolina Skiff DLV 258)
Research vessel PI-3930 (Carolina Skiff DLV 258)

Vzorčenje vodnega stolpca
Sampling of water column

Terensko delo in podvodno vzorčenje
Field-work and underwater sampling

Vzorčenje planktona
Phytoplankton sampling



Priprave na potop pri oceanografski boji »Vida«
Preparations for a dive under oceanographic bouy »Vida«

Infrastrukturna dejavnost

Instrumentalni center morske biološke postaje (IC MBP) deluje v okviru oddelka Morske biološke postaje v Piranu in je sestavni del infrastrukturnega programa NIB. Veliko infrastrukturno opremo IC MBP sta v letu 2011 sestavljali Raziskovalno plovilo PI-800, »Sagita« ter Oceanografska boja s pripadajočo logistično in računalniško opremo.

Glavni dosežki v letu 2011

IC MBP je v letu 2011 pridobil plovilo »Carolina« (**Carolina Skiff DLV 258)** s katerim smo zamenjali dotrajano plovilo PI-50. S sodobnejšim plovilom nam je omogočen hitri izhod na morje v primeru potrebe. Zelo uporabno je pri delu v obrežnem pasu in v situacijah, ko pride do nenadnih pojavov (izlitja, lokalni pojavi sluzenja ali cvetenja), ki so kratkega veka in jih je nemogoče načrtovati. Obenem služi kot podpora obsežnejšemu raziskovalnemu delu na morju.

Infrastruktura IC MBP je bila v letu 2011 vključena v pedagoško dejavnost, ki smo jo izvajali v sodelovanju z Univerzama v Ljubljani in Novi Gorici. Nudili smo podporo izobraževalnim programom organiziranim na Biotehniški fakulteti v Ljubljani, Fakulteti za znanosti o okolju v Novi Gorici in Fakulteti za pomorstvo in promet v Portorožu.

IC MBP je prav tako nudil podporo izvajanju pedagoške dejavnosti za osnovne in srednje šole, saj je v tem obdobju MBP obiskalo več kot 20 organiziranih skupin dijakov in študentov.

Poleg promocijske in pedagoške dejavnosti je IC MBP deloval tudi kot mednarodni podatkovni center za Slovenijo v okviru mednarodnega oceanografskega inštituta (IOI), saj podpira:

- podatkovno bazo oceanografske postaje (senzorji na boji, zasidrani 2,7 km od piranske Punte; 365 dni x 48 vnosov dnevno; http://buoy.mbss.org/) ter
- podatkovno bazo fizikalno-kemijskih parametrov, 4.500 vnosov letno; intranet: mbp-01/public/ewn), preko katerih se vključujemo v mednarodne metapodatkovne baze z oceanografskimi podatki (http://www.sea-search.net/).

Research Activity

The Instrumental Centre of the Marine Biological station (IC MBS) is a part of the Marine Biology Station in Piran and a constituent part of the NIB infrastructure. In 2011, large infrastructural equipment of the IC MBS consisted of the Research vessel PI-800, "Sagita" and of the Oceanographic Buoy with logistic and computer equipment. Since its beginnings the centre activity is focused on supporting research programmes and projects related to sea research and to perform oceanographic and ecological measurements. The final goal of these activities is to keep the public informed.

Important Achievements in 2011

By replacing the old PI-50 with the new 7.5 m long boat, IC MBP gained a new and fast vessel to use in cases of need for sudden interventions at sea. In cases like extensive mucous aggregate formation and occurrence of unusual marine organisms or phenomena and oil spills where rapid intervention is needed, the **Carolina Skiff DLV 258** has already become irreplaceable. It also serves as support vessel to all more extensive research activities at sea.

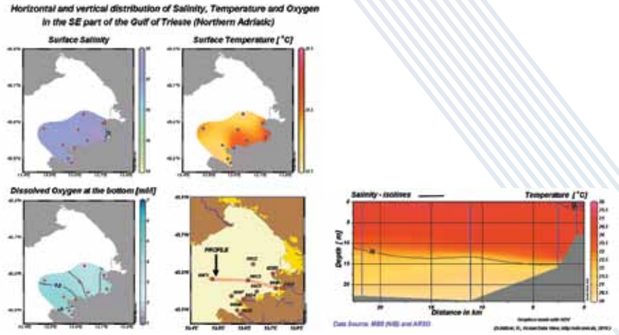
The infrastructure of the IC MBS was used also in educational activities realised in cooperation with the Universities of Ljubljana and Nova Gorica. It offers support to education programmes, organised at the Biotechnical Faculty in Ljubljana, the Faculty of Environmental Sciences in Nova Gorica and the Faculty of Maritime Studies and Transport in Portorož.

IC MBS also offers support to educational activities for elementary schools and grammar schools, over 20 organised groups of pupils and students namely visited the MBS in 2011.

In addition to its promotional and educational activities, IC MBS also acts as an international data centre for marine data in Slovenia (NODC), within the framework of the International Oceanographic Institute (IOI), offering support to:

- database of the Oceanographic station (sensors on the buoy, anchored 2,7 km from The Punta in Piran; 365 days x 48 entries a day˙(http://buoy.mbss.org/) and
- database of physical-chemical parameters, 4500 entries a year; intranet: mbp-01/public/ewn), via which we are connected to international oceanographic meta-databases (http://www.sea-search.net/).

Raziskovalno plovilo PI-800 »Sagita«
Research vessel PI-800 »Sagita«



Prikaz oceanografskega in ekološkega stanja slovenskega obalnega morja na podlagi fizikalno-kemičnih podatkov.
Presentation of oceanographic and ecological status of slovenian coastal waters based on physico-chemical data.

V letu 2011 so veliko infrastrukturno opremo IC MBP NIB uporabljali naslednji mladi raziskovalci:

1. Valentina Pitacco, NIB, Morska biološka postaja, mentor: dr. Lovrenc Lipej
2. Maja Kos NIB, morska biološka postaja, mentorica: dr. Valentina Turk
3. Katja Klun, NIB, Morska biološka postaja, mentor: dr. Jadran Faganeli
4. Tjaša Kogovšek, NIB, Morska biološka postaja, mentorica: dr. Alenka Malej
5. Tinkara Tinta, univ. dipl. biokemičarka, NIB, Morska biološka postaja, mentorica: dr. Valentina Turk
6. Neli Glavaš, NIB, Morska biološka postaja, mentorica: dr. Nives Kovač
7. Iva Talaber, NIB, Morska biološka postaja, mentorica: dr. Patricija Mozetič
8. Neža Koron, NIB, Morska biološka postaja, mentor: dr. Jadran Faganeli
9. Jana Vojvoda, NIB, Morska biološka postaja, mentorica: dr. Valentina Turk
10. Lucija Raspor dall'Olio, Morska biološka postaja, mentorica: dr. Alenka Malej

Oprema IC MBP se je uporabljala za izvajanje pedagoške dejavnosti pri različnih predmetih na šestih študijskih programih na treh univerzah.

Za poglobitev sodelovanja med infrastrukturno dejavnostjo na MBP in uporabniki storitev, se je IC MBP vključeval v proces osveščanja javnosti o potrebi po izmenjavi oceanografskih podatkov v mednarodnem prostoru (projekti **SEADATANET 1, SEADATANET 2, MFSTEP, MYOCEAN**) in še zlasti na lokalnem območju (Morska Biološka Postaja-Instituto nazionale di Oceanografia e di Geofisica Sperimentale v Trstu) ter evidentiranja in predstavljanja znanstveno-tehnoloških zmogljivosti po celotnem Sredozemlju.

Večina dejavnosti v letu 2011 je bila povezana z nadgradnjo opreme in storitev, ki jih ponuja Oceanografska boja »Vida«. Navkljub postavitvi nove boje v letu 2008 in namestitvi nove opreme, smo v tem obdobju reševali številne tehnične probleme. Ugotavljali smo nepravilnosti v delovanju merilnih instrumentov pod vodno gladino in nad njo. Dodatno pozornost smo namenili napakam meritev tokov v določenih slojih vodnega stolpca, ki smo jih zasledili na tokomerju postavljenim pod oceanografsko bojo. Meritve tega instrumenta smo primerjali z meritvami treh dodatnih tokomerjev, ki smo jih na dno namestili v sodelovanju z raziskovalci inštituta Istituto Nazionale di Oceanografia e di Geofisica Sperimentale – OGS. In nenazadnje smo izpopolnili meritve koncentracije kisika in odpravili težave obrasti z bentoškimi algami, sicer pa smo uporabljali neprekinjene meritve oceanografskih, meteoroloških in ekoloških parametrov.

V 2011 smo izvedli nakup novega akustičnega merilnika tokov, ki je enostavno in inventivno pritrjen na plovilo *Sagita* ter meri tokove med gibanjem plovila. Z njim smo tudi izvedli prve 24-urne meritve v Koprskem zalivu. Namestitev pa omogoča večjo hitrost plovbe in stabilnejšo lego samega instrumenta.

In 2011 the large IC MBS NIB infrastructure equipment was used by the following young researchers:

1. Valentina Pitacco, NIB, Marine biology station, Mentor: Dr. Lovrenc Lipej
2. Maja Kos NIB, Marine biology station, Mentor: Dr. Valentina Turk
3. Katja Klun, NIB, Marine biology station, Mentor: Dr. Jadran Faganeli
4. Tjaša Kogovšek, NIB, Marine biology station, Mentor: Dr. Alenka Malej
5. Tinkara Tinta, univ. dipl. Biokem., NIB, Marine biology station, Mentor: Dr. Valentina Turk
6. Neli Glavaš, NIB, Marine biology station, Mentor: Dr. Nives Kovač
7. Iva Talaber, NIB, Marine biology station, Mentor: Dr. Patricija Mozetič
8. Neža Koron, NIB, Marine biology station, Mentor: Dr. Jadran Faganeli
9. Jana Vojvoda, NIB, Marine biology station, Mentor: Dr. Valentina Turk
10. Lucija Raspor dall'Olio, Marine biology station, Mentor: Dr. Alenka Malej

In 2011 the IC MBS equipment was used for pedagogical activities in different courses within 3 Universities.

In order to develop better cooperation between the infrastructure activity of the MBS and the users of its services, IC MBS is participating in the process of raising public awareness on the need for this type of data, the need for exchange of data on the international (projects: **SEADATANET 1 and SEADATANET 2, MFSTEP, MYOCEAN**) and local (Maritime Biological Station - Instituto nazionale di Oceanografia e di Geofisica Sperimentale in Trieste) level and the need for collecting evidence and present scientific-technological capacity in the entire Mediterranean.

The bulk of IC MBS's activities however were embodied in the upgrade of equipment and services offered by the oceanographic buoy »Vida«. Although the oceanographic buoy was newly setup in 2008, different technical problems were still to be resolved. Technical problems in equipment performance showed to be more acute than it was thought at the beginning, either below or above the sea surface. And yet most of them have been resolved in 2011. Additional attention was paid to current measurements in distinct layers of the water column. The measurements were crosschecked and compared with the measurements of additionally placed current meters borrowed by the Instituto nazionale di Oceanografia e di Geofisica Sperimentale from Trieste. Problems regarding the dissolved oxygen measurements needed a special attention until we discovered the real cause of the problem. It was not the instrument malfunction, but the pure and simple bio-fouling. Tiny benthic micro algae were discovered under a microscope attached to the instrument membrane, which altered the measurements. The problem was solved by mounting a simple mechanical wiper. Nevertheless most of oceanographical, meteorological and ecological parameter measurements run continuously all over the year.

In the list of the new equipment there is also a new acoustic current meter (ADCP) designed for ship cruise use, bought in 2011. At MBS we already had experience with various instruments of this kind in the past, either standalone or vessel mounted, but this time we used a new approach to attach the ADCP to the hull of the research vessel. The idea of attaching it to the hull is not new, but it results from a continuous education and information of our technical staff. It also means an increase in ship velocity and stability of the instrument itself during the measurements and thus an important quality improve.

In 2008 the old oceanographic buoy hull was replaced with the new one made in stainless steel. The old hull was repainted and for three years waited for a new opportunity. At the beginning of April it was donated to the Institute of Marine Biology in Kotor, Montenegro. The research staff of the institute will use it as a research platform for various oceanographic instruments. This in a way widens up already good research cooperation between our two institutions.

Trup stare oceanografske boje, ki smo ga v letu 2008 zamenjali z novim, je kar tri leta sameval ob stavbi morske biološke postaje. V letu 2011 pa smo trup podarili inštitutu za biologijo morja v Kotorju (Črna Gora). Raziskovalcem tega inštituta bo odlično vzdrževani trup služil kot raziskovalna platforma za oceanografske instrumente, s tem pa smo še poglobili tudi sicer dobre odnose med našo in omenjeno črnogorsko raziskovalno institucijo.

Preko spletnih strani MBP je bil večji del aktivnosti MBP ažurno predstavljen domači in tuji javnosti. Uporabniki imajo dostop do trenutnih oceanografskih podatkov v skoraj realnem času. V razvoj infrastrukture in znanja aktivno vključujemo domače in tuje subjekte, kar je do sedaj v veliki meri pripomoglo k razvoju infrastrukture in znanja, v prihodnosti pa daje možnosti razvoja novih merilnih metod v ekotoksikologiji in oceanografiji obalnih voda. V izkoriščenost podatkov sta vključeni Fakulteta za matematiko in fiziko ter Fakulteta za pomorstvo in promet s pedagoškimi programi (diplomska dela). Podatki so v skoraj realnem času posredovani Agenciji za okolje RS.

SEZNAM NEKATERIH PROJEKTOV, KI SO V LETU 2011 UPORABLJALI VELIKO OPREMO IC MBP

RAZISKOVALNI PROGRAM, KI GA FINANCIRA JAVNA AGENCIJA ZA RAZISKOVALNO DEJAVNOST REPUBLIKE SLOVENIJE

- Raziskave obalnega morja / *Coastal marine research* (P1-0237), vodja programa / *the research programme leader* prof. dr. Alenka Malej.
- Kroženje snovi v okolju, snovna bilanca in modeliranje okoljskih procesov ter ocena tveganja / *Cycling of substances in the environment, mass balances, modelling of environmental processes and risks assessment* (P1-0143), vodja programa / *the research programme leader* prof. dr. Milena Horvat.

RAZISKOVALNI PROJEKTI, KI JIH FINANCIRA JAVNA AGENCIJA ZA RAZISKOVALNO DEJAVNOST REPUBLIKE SLOVENIJE

- Povezave med organsko snovjo in kovinami, s posebnim poudarkom na Hg, v obalnem morju (Tržaški zaliv) / Organic matter - metal interactions, with special reference to Hg, in coastal waters (Gulf of Trieste, northern Adriatic Sea) (J1-2136), nosilec projekta/*principal investigator* prof. dr. Jadran Faganeli.
- Vpliv cirkulacije v široko odprtih zalivih in pomorskega prometa na transport sedimenta / *Influence of circulation and maritime traffic on sediment transport in wide open bays* (L2-4147), nosilec projekta/principal investigator prof. dr. Vlado Malačič.

RAZVOJNI PROJEKTI

- Spremljanje ekološkega in kemijskega stanja morja (Ministrstvo za okolje in prostor, Agencija RS za okolje), nosilka doc. dr. Patricija Mozetič.
- Spremljanje kakovosti vode za življenje morskih školjk in morskih polžev (Ministrstvo za okolje in prostor, Agencija RS za okolje), nosilka doc. dr. Patricija Mozetič
- Spremljanje kakovosti morja in vnosov onesnaženja s kopnega v skladu z Barcelonsko konvencijo (Ministrstvo za okolje in prostor, Agencija RS za okolje), nosilka izr. prof dr. Valentina Turk

Oceanografska boja »Vida« za meritve oceanografskih, meteoroloških in ekoloških parametrov.
Oceanographic buoy »Vida« for measuring oceanographic, meteorologica and ecological parameters.

Oceanografska boja »Vida« za meritve oceanografskih, meteoroloških in ekoloških parametrov.
Oceanographic buoy »Vida« for measuring oceanographic, meteorologica and ecological parameters.

Terensko delo in podvodno vzorčenje
Field-work and underwater sampling

On the MBS's web pages up-to-date activities of the Station are presented to the national and international public. Users are able to access updated oceanographic data almost in real time. We actively include national and foreign subjects into the development of the infrastructure and knowledge, who so far contributed considerably to the development of both, allowing future potentials to develop new measurement methods in ecotoxicology and in the oceanography of costal waters. Education programmes in the Faculty of Mathematics and Physics and the Faculty of Maritime Studies and Transport are also data users (Graduate thesis). The data is almost immediately transmitted to the Environmental Agency of the Republic of Slovenia and to the Observatory for experimental Geophysics (OGS) in Trieste, an institution we also exchange data with. The oceanographic buoy is already a part of the future network of automatic data collecting stations in the Adriatic.

RESEARC H PROGRAMS FINANCED BY SLOVENIAN AGENCIES THAT WERE USING IC MBP LARGE EQUIPMENT AND FACILITIES IN 2011

RESEARCH PROGRAM FINANCED BY SLOVENIAN RESEARCH AGENCY

- Raziskave obalnega morja / *Coastal marine research* (P1-0237), vodja programa / *the research programme leader* prof. dr. Alenka Malej.
- Kroženje snovi v okolju, snovna bilanca in modeliranje okoljskih procesov ter ocena tveganja / *Cycling of substances in the environment, mass balances, modelling of environmental processes and risks assessment* (P1-0143), vodja programa / *the research programme leader* prof. dr. Milena Horvat.

RESEARCH PROJECTS FINANCED BY SLOVENIAN RESEARCH AGENCY

- Povezave med organsko snovjo in kovinami, s posebnim poudarkom na Hg, v obalnem morju (Tržaški zaliv) / Organic matter - metal interactions, with special reference to Hg, in coastal waters (Gulf of Trieste, northern Adriatic Sea) (J1-2136), nosilec projekta/ *principal investigator* prof. dr. Jadran Faganeli.
- Vpliv cirkulacije v široko odprtih zalivih in pomorskega prometa na transport sedimenta / *Influence of circulation and maritime traffic on sediment transport in wide open bays* (L2-4147), nosilec projekta/principal investigator prof. dr. Vlado Malačič.

DEVELOPMENT PROJECTS

- Circulation and environmental conditions in the Bay of Koper and Port of Koper (Port of Koper), Responsible: Dr. Vlado Malačič
- Monitoring of the quality of the sea water, brackish waters and shellfish waters in the year 2005, Responsible: Dr. Patricija Mozetič.
- Monitoring for the Assessment and Control of Pollution from Land Base Sources (Barcelona convention), Responsible: Dr. Valentina Turk.

3.0

Oddelek za raziskovanje sladkovodnih in kopenskih ekosistemov - EKO 0105-002
Department of Freshwater and Terrestrial Ecosystems Research - EKO

VODJA HEAD
prof. dr. Anton Brancelj, univ.dipl.biol., znanstveni svetnik

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RAZISKOVALCI
SCIENTIFIC STAFF

1. dr. Irena Bertoncelj, univ. dipl. biol., asistentka z doktoratom
2. doc. dr. Damijan Denac, prof. biol. in kem., asistent z doktoratom
3. dr. Urška Koce, univ. dipl. biol., asistentka z doktoratom*
4. dr. Tadej Mezek, prof. biol. in kem., asistent z doktoratom*
5. dr. Nataša Mori, univ. dipl. biol., znanstvena sodelavka
6. dr. Franja Pajk, univ. dipl. biol., asistentka
7. dr. Tatjana Simčič, univ. dipl. biol., višja znanstvena sodelavka
8. prof. dr. Davorin Tome, univ. dipl. biol., znanstveni svetnik
9. doc. dr. Al Vrezec, univ. dipl. biol., znanstveni sodelavec

MLADI RAZISKOVALCI
YOUNG RESEARCHERS

1. Dejan Bordjan, univ. dipl. biol.
2. Martina Jaklič, univ. dipl. biol.
3. Uroš Žibrat, univ. dipl. biol.
4. Allen Wei Liu, univ. dipl. ekol.

TEHNIČNI SODELAVCI
TECHNICIANS

1. Špela Ambrožič, samostojna strokovna sodelavka
2. Andreja Jerebic, koordinatorka področij
3. Andrej Kapla, projektni sodelavec
4. Tina Leskošek, samostojna strokovna sodelavka

* delovno razmerje prenehalo v letu 2011/ employment ended in 2011

Odkritje tujerodne vrste potočnega raka Rdečeškarjevca (*Cherax quadricarinatus*) v termalni mrtvici Topla na Prilipah
First record of alien species of redclaw (*Cherax quadricarinatus*) in termal oxbow Topla in Prilipe

Varstveno pomembna vrsta vodnega hrošča *Graphoderus bilineatus*
Water beetle *Graphoderus bilineatus* - species important for conservation

Meritve okoljskih dejavnikov na ustju kraškega izvira Lipnik v Radovni
Measurements of environmental characteristics of the spring Lipnik in Radovna

Raziskovalna dejavnost

Na oddelku za raziskovanje sladkovodnih in kopenskih ekosistemov raziskujemo procese v okolju tako iz bazičnega kot tudi aplikativnega vidika. V raziskavah, ki jih izvajamo na področju kopenskih ekosistemov, se posvečamo izbranim vrstam, vlogi le-teh v prehranjevalnih spletih ter vplivu klimatskih sprememb na organizme ter njihovo življenjsko okolje. Vrste, ki jim posvečamo največ pozornosti so ptice in različne skupine nevretenčarjev. Na področju ekologije ptic proučujemo vplive sprememb v okolju na populacije, medvrstne odnose, ter odnose med pticami in človekom. Proučujemo tudi ekologijo ter vrstno specifično dinamiko hroščev v podzemnih – jamskih ekosistemih.

V okviru raziskav vodnih ekosistemov preučujemo povezave med ekološkimi lastnostmi kraških razpoklinskih in medzrninskih vodonosnikov, pojavljanjem podzemnih vrst, predvsem nižjih rakov ter posrednimi in neposrednimi vplivi človeka. Raziskave vodnih ekosistemov zajemajo tudi visokogorske in predalpske ekosisteme (jezera) ter tekoče vode. V laboratoriju z meritvami fiziološkega odziva organizmov poučujemo tudi fiziološke ter ekofiziološke prilagoditve avtohtonih in tujerodnih vrst na različne fizikalne dejavnike (npr. temperatura). Pri slednjih smo še posebej osredotočeni na tujerodne vrste potočnih rakov in njihov vpliv na domorodne vrste.

V okviru programa P1-0255 (Združbe, odnosi in komunikacije), ki ga izvajamo skupaj s skupino ENTOMO in vsebuje 6 sklopov so potekale raziskave v naslednjih štirih sklopih:

3. SKLOP: OKOLJE-ORGANIZEM

- vpliv klimatskih sprememb na časovno in prostorsko dinamiko populacije gozdnih ptic in bele štorklje
- spremljanje meteoroloških pogojev in sestave jamske vodne favne v curkih v eksperimentalni jami
- določanje prilagojenosti različnih vrst rakov na spremembe dejavnikov v okolju, predvsem temperature s pomočjo merjenja dihanja in aktivnosti ETS
- spremljanje fizikalno kemijskih lastnosti vode in pojavljanja podzemne vodne favne v kraških izvirih na stičišču saturirane in nesaturirane cone

4. SKLOP: INTERSPECIFIČNI ODNOSI

- interspecifični odnosi v naravnih gozdnih in travniških združbah, ki povezujejo med seboj različne trofične nivoje
- odnosi med tujerodnimi in domorodnimi vrstami s podobnimi ekološkimi nišami

5. SKLOP: BIODIVERZITETA

- raziskave podzemne favne v medzrninskem vodonosniku na območju črpališča pitne vode za Ljubljano (Brest) v sodelovanju s podjetjem VO-KA
- revizija seznama vrst hroščev evropskega varstvenega pomena v Sloveniji, katerih populacije so podlaga za razglaševanje Natura 2000 območij
- sodelovanje v mednarodni raziskavi razširjenosti in bionomije rogača (*Lucanus cervus*) v Evropi, ki je evropska varstveno pomembna vrsta

Vzorčenje podzemne favne na prodiščih Soče pri Bovcu
Sampling of groundwater fauna in the Soča River near Bovec

Jelševec (*Astacus astacus*) iz Bloščice na Blokah
The European crayfish (*Astacus astacus*) from the stream Bloščica at Bloke

Opazovanje ptic na Ljubljanskem Barju
Bird watching in the Ljubljana Moor

Research Activity

The main research focus at the Department of Freshwater and Terrestrial Ecosystems Research are ecological processes, from both basic and applicative aspects. The studies of terrestrial ecosystems are focused on selected species, their role in the food webs and the impact of climate change on organisms and their environment. Species within our research scope are mainly the birds and various invertebrates. Within the ecology of birds we study the effects of environmental change on populations and interspecific relationships between birds and humans. We are also studying the ecology and species specific dynamics of the beetles inhabiting the subterranean cave ecosystems.

Within aquatic research we study the linkages between ecological characteristics of karstic fractured and porous aquifers, occurrence of groundwater species, particularly crustaceans and direct and indirect human impacts. Research on aquatic ecosystems includes also mountain and alpine ecosystems (lakes) and running waters. Moreover we study physiological and ecophysiological adaptations of native and exotic species on different physical factors (e.g. temperature) under controlled laboratory conditions. We are particularly focused on non-native species of crayfish and their impact on native species.

Within research program **P1-0255 (Communities, relations and communications)**, which is carried out together with the ENTOMO research group and contains 6 main topics the research was conducted within the following four topics:

3. TOPIC: ENVIRONMENT-ORGANISM

- The impact of climate change on the temporal and spatial population dynamics of forest birds and white stork
- Monitoring of meteorological conditions and the composition of cave fauna in the water drips in the experimental karstic cave
- Determining the adaptability of various species of crustaceans to changes in environmental factors, especially temperature by measuring respiration and ETS activity
- Monitoring of physical and chemical properties of water and the occurrence of ground water fauna in the karst springs at the contact of saturated and unsaturated zone

4. TOPIC: INTERSPECIFIC RELATIONS

- Interspecific relationships in the natural forest and grassland communities that link different trophic levels
- Relations between invasive and native species with similar ecological niches

5. TOPIC: BIODIVERSITY

- Surveys of groundwater fauna in the porous aquifer near Ljubljana (Brest) in the cooperation with the company VO-KA
- Reviewing the species list of beetles of European conservation importance in Slovenia, which are the basis for the Natura 2000 sites

Oprema za obročkanje ptičev
Equipment for the bird ringing

Raziskave gnezditvene ekologije kozače (*Strix Uralensis*) na Krimu
A study on nesting ecology of the Ural owl (*Strix Uralensis*) in the Krim mountain

Raziskave intersticijske favne v litoralnem delu Bohinjskega jezera
Investigation of interstitial fauna in the lithoral of Lake Bohinj

- zbiranje podatkov o prisotnosti do sedaj slabo raziskane skupine rakov dvoklopnikov (Ostracoda) na območju Slovenije ter priprava preliminarnega seznama vrst

6. SKLOP: INTEGRALNE RAZISKAVE V EKOSISTEMIH – VPLIV ČLOVEKA NA OKOLJE

- interakcija človeka z okoljem v travniškem in mestnem okolju, ter vplivi na biodiverziteto
- razvoj prostorskega modela za oceno in napovedovanje rabe habitata zaradi klimatskih sprememb (modelna vrsta bela štorklja)
- raziskave na področju invazivnih tujerodnih vrst v vodnih ekosistemih, še posebej invazivnih tropskih vrst v termalnih vodnih telesih
- primerjalna ekološka raziskava procesov razgradnje snovi na dveh alpskih poplavnih ravnicah z različnimi klimatskimi razmerami in intenziteto antropogenih pritiskov
- ocena pretoka energije in kroženje snovi v različnih tipih jezer, ki se razlikujejo po globini, trofičnem stanju in intenziteti izpostavljenosti antropogenemu vplivu

Glavni dosežki v letu 2011

V letu 2011 smo zaključili sodelovanje v mednarodnem projektu **Alp Water Scarce (Pomanjkanje vode v Alpah).** Izdelan je bil pregled ranljivosti vodnih teles na območju Alp. Uspešno je bil zaključen tudi podoktorski projekt **Ekološka klasifikacija vodnih sistemov na območju Julijskih Alp in Karavank in ocena ranljivosti zaradi vpliva podnebnih sprememb.** Raziskava je pokazala, da so vodonosniki v tem prostoru izredno ranljivi ter da so nižji raki (Copepoda, Ostracoda) primerni indikatorji hidrogeomorfoloških in ekoloških lastnosti vodonosnikov. Rezultati raziskave prispevajo k boljšemu poznavanju vpliva človekove dejavnosti in podnebnih sprememb na alpske kraške vodonosnike ter so lahko podlaga za načrtovanje upravljanja z vodnimi viri na raziskovanem območju. V okviru mednarodnega projekta **SILMAS (Mehanizmi za trajnostno upravljanje alpskih jezer)** je potekalo izobraževanje prebivalcev in obiskovalcev Bohinjskega pojezerja ter identifikacija vplivov človekove prisotnosti na jezerske ekosisteme. V letu 2011 smo izvedli tri delavnice na temo trajnostne rabe jezerskega in objezerskega prostora.

Nadaljevali smo z dolgoročnim projektom **Monitoring varstveno pomembnih vrst hroščev v okviru evropskega omrežja Natura 2000**, kjer smo opravili raziskave varstveno pomembnih, a na evropskem nivoju ekološko zelo slabo poznanih vrst. Gre za razvoj novih metod vzorčenja in principov spremljanja populacijske dinamike specialističnih in metodološko zahtevnih vrst. Pripravili smo seznam tujerodnih vrst ptic, hroščev in rakov v Sloveniji v okviru projekta **Neobiota Slovenije: Invazivne tujerodne vrste v Sloveniji ter vpliv na ohranjanje biotske raznovrstnosti in trajnostno rabo virov** v sodelovanju z Oddelkom za

- Participation in international studies of distribution and bionomics of stag Beetle (*Lucanus cervus*) in Europe, which is a European species of conservation importance
- Gathering the data on the presence of so far poorly studied crustacean group (Ostracoda) in Slovenia and the preparation of the preliminary list of species

6. TOPIC: COMPLEX AND INTEGRAL RESEARCH OF ECOSYSTEMS - THE IMPACT OF HUMANS ON THE ENVIRONMENT

- Human interactions with the environment in the meadows and urban areas, and impacts on biodiversity
- Development of spatial model to estimate and predict the habitat use due to climate change (modelling species white stork)
- Research on invasive alien species in aquatic ecosystems, especially tropical invasive species in the thermal water bodies
- A comparative ecological study of degradation processes of materials in two alpine floodplains with different climatic conditions and intensity of anthropogenic pressures
- Evaluation of energy flow and circulation of matter in different types of lakes, which vary in depth, trophic status and intensity of exposure to anthropogenic impact

Important Achievements in 2011

In 2011, we completed the international project **Alp Water Scarcity**. An overview of the vulnerability of the water bodies was provided for the whole Alpine area. A postdoctoral project **Ecological classification of water systems in the Julian Alps and Karavanke and vulnerability assessment of the impact of climate change** concluded as well. Research has shown that the aquifers in this area are extremely vulnerable and that the crustaceans (Copepoda, Ostracoda) are suitable indicators of hydrogeomorphological and ecological characteristics of the aquifers. The research results contribute to the better understanding of the impact of human activities and climate change on alpine karst aquifers and can be a basis for future water resources management. Within the international project **SILMAS** (**Sustainable Instruments of Lake Management in the Alpine space**) the educational activities within the Bohinj lake area and identification of the impacts of human presence on the lake ecosystem were carried out. In 2011, we conducted three workshops on the sustainable use of lake and lakeshore area.

We continued a long-term project **Monitoring of conservation priority species of beetles in the Natura 2000 network**, where we conducted surveys of important species by means of conservation priority which are ecologically poorly known in European region. The development of new sampling methods and principles of monitoring population dynamics of specialists and methodologically demanding species was carried out. We have prepared a list of non-native species of birds, beetles and crabs in Slovenia in the framework of the project **Neobiota Slovenia: Invasive alien species in Slovenia and their impact on biodiversity conservation and sustainable use of resources** in cooperation with the Department of Biology, Biotechnical Faculty. The list should be a reference for further studies, it will also include examples of types of impacts on ecosystems, economic activities and made suggestions for limiting introduction and spread of alien species. Together with the Forestry Institute of Slovenia we started to implement the conservation status of the project **Indicators of conservation status and measures to ensure the favorable conservation status of species and habitats in forests of Natura 2000**. This is the first project, which will aim to develop models that will be possible to determine the impact and size of permissible intervention in forest area, in the way that conservation status of populations of indicator species would not be threatened. The project involves modeling of selected indicator species (beetles, birds) and habitat types and experimental works in which they will determine the size of the influence of individual forest-cultivation measures on the populations of these species.

In the project **Invasion of alien species of crayfish and their impact on native species in Slovenia**, we have dealt with the problem of the impact of invasive crayfish species on the domestic species. Effects and interactions were studied from several angles: the ecological (comparison of habitat selection of species), physiological (measuring the metabolic activity of species in the temperature and humidity gradient) and pathological aspects (identifying wild populations infected with crayfish plague *Aphanomyces astaci*), where we cooperated with the Veterinary Faculty. The expected result of the project is to assess the degree of

biologijo Biotehniške fakultete. Seznam naj bi bil referenca za nadaljnje študije, saj bo vključeval tudi primere vplivov vrst na ekosisteme, gospodarske dejavnosti in podal predloge za omejevanje vnosov in širjenja tujerodnih vrst. Skupaj z Gozdarskim inštitutom Slovenije smo začeli izvajati projekt **Kazalci ohranitvenega stanja in ukrepi za zagotavljanje ugodnega stanja ohranjenosti vrst in habitatnih tipov v gozdovih Nature 2000**. Gre za prvi projekt, pri katerem se bo skušalo razviti modele, s katerimi bo mogoče določati vplive in dopustno velikost posegov v gozdni prostor, pri čemer ohranitveno stanje populacij indikatorski vrst ne bi bilo ogroženo. Projekt vključuje modeliranje razširjenosti izbranih indikatorskih vrst (hrošči, ptice) in habitatnih tipov ter eksperimentalni del, v katerem se bo določalo velikost vpliva posameznih gozdno-gojitvenih ukrepov na populacije teh vrst.

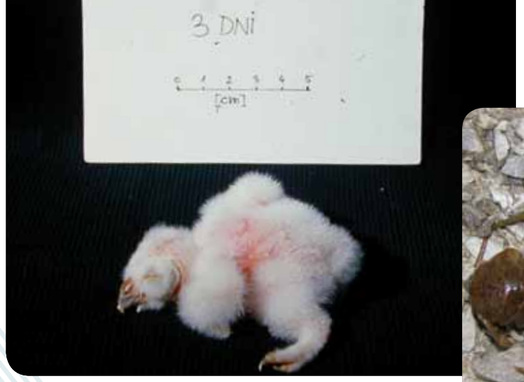
V okviru projekta **Invazivnost tujerodnih vrst potočnih rakov ter njihov vpliv na avtohtone vrste v Sloveniji** smo se ukvarjali s problematiko vpliva invazivnih vrst potočnih rakov na domače vrste. Vplivi in interakcije smo preučujevali iz več zornih kotov: ekološkega (primerjava izbora habitata med vrstami), fiziološkega (merjenje metabolne aktivnosti vrst v temperaturnem in vlažnostnem gradientu) in patološkega vidika (ugotavljanje okuženosti divjih populacij potočnih rakov z račjo kugo *Aphanomyces astaci*), kjer sodelujemo z Veterinarsko fakulteto. Pričakovani rezultat projekta je ocena stopnje ogroženosti celinskih voda zaradi naseljevanja tujerodnih vrst v Sloveniji in s tem tudi gospodarske škode ter posledic za biodiverziteto. Razvili smo **novo metodo za določanje celotne metabolne aktivnosti pri potočnih rakih** na osnovi izmerjene aktivnosti ETS na nogi. Model smo testirali na različnih vrstah rakov (*A. astacus, A. torrentium, A. pallipes, P. leniusculus, O. limosus, C. quadricarinatus*) in ugotovili, da se napovedi iz modela ne razlikujejo značilno od izmerjenih vrednosti. Izdelan model nam tako lahko služi za oceno metabolne aktivnosti pri različno velikih osebkih različnih vrst potočnih rakov, ne da bi jih bilo treba žrtvovati.

Sodelovanje z različnimi uporabniki

Storitve, ki jih nudimo uporabnikom so inventarizacije bioloških elementov, presoje vplivov na okolje ter ekološke analize pri reševanju aktualnih okoljskih problemov. V letu 2011 smo za **Mestno občino Ljubljana (MOL)** popisali ptice v Ljubljani in neposredni okolici po metodi atlasa razširjenosti vrst. Evidentirali smo vrstno pestrost ptic gnezdilk in prezimovalk v odvisnosti od stopnje in oblike urbanizacije. Raziskave sodijo na področje urbane ekologije in bodo v pomoč pri izdelavi načrtov nadaljnjega razvoja mesta (sodelujoči: D. Tome, U. Koce). Za **Ministrstvo za okolje in prostor (MOP)** smo nadaljevali monitoring hroščev v sklopu Natura 2000 omrežja, ki ga zahteva evropska Direktiva o habitatih 92/43/EEC (sodelujoči: A. Vrezec, Š. Ambrožič, A. Kapla). Nadalje smo za **Zavod RS za varstvo narave (ZRSVN)** izvajali monitoring gnezdenja sov na Jelovici (sodelujoči: A. Vrezec). Sodelovali smo tudi s komunalnim podjetjem **VO-KA v Ljubljani**, za katere smo izvedli raziskave prisotnosti podzemne vodne favne na območju črpališča Brest.

GODPODARSKA UPORABNOST RAZISKAV/POSEBEN POMEN ZA DRŽAVO IN POLITIKE

Del raziskav, ki jih izvaja raziskovalna skupina spadajo v t.i. podporne aktivnosti pri različnih odločitvah pri posegih v prostor, ki se navezujejo zlasti na okoljske direktive v povezavi z celinskimi površinskimi in podzemnimi vodami in kopenskimi okolji (travniki, pašniki, gozdovi). Raziskave so uporabne za gospodarske dejavnosti, kot so vodarstvo, kmetijstvo, gozdarstvo, veterina, turizem in tudi naravovarstvene aktivnosti. Raziskave obsegajo inventarizacije bioloških elementov ali pa vplive človekovih posegov na izbrane habitate. Inventarizacije vključujejo popise izbranih rastlinskih in živalskih vrst, njihov populacijski status in tudi stopnjo ogroženosti oz. njihov indikatorski pomen za stanje v okolju. Za podporo strokovnim odločitvam se uporabljajo tudi fizikalne in kemijske analize površinskih ali podzemnih vod, zlasti z vidika organskega onesnaževanja in prisotnosti najpomembnejših spojin v vodi. Za podporo rezultatom se izvajajo ekofiziološke meritve, ki s pomočjo merjenja encimske aktivnosti in meritve porabe kisika ocenjujejo stres organizmov zaradi strupenih ali škodljivih snovi v vodi ali v zraku. Metoda je primerna tudi za raziskave o temperaturnih obremenitvah organizmov oz. o njihovi toleranci do temperaturnega stanja v okolju. S temi raziskavami lahko ugotavljamo posledice klimatskih sprememb na domače vrste rastlin in živali, kot tudi na invazivnost tujerodnih vrst, tako v vodi kot tudi na kopnem. Ugotavljanje temperaturnega optimuma posameznih vrst oz. njihovo odpornost na visoke/nizke temperature lahko pomembno prispevajo k ohranjanju domačih vrst kot tudi za kontrolo tujerodnih vrst, zlasti v kontroliranih oz. zaprtih prostorih ali pa pri določanju temperaturnih režimov pri izpustih toplotno obremenjenih vod (hladilne vode) v naravne vodotoke.



Zgodnja stopnja razvoja male uharice (*Asio otus*)
Early stage in the development of Long-eared Owl (*Asio otus*)

Austropotamobius sp. - endemit Kolpe s pritoki, najden šele leta 2005
Austropotamobius sp. - endemic species from the river Kolpa and its tributaries found in 2005

Redni monitoring visokogorskih jezer
Regular monitoring of high alpine lakes

threat to inland waters due to occurence of alien species in Slovenia, and thus the economic damage and the consequences for biodiversity. Moreover, we have developed **a new method for determining the overall metabolic activity in crabs** on the basis of the measured ETS activity in the leg. The model was tested on various species of crabs (*A. astacus, A. torrentium, A. pallipes, P. leniusculus, O. limosus, C. quadricarinatus*) and indicated that the predictions of the model do not differ significantly from the measured values. A model can serve to assess the metabolic activity of different sized individuals of different species of crayfish, without being sacrificed.

Collaboration with Various Users

Services that we provide for end-users are the inventory of biological elements, environmental impact assessment and environmental analysis to address current environmental problems. In 2011, we surveyed birds in the immediate surroundings of Ljubljana for the **Municipality of Ljubljana (MOL)**. We recorded species diversity of nesting and hibernating birds as a function of the level and form of urbanization. This research was within the field of urban ecology and it will help for better city planning (involved: D. Tome, U. Koce). We continued to monitor bettles within the Natura 2000 network for the **Ministry for the Environment and Spatial Planning (MESP)**, as requires the European Habitats Directive 92/43/EEC (involved A. Vrezec, Š. Ambrožič, A. Kapla). Furthermore, we carried out monitoring of nesting owls on Jelovica for the **Institute for Nature Conservation (IRSNC)** (A. Vrezec). We also cooperated with the municipal company **VO-KA** in Ljubljana, where we conducted surveys of aquatic fauna is the groundwater wells of porous aquifer near Brest.

ECONOMICAL APPLICATIBILITY OF THE RESEARCH/ SPECIAL SIGNIFICANCE FOR THE STATE AND POLICY

Part of our research includes the support activities for various decisions regarding land use and spatial planning, in order to follow the European environmental directives and national laws coping with the management of inland surface water, groundwater and terrestrial environments (meadows, pastures, forests). Our research can be support for sustainable approaches within economic activities such as water use, agriculture, forestry, veterinary science, tourism and conservation actions. Our expertise includes inventory of the biological elements and identification of the effects of human interventions on ecosystems. Inventory is composed of inventory of selected plant and animal species, their population status, threat and importance for the ecosystem functioning. We are carrying out physical and chemical analysis of surface or ground waters, particularly in terms of organic pollution. Ecophysiological measurements

Gnezdilnice za spremljanje biologije gnezdenja ptic
Artificial nest to study nesting biology of birds

Priprave na terensko vzorčenje na visokogorskih jezerih
Preparation for the field sampling of high alpine lakes

Raziskave bentosa in hiporeika v reki Bači pri Tolminu
A study of benthic and hyporheic fauna in the Bača River near Tolmin

Poleg zgoraj navedenih aktivnosti člani skupine EKO sodelujejo tudi pri različnih izobraževalnih aktivnostih izven organiziranega študija. V to so vključena razna posvetovanja, okrogle mize z uporabniki, predavanja za zainteresirano javnost. Vsebine predavanj obsegajo ekološke in naravarstvene teme, prvenstveno povezane z vodami, pticami ali hrošči.

Z obstoječo opremo in znanjem lahko opravljamo:

- pobiranje vzorcev sedimenta in živalstva v različnih vodnih okoljih (kraške jame, prodišča, vodnjaki, jezera)
- analize kakovosti vode
- meritve pretokov vode
- meritve koncentracij kisika, pH in prevodnosti v vodi
- strupenost/škodljivost določenih kemijskih spojin v vodi ali v zraku, ki vplivajo na vedenje/dihanje organizmov
- izvajanje monitoringa na izbranih skupinah vodnih in kopenskih organizmov (raki, ptice, hrošči, dvoživke)
- svetovanja pri posegih v okolje z vidika omilitvenih ukrepov

Raziskovalna infrastruktura

POMEMBNI INŠTRUMENTI IN OPREMA

- terenski digitalni profesionalni snemalnik zvoka (Marantz PMD660).
- parabolični občutljivi mikrofon Telinga.
- Ionski kromatograf IC Metrohm Compact 761 Compact 2x.
- Plinski kromatograf z masnim detekorjem Agilent 6890N – 6890N z avtomatskim podajalnikom vzorcev 7683B.
- Sušilnik S-50.
- Tehtnica Sartorius BP210.
- Tehtnica Sartorius ME-5.
- Spektrofotometer Lambda 25.
- Merilec kisika OXY 4-mini (Presens)
- ADC Flow meter, OTT
- Sonde za merjenje kisika in prevodnosti WTW 340i.
- Hladilnik Liebherr premium.
- Mikroskopa Olympus (BH2 & BX50)
- Lupi Olympus (SZH & SZX12)
- Program ArcGIS9

Mednarodno sodelovanje

Z **Univerzo v Zagrebu (Hrvaška)** smo sodelovali pri razvoju prostorskih modelov rabe habitata na primeru bele štorklje

Z raziskovalci z **EAWAG-a (Švica)** smo razvili nove, funkcionalne indikatorje za oceno ekosistemske integritete. Kot modelen ekosistem so služile alpske poplavne ravnice, ki so heterogen in dinamičen sistem, hkrati pa tudi pod močnim pritiskom človekovih dejavnosti. Raziskava je vključevala kombinacijo terenske primerjalne študije dveh rečnih sistemov (Soča, Slovenija in Urbach, Švica) ter kontroliranih laboratorijskih poskusov.

by measuring enzyme activity and oxygen consumption under controlled laboratory conditions enable us to estimate the stress due to toxic substances or thermal stress. With these studies we can compare ecological tolerance of domestic and invasive alien species. Knowledge about temperature optimum and species resistance to high or low temperatures can significantly contribute to the conservation of native species, as well as can help to control non-native species.

In addition to the above-mentioned activities we are also involved in various educational activities. This includes consulting, round tables with the users, lectures for the public. Content of courses is primarily related to groundwater, bird or beetle ecology.

With the existing equipment and knowledge we can:

- Collect samples of sediment and fauna in different aquatic environments (caves, wells, lakes)
- Analyse water quality
- Measure flow and discharge
- Measure oxygen concentrations, pH and conductivity in the water
- Estimate toxicity/dangers of certain chemical compounds in the water or in the air affecting the behavior or respiration of organisms
- Monitor selected groups of aquatic and terrestrial populations (plankton, crustaceans, birds, beetles, amphibians)
- Consult which mitigation measures are the most efficient projects

Research Infrastructure

IMPORTANT INSTRUMENTS AND EQUIPMENT

- Field professional digital sound recorder (Marantz PMD660)
- Sensitive parabolic microphone Telinga
- Ion Chromatograph Compact IC Metrohm 761 Compact 2x
- Gas chromatograph with mass detector and outsampler Agilent 6890N - 6890N-7683B
- Oven S-50
- Microbalance Sartorius BP210
- Microbalance Sartorius ME-5
- Spectrophotometer Lambda 25
- Oxygen meter OXY 4-mini (Presens)
- ADC Flow meter, OTT
- Probes to measure oxygen and conductivity WTW 340i
- Freezer Liebherr Premium
- Olympus microscope (BH2 & BX50)
- Compound microscope Olympus (SZH & SZX12)

International Collaboration

With the **University of Zagreb (Croatia)** we are developing spatial models for habitat use with white stork as a model species.

With the researchers from **EAWAG's (Switzerland)**, we developed new functional indicators for assessing ecosystem integrity. We have used alpine floodplains as a model ecosystem, since they are extremely heterogeneous and dynamic system, and at the same time under intense human pressure. The study included a combination of comparative field study of two river systems (Soča, Slovenia and Urbach, Switzerland) and laboratory experiments.

In 2011 we completed the bilateral scientific cooperation between Slovenia and the Republic of Poland, where we studied with the researchers from **the University of Nicolaus Copernicus University in Torun (Poland)** the role of specific groups of organisms in the mineralization processes in different types of shallow lakes. We found out that the depth of the lakes and their trophic status and the presence of macrophytes affect the mineralization process and the circulation of matter and energy flow in the ecosystem.

Educational Activities and Promotion of Science

In our research group we take care for flow of knowledge to laic public, for promotion of science and its popularization. In 2011, we published more than 25 popular science articles in the most popular media, such as attachments of the daily Delo (Polet, Znanost) and in the popular ornithological journal Svet ptic. In addition, we contributed to the TV broadcasts on national television TV Slovenia (1 program, Biotopes: invasive animals by: A. Vrezec, M. Jaklič) and, on Pop TV (Show Trenja - Birds are falling from the sky, the authors: T . Trilar, D.Tome, B. Turk, B. Liem). We were also involved in a radio show on Radio Slovenia (2nd program, Val 202, Polonica, by A. Vrezec) and Radio Koper (Ecological emitting, A. Brancelj). In 2011, Dr. Davorin Tome and Al Vrezec with co-authors published a textbook Evolution, biodiversity and ecology, and behavior of animals, biotechnology and microbiology, human and natural resources, biological basis of healthy life that are intended for high school high school program.

V letu 2011 se je zaključilo bilateralno znanstvenoraziskovalno sodelovanje med Republiko Slovenijo in Republiko Poljsko, kjer smo z raziskovalci z **Univerze Nicolaus Copernicus v Tórunu (Poljska)** raziskovali vlogo posameznih skupin organizmov v procesih mineralizacije v različnih tipih plitvih jezer. Ugotovili smo, da globina jezer, njihovo trofično stanje in prisotnost makrofitov vplivajo na mineralizacijske procese ter kroženje snovi in pretok energije v ekosistemu.

Izobraževalne dejavnosti in promocija znanosti

V raziskovalni skupini skrbimo za prenos strokovnega znanja v laično javnost, promocijo znanosti ter njeno popularizacijo. V letu 2011 smo objavili več kot 25 poljudnoznanstvenih prispevkov v najbolj branih medijih, kot denimo priloge dnevnega časopisa Delo (Znanost, Polet) ter v poljudni ornitološki reviji Svet ptic. Poleg tega smo se predstavili v TV oddajah na nacionalni televiziji TV Slovenija (1. Program, Oddaja Biotopi: invazivne živali, avtorja: A. Vrezec, M. Jaklič) in komercialni Pop TV (Oddaja Preverjeno - Ptice padajo z neba, avtorji: T. Trilar, D.Tome, B. Turk, B. Kryštufek). V oddaji, katere namen je osveščati javnost o problemu invazij tujerodnih vrst v naravnih ekosistemih smo predstavili prve izsledke raziskav projekta, v katerem se ukvarjamo s problematiko tujerodnih vrst potočnih rakov v Sloveniji. Kot primer smo prikazali novo odkrito populacijo tujerodnega avstralskega raka rdečeškarjevca *Cherax quadricarinatus* v termalni mrtvici Topla. Vključeni smo bili tudi v radijske oddaje na Radiu Slovenija (2. program, Val 202, Polonice, avtor A. Vrezec) ter Radiu Koper (Ekološka oddaja, avtor A. Brancelj).

V letu 2011 sta dr. Davorin Tome in dr. Al Vrezec z soavtorji izdala učbenika *Evolucija, biotska pestrost in ekologija,* ter *Vedenje živali, Biotehnologija in mikrobiologija, Človek in naravni viri, Biološke osnove zdravega življenja* ki sta namenjena gimnazijskemu srednješolskem programu.

Najpomembnejše objave v 2011

TOME, Davorin. Post-fledging survival and dynamics of dispersal in Long-eared Owls Asio otus. *Bird study*, 2011, vol. 58, no. 2, str. 193-199. [COBISS.SI-ID 2373455]

S pomočjo radijskih oddajnikov smo določili smrtnost med speljanimi mladiči male uharice. Ugotovili smo, da je bistveno večja kot se je smatralo do sedaj.

MORI, Nataša, SIMČIČ, Tatjana, LUKANČIČ, Simon, BRANCELJ, Anton. The effect of in-stream gravel extraction in a pre-alpine gravel-bed river on hyporheic invertebrate community. Hydrobiologia (Den Haag), 2011, vol. 667, no. 1, str. 15-30. [COBISS.SI-ID 2354255]

V raziskavi smo opazovali kako odvzemanje gramoza iz rečne struge vpliva na vodne nevretenčarje, na aktivnost biofilma, ter na kvaliteto vode, ki se pretaka skozi prod. Število in vrstna pestrost nevretenčarjev se je zelo znižala takoj po odvzemu. Sestava združbe se je povrnila v prvotno stanje šele po 5-7 mesecih. V raziskavi se je pokazal škodljiv vpliv povečane količine finega sedimenta v produ na gostoto in vrstno pestrost nevretenčarjev ter na aktivnost biofilma.

HARVEY, Deborah J., VREZEC, Al. Bionomics and distribution of the stag beetle, Lucanus cervus (L.) across Europe. Insect conserv. divers. (Print), 2011, vol. 4, iss. 1, str. 23-38. [COBISS.SI-ID 2338639]

Članek obravnava razširjenost in bionomijo rogača (*Lucanus cervus*), vrsto evropskega varstvenega pomena. Gre za ključno referenco za nadaljnje raziskave te vrste v Evropi, ki je razkrilo močne populacije v južnem delu Evrope, tudi v Sloveniji, in pospešeno izumiranje vrste v severnem delu Evrope, zlasti v zahodni Evropi.

Oprema za vzorčenje intersticijske favne
Equipment for sampling of interstitial fauna

Tujerodni tropski rak Rdečeškarjevec (*Cherax quadricarinatus*) prvič odkrit v Sloveniji in v Evropi
The first tropical alien crayfish species in European waters: the redclaw *Cherax quadricarinatus*

Vzorčenje favne v povirnih delih vodotokov s Hessovim vzorčevalnikom
Sampling of headwater benthic fauna with Hess sampler

Main Publications in 2011

TOME, Davorin. Post-fledging survival and dynamics of dispersal in Long-eared Owls Asio otus. *Bird study*, 2011, vol. 58, no. 2, str. 193-199. [COBISS.SI-ID 2373455]

Mortality in postfledging period was determined in Long-eared Owls using radio--transmitters. We found it to be much higher as previously thought.

MORI, Nataša, SIMČIČ, Tatjana, LUKANČIČ, Simon, BRANCELJ, Anton. The effect of in-stream gravel extraction in a pre-alpine gravel-bed river on hyporheic invertebrate community. Hydrobiologia (Den Haag), 2011, vol. 667, no. 1, str. 15-30. [COBISS.SI-ID 2354255]

In this study we observed how in-stream gravel extraction affects hyporheic invertebrate community, biofilm activity and water quality. Invertebrate densities and taxonomic richness recovered relatively fast, while the community composition recovered 5-7 months after the impact. The negative impact of fine sediments (<0.1 mm) on biofilm activity and hyporheic invertebrate density and taxonomic richness was strongly confirmed in this study.

HARVEY, Deborah J., VREZEC, Al. Bionomics and distribution of the stag beetle, Lucanus cervus (L.) across Europe. Insect conserv. divers. (Print), 2011, vol. 4, iss. 1, str. 23-38. [COBISS.SI-ID 2338639]

This original article analyses the distribution and bionomics of stag beetle (*Lucanus cervus*) across Europe. The results demonstrated a strong population in the southern Europe, also Slovenia and decline of European north population, especialy in western Europe.

Meritve kisika v plitvem hiporeiku reke Soče pri Bovcu
Measurements of oxygen concentrations in the shalow hyporheic zone of the Soča River near Bovec

Najdba jamskega brzca *Typhlotrechus bilimeki* v Veliki Pasici pri Igu
Record of cave beetle *Typhlotrechus bilimeki* in the cave Velika Pasica near Ig

Vzorčenje jamske vodne favne v Veliki Pasici pri Igu
Sampling of aquatic cave fauna in the cave Velika Pasica near Ig

RAZISKOVALNI PROGRAM, KI GA FINANCIRA JAVNA AGENCIJA ZA RAZISKOVALNO DEJAVNOST REPUBLIKE SLOVENIJE
RESEARCH PROGRAM FINANCED BY SLOVENIAN RESEARCH AGENCY

- Združbe, odnosi in komunikacije v ekosistemih (P1-0255); vodja programa: prof. dr. Anton Brancelj *Communities, relations and communications in the ecosystems (P1-0255); the research programme leader: prof. dr. Anton Brancelj*

RAZISKOVALNI PROJEKTI, KI JIH FINANCIRA JAVNA AGENCIJA ZA RAZISKOVALNO DEJAVNOST REPUBLIKE SLOVENIJE
RESEARCH PROJECTS FINANCED BY SLOVENIAN RESEARCH AGENCY

- Invazivnost tujerodnih vrst potočnih rakov ter njihov vpliv na avtohtone vrste v Sloveniji (L1-2169); nosilec projekta: prof. dr. Anton Brancelj *Invasive potential of alien crayfish species and their effects on native species in Slovenia (L1-2169); principal investigator: prof. dr. Anton Brancelj*
- Ekološka klasifikacija vodnih sistemov na območju Julijskih Alp in Karavank in ocena ranljivosti zaradi vpliva podnebnih sprememb (Z1-2213); nosilka projekta: dr. Nataša Mori *Ecological classification of water systems in Julian Alps and Karavanke belt and the vulnerability assessment due to climate change impacts (Z1-2213); principal investigator: dr. Nataša Mori*
- Ocena tveganja za receptorske organizme iz antropološko spremenjenih travniških in gozdnih habitatov (L1-4320); pridruženi partner: prof. dr. Davorin Tome *Ecological Risk Assessment of Receptor Organisms Inhabiting Anthropogenically Influenced Grasslands and Forest Habitats (L1-4320); joint partner: prof. dr. Davorin Tome*

MEDNARODNI RAZISKOVALNI PROJEKTI
INTERNATIONAL RESEARCH PROJECTS

- Toplotna adaptacija ektotermnih organizmov: povezava med življenjsko strategijo, fiziologijo, vedenjem in genetiko; Evropska znanstvena fundacija (2006 - 2011); vodja projekta: Wolf Blackhorn *Thermal adaptation in ectotherms: Linking life history, physiology, behaviour and genetics; European Scientific Fundation (2006 – 2011); project leader: Wolf Blackhorn*

BILATERALNI RAZISKOVALNI PROJEKTI
BILATERAL RESEARCH PROJECTS

- Bilaterala Slovenija - Črna Gora: Razvoj orodij monitoringa ptic za opredelitev in trajnostno rabo velikih območij izjemnega naravovarstvenega pomena (BI-ME/10-11-11); (2010–2011); vodja projekta: doc. dr. Damijan Denac *Bilateral Slovenia – Montenegro: Development of waterfowl monitoring tools for the establishment and sustainable use of outstanding large scale nature-conservation areas (BI-ME/10-11-11); (2010–2011); project manager: doc. dr. Damijan Denac*
- Bilaterala Slovenija - Poljska: Vloga posameznih delov biocenoze v procesih mineralizacije v različnih tipih plitvih jezer (BI-PL/10-11-008); (2010-2011); vodja projekta: dr. Tatjana Simčič *Bilateral Slovenia - Poland: The role of various components of the biocoenosis in the mineralization processes in shallow lakes of different types (BI-PL/10-11-008); (2010-2011); project manager: dr. Tatjana Simčič*
- Bilaterala Slovenija - Brazilija: Vplivi klimatskih sprememb na življenjske procese vodnih živali (BI-BR/11-13-00); (2011-13); vodja projekta: prof. dr. Anton Brancelj *Bilateral Slovenia - Brazil: Effects of climate changes to animals in temporary water bodies (BI-BR/11-13-00); (2011-13); project manager: prof. dr. Anton Brancelj*
- Bilaterala Slovenija - Japonska: The functional role of hyporheic zone in different river ecosystems: a comparative study (JP/11-13-008); (2011-2013); vodja projekta: dr. Nataša Mori *Bilateral Slovenia - Japan: The functional role of hyporheic zone in different river ecosystems: a comparative study (BI-JP/11-13-008); (2011-13); project manager: dr. Nataša Mori*

CILJNI RAZISKOVALNI PROJEKTI
TARGER RESEARCH PROJECTS

- Konkurenčnost Slovenije 2006 - 2013: Neobiota Slovenije: Invazivne tujerodne vrste v Sloveniji ter vpliv na ohranjanje biotske raznovrstnosti in trajnostno rabo virov (V1-1089); (NIB – doc. dr. Al Vrezec), pridruženi partnerji *Competitiveness of Slovenia 2006 - 2013: Slovenian Neobiota: Invasive alien species in Slovenia and the impact on biodiversity conservation and sustainable use of resources (V1-1089) (NIB - doc. dr. Al Vrezec), joint partners*
- Zagotovimo si hrano za jutri: Kazalci ohranitvenega stanja in ukrepi za zagotavljanje ugodnega stanja ohranjenosti vrst in habitatnih tipov v gozdovih Nature 2000 (V4-1143), (NIB – doc. dr. Al Vrezec), pridruženi partnerji *Providing the food for tomorrow: Indicators of conservation status and measures to ensure the favorable conservation status of species and habitats in forests of Natura 2000 (V4-1143), (NIB - doc. dr. Al Vrezec), joint partners*

RAZVOJNI PROJEKTI
DEVELOPMENT PROJECTS

- Dodatne raziskave kvalifikacijskih vrst Natura 2000 ter spremljanje stanja populacij izbranih ciljnih vrst hroščev v letih 2010 in 2011 (financer: Ministrstvo RS za okolje in prostor, pogodba št. 2511-10-250017) (nosilec: doc. dr. Al Vrezec). *Additional studies of species qualified in Natura 2000 and monitoring of selected populations of target species of beetles in 2010 and 2011 (financier: Ministry RS for spatial planning and environment, contract no. 2511-10-250017) (project manager: doc. dr. Al Vrezec)*

DRUGI RAZISKOVALNI PROJEKTI
OTHER RESEARCH PROJECTS

- Priprava Atlasa ptic Ljubljane; financer MOL; vodja projekta: prof. dr. Davorin Tome. V Ljubljani in okolici smo popisali in prešteli ptice v času gnezdenja in v času prezimovanja. *Preparation of the Bird Atlas for the city of Ljubljana, financier MOL, project manager: prof. dr. Davorin Tome. We surveyed birds in Ljubljana city and surroundings during breeding and wintering period.*

ORGANIZACIJA ZNANSTVENIH IN STROKOVNIH SREČANJ
ORGANIZATION OF SCIENTIFIC AND PROFESSIONAL MEETING

- Mednarodni posvet Biološka znanost in družba: Povezanost procesov, Ljubljana, Slovenija (6.-7. 10. 2011); organizator Zavod RS za šolstvo, doc. dr. Al Vrezec; član organizacijskega odbora. *International Conference on Bioscience and Society: Interdependences of processes Ljubljana, Slovenia (6. -7. 10. 2011); organizer Institute RS for education. doc. dr. Al Vrezec, a member of the organizing committee*

OBISKI IN ŠTUDIJSKA IZPOLNJEVANJA NA TUJIH RAZISKOVALNIH INŠTITUCIJAH
VISITS AND SCIENTIFIC STUDIES AT INSTITUTIONS ABROAD

- Dr. Nataša Mori: EAWAG, Department of Aquatic Ecology, Dübendorf, Švica
- Dr. Nataša Mori: Oak Ridge National Laboratory, Environmental Sciences Division, Oak Ridge, TN, ZDA
- Allen Wei Liu: Aristotle University of Thessaloniki, Thessaloniki, Greece

OBISKI IZ TUJINE
VISITORS FROM ABROAD

- prof. dr. Thorsten Assmann, Institute of Ecology, Leuphana University Lüneburg, Lüneburg, Nemčija
- dr. Claude Meisch, National Natural History Museum of Luxembourg, Luksemburg
- Santi Watiroyram, PhD student, Applied Taxonomic Research Center, Department of Biology, Faculty of Science, Khon Kaen University, Khon Kaen, Tajska

ČLANSTVA V ODBORIH MEDNARODNIH ORGANIZACIJ, DELOVNIH TELES, EKSPERTNIH SKUPINAH
MEMBERSHIP OF INTERNATIONAL BOARDS AND EXPERT GROUPS

- Prof. dr. A. Brancelj: 11th International Conference on Copepoda (Merida, 10.-17. July 2011)
- Doc. dr. A. Vrezec: EURAPMON (Research and Monitoring for and with Raptors in Europe), European Science Fundation

DRUGA DELA
OTHER ACTIVITIES

- Prof. dr. D. Tome, doc. dr. A. Vrezec: člana Strokovnega odbora za vsebine Direktive o ptican in Direktive o habitatih (Ministrstvo RS za okolje in prostor)
- Prof. dr. D. Tome: Svet za Varstvo Okolja Republike Slovenije
- Prof. dr. D. Tome: Znanstveni odbor za delo z GSO v zaprtih sistemih

SODELUJOČE ORGANIZACIJE
COOPERATING INSTITUTIONS

Domače
National

- Oddelek za biologijo, Biotehniška fakulteta, Univerza v Ljubljani *Department of Biology, Biotechnical Faculty, University of Ljubljana*
- Univerza v Novi Gorici, Fakulteta za znanosti o okolju, Nova Gorica *University of Nova Gorica, Faculty of environmental sciences Nova Gorica*
- DOPPS - Društvo za opazovanje in proučevanje ptic Slovenije, Ljubljana *DOPPS – BirdLife Slovenia, Ljubljana*
- Center za kartografijo favne in flore (CKFF), Miklavž na Dravskem polju *Center for Cartography of Fauna and Flora (CKFF), Miklavž na Dravskem polju*
- Geološki Zavod RS, Ljubljana *Geological Survey RS, Ljubljana*
- Prirodoslovni muzej Slovenije, Ljubljana *Natural History Museum, Ljubljana*
- Ministrstvo za okolje in prostor, Ljubljana *Ministry of environment and spatial planning*
- Biološki inštitut Jovana Hadžija, ZRC SAZU, Ljubljana *Biological institute of Jovan Hadži; ZRC SAZU, Ljubljana*
- Inštitut "Jozef Stefan", Ljubljana *Institute "Jozef Stefan", Ljubljana*
- Gozdarski inštitut Slovenije, Ljubljana *Slovenian forestry institute, Ljubljana*
- Veterinarska fakulteta, Univerza v Ljubljani, Ljubljana *Veterinary Faculty, University of Ljubljana, Ljubljana*

Tuje
International

- EAWAG, Department for Aquatic research, Dübendorf, Switzerland
- Echime University, Matsuyama, Japan
- University of Nicolaus Copernicus, Tórun, Poland
- University of Zagreb; Faculty of Science; Division of Biology, Zagreb, Croatia

UREDNIŠKI ODBORI
EDITORS

- *Acrocephalus*. Vrezec, Al (član uredniškega odbora 1999-). Ljubljana: Društvo za opazovanje in proučevanje ptic Slovenije, 1980-. ISSN 0351-2851. [COBISS.SI-ID 7679234]
- *Annales. Series historia naturalis*. Tome, Davorin (član uredniškega odbora 1994-). Koper: Zgodovinsko društvo za južno Primorsko: Znanstveno raziskovalno središče Republike Slovenije = Capodistria: Società storica del Litorale: Centro di ricerche scientifiche della Repubblica di Slovenia = Koper: Science and Research Centre of the Republic of Slovenia, 1994-. ISSN 1408-533X. http://www.zrs-kp.si/SL/Zaloznistvo/annales/annali_naturali.htm. [COBISS.SI-ID 71951360]
- *National geographic*. Vrezec, Al (član uredniškega odbora 2009-). Ljubljana: Rokus, 2006-. ISSN 1854-4851. [COBISS.SI-ID 225874688]
- *Scopolia*. Vrezec, Al (član uredniškega odbora 2009-). Ljubljana: Prirodoslovni muzej Slovenije, 1978-. ISSN 0351-0077. http://www2.pms-lj.si/publikacije/scopolia/scop_vsebina.html. [COBISS.SI-ID 15960578]
- *Svet ptic*. Vrezec, Al (član uredniškega sveta 2000-). Ljubljana: Društvo za opazovanje in proučevanje ptic Slovenije DOPPS, 2000-. ISSN 1580-3600. [COBISS.SI-ID 107164672]

PREDAVANJA IN SEMINARJI
LECTURES AND SEMINARS

- MORI, Nataša. Združbe vodnih nevretenčarjev v prehodnih habitatih kot indikatorji antropogenega stresa: Oak Ridge National Laboratory, Environmental Sciences Division, Oak Ridge, TN, ZDA, marec, 2011 *Aquatic invertebrate communities in border habitats: their use as indicators of anthropogenic stress: Oak Ridge National Laboratory, Environmental Sciences Division, Oak Ridge, TN, USA, March 11, 2011*
- VREZEC, Al. Invazijski proces tujerodnih vrst s primeri iz Slovenije. Mednarodni posvet Biološka znanost in družba, Ljubljana, 6. in 7. oktober 2011 *Invasive process of non-native species with examples from Slovenia. Conference on Bioscience and Society, Ljubljana, Slovenia, October 6th-7th, 2010*
- VREZEC, Al. Delovanje ekosistema: vloga biotskih odnosov. Sestanek študijske skupine za Biologijo, OŠ Žalec, Žalec, 16.3.2011 (organizator: Zavod RS za šolstvo) *Ecosystem functioning: the role of biological relationships. Meeting of the expert group for biology, Elementary school Žalec, Žalec, March 16th, 2011 (organizer: Institute RS for education)*
- VREZEC, Al. Evolucijski in ekosistemski pomen biotskih odnosov. Sestanek študijske skupine za Biologijo, OŠ Žalec, Žalec, 16.3.2011 (organizator: Zavod RS za šolstvo) *Evolutionary and ecosystem importance of biological relationships. Meeting of the expert group for biology, Elementary school Žalec, Žalec, March 16th, 2011 (organizer: Institute RS for education)*
- VREZEC, Al. Delovanje ekosistema: vloga biotskih odnosov. Sestanek študijske skupine za Biologijo, Biotehniška fakulteta, Ljubljana, 12.3.2011 (organizator: Zavod RS za šolstvo) *Ecosystem functioning: the role of biological relationships. Meeting of the expert group for biology, Biotechnical Faculty, Ljubljana, March 12th, 2011 (organizer: Institute RS for education)*
- VREZEC, Al. Evolucijski in ekosistemski pomen biotskih odnosov. Sestanek študijske skupine za Biologijo, Biotehniška fakulteta, Ljubljana, 12.3.2011 (organizator: Zavod RS za šolstvo) *Evolutionary and ecosystem importance of biological relationships. Meeting of the expert group for biology, Biotechnical Faculty, Ljubljana, March 12th, 2011 (organizer: Institute RS for education)*
- VREZEC, Al. Delovanje ekosistema: vloga biotskih odnosov. Sestanek študijske skupine za Biologijo, Ekonomska šola Murska Sobota, Murska Sobota, 23.3.2011 (organizator: Zavod RS za šolstvo) *Ecosystem functioning: the role of biological relationships. Meeting of the expert group for biology, School for Economy Murska Sobota, Murska Sobota, March 23rd, 2011 (organizer: Institute RS for education)*
- VREZEC, Al. Evolucijski in ekosistemski pomen biotskih odnosov. 2. Sestanek študijske skupine za Biologijo, Ekonomska šola Murska Sobota, Murska Sobota, 23.3.2011 (organizator: Zavod RS za šolstvo) *Evolutionary and ecosystem importance of biological relationships. Meeting of the expert group for biology, School for Economy Murska Sobota, Murska Sobota, March 23rd, 2011 (organizer: Institute RS for education)*
- VREZEC, Al. Perspektiva žuželk. Delavnica Kaverljag 016 - Žuželke za slepe in slabovidne, Mednarodna delavnica vizualne komunikacije za slepe in slabovidne, Grintovec, 8.-16.7.2011 (organizator: Društvo Kaverljag, Akademija za likovno umetnost iz Lecce, Moholy-Nagy univerza za umetnost in oblikovanje iz Budimpešte, Jan Matejko akademija za likovno umetnost iz Krakova, Akademija za likovno umetnost in oblikovanje Ljubljana) *Our insects perspective. Workshop Kaverljag 016 – Insects for blind and visually disabled, International workshop of visual communication for blind and visually disabled, Grintovec, July 8th-16th, 2011 (organizer: Društvo Kaverljag, Akademija za likovno umetnost iz Lecce, Moholy-Nagy univerza za umetnost in oblikovanje iz Budimpešte, Jan Matejko akademija za likovno umetnost iz Krakova, Akademija za likovno umetnost in oblikovanje Ljubljana)*
- VREZEC, Al. Paritvene strategije ptic. Letna skupščina DOPPS, Grand hotel Union, Ljubljana, 18.2.2011 *Birds mating strategies. BirdLife Annual meeting, Grand hotel Union, Ljubljana, February 18th, 2011*
- VREZEC, Al. Paritvene strategije ptic. Raziskovalni tabor študentov biologije 2011, OŠ Sveti Jurij ob Ščavnici, Sveti Jurij ob Ščavnici, 24.7.2011 *Birds mating strategies. Research camp of biology students 2011, Elementary school Sveti Jurij ob Ščavnici, Sveti Jurij ob Ščavnici, July 24th, 2011*

MAGISTRSKA DELA
MASTER'S THESES

- ODER, Martina. Razširjenost koliformnih bakterij v Bohinjskem jezeru/Sources of coliform bacteria in Lake Bohinjsko Jezero. Mentor/supervisor: prof. dr. Anton Brancelj
- RIBEIRO, Daniela. Razširjenost invazivne vrste Robinia pseudacacia v SV Sloveniji/Distribution patterns of the invasive species Robinia pseudacacia in northeast Slovenia. Član komisije/Member of comitee: dr. Damijan Denac

DOKTORSKA DELA
DOCTORAL THESES

- PAJK, Franja. Ocena temperaturne občutljivosti različnih vrst iz rodu Daphnia/Estimation of thermal sensitivity of different species within the genus Daphnia. Mentorja/supervisors: prof. dr. Anton Brancelj, dr. Tatjana Simčič

Meritve respiracije na testnih organizmih
Measurements of respiration under controlled laboratory conditions

Merjenje fiziološkega odziva rib na spremembe v temperaturi vode
Measurements of physiological response of the fish to the changes in water temperatures

Meritve potencialne respiracije
Measurements of respiratory potential

4.0

Oddelek za entomologijo - ENTOMO

Department of Entomology – ENTOMO

0105-004

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SCIENTIFIC STAFF

1. prof. dr. Andrej Blejec, univ. dipl. ing. mat., znanstveni svetnik
2. dr. Meta Virant-Doberlet, univ. dipl. biol., znanstvena svetnica
3. dr. Jasna Kralj, univ. dipl. biol., znanstvena sodelavka
4. dr. Nataša Stritih, univ. dipl. biol., znanstvena sodelavka
5. dr. Maja Zorović, univ. dipl. biol, asistentka z doktoratom
6. dr. Alenka Žunič, univ.dipl .biol., asistentka z doktoratom

MLADI RAZISKOVALCI
YOUNG RESEARCHERS

1. mag. Maarten de Groot, asistent z magisterijem
2. Danilo Bevk, univ. dipl. biol., asistent
3. Maja Derlink, univ. dipl. biol., asistentka
4. Andreja Kavčič, univ. dipl. biol., asistentka
5. Vera Zgonik, univ. dipl. biol., asistentka
6. Anka Kuhelj, univ. dipl. biol., asistentka
7. Jernej Polajnar, univ. dipl. biol., asistent

Antenacija med samico in samcem zelene smrdljivke (*Nezara viridula*).
Antennation between female and male of the green stink bug (*Nezara viridula*).

Kranjska čebela *Apis mellifera carnica*.
Carniolan honeybee *Apis mellifera carnica*.

Snemanje vibracijskih signalov škržatka iz rodu *Aphrodes*.
Recording of vibrational signals of a leafhopper from the genus *Aphrodes*.

Raziskovalna dejavnost

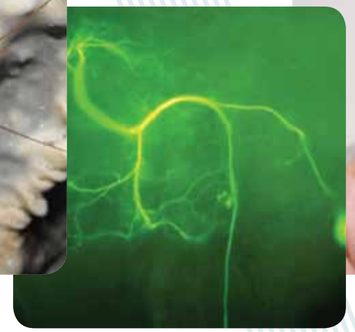
Oddelek za entomologijo v skladu s svojo vizijo in dolgoročno usmeritvijo raziskuje življenje žuželk na različnih nivojih. Temeljne raziskave so osredotočene na vedenje povezano z znotrajvrstno in medvrstno komunikacijo, na študij živčne osnove le-tega, populacijsko genetiko in na vpliv bolezni na vedenje in fiziologijo žuželk. Predmet raziskav so ekonomsko pomembne vrste žuželk kot so čebele, rastlinske stenice, škržatki in hrošči ter vrste, ki so značilne za ekstremna okolja kot so na primer jamske kobilice, ki žive v slovenskem podzemlju. V okviru študija komunikacije sodelavci skupine proučujejo mehanske in kemične signale, njih oddajanje, zaznavanje, informacijsko vrednost in prenos preko medija. Vsi ti podatki služijo razumevanju delovanja živčnih mrež, ki jih sodelavci skupine raziskujejo na nivoju posameznih celic od receptorjev do integracijskih centrov v možganih. Genetsko variabilnost raziskovalci skupine proučujejo znotraj populacij, pri čemer so pozorni na populacijsko strukturo in diferenciacijo, evolucijske odnose, genski pretok in razširjanje, ter vzorce introgresije in hibridizacije. Na podlagi molekularnih metod in vedenja raziskujejo prehranjevalne interakcije med nevretenčarskimi plenilci in plenom. V obdobju zadnjih nekaj let je skupina razširila svoj spekter raziskav na biologijo medonosnih čebel, zlasti na vpliv bolezni in pesticidov na njihove fiziološke procese in vedenje. Aplikativne raziskave so zasnovane na izsledkih temeljnih raziskav in posegajo na področja vpliva pesticidov na vedenje in imunski sistem izbranih vrst žuželk, biološko kontrolo ter na področje uporabe laserske tehnologije pri bioloških raziskavah. V letu 2011 je skupina svoje raziskave razširila tudi na področje nadzora karantenskih škodljivcev. V povezavi z Oddelkom za entomologijo Univerze v Kaliforniji Riverside (ZDA) v okviru bilateralnega projekta testirajo raziskovalci Oddelka učinkovitost različnih kemičnih substanc kot snovi, ki privabljajo različne vrste hroščev v feromonske pasti.

Raziskovalno delo Oddelka za entomologijo poteka v okviru naslednjih smiselno povezanih sklopov; (a) Vedenje in komunikacija žuželk (b) Nevrobiologija, (c) Genetsko molekularne raziskave in (d) Raziskave čebel, (e) Bioakustične metode za nadzor vnosa in potencialnega širjenja škodljivih organizmov ter (f) Kemična ekologija in feromonske pasti.

A) VEDENJE IN KOMUNIKACIJA ŽUŽELK

V letu 2011 je skupina nadaljevala z raziskavami vibracijske komunikacije pri različnih vrstah polkrilcev; stenicah *Nezara viridula* (L.), *Eushistus heros* Fabricius), *Chinavia ubica* (Rolston), *Chinavia impicticornis* (Stal), *Palomena prasina* (L.), *Holcostethus abbreviatus* Uhler in *Podisus nigrispinus* (Dallas) (Heteroptera: Pentatomidae), ter pri škržatkih iz rodu *Aphrodes* (Hemiptera: Cicadellidae), svetlečem škržatku *Hyalesthes obsoletus* Signoret in ameriškem škržatku *Scaphoideus titanus* Ball. Pomemben del raziskav na področju vedenja predstavljajo tudi študije prehranjevalnih interakcij med

Jamska kobilica *Troglophilus neglectus* se v jamah skriva poleti preko dneva, pozimi pa tam preživi diapavzo.
The cave cricket *Troglophilus neglectus* hides in caves during daytime in the summer and hibernates there in the winter.



Vibracijski internevron v trebušnjači jamske kobilice, obarvan s fluorescentnim barvilom.
Vibratory interneuron in the ventral nerve chord of a cave cricket, filled with fluorescent dye.

Azijski kozliček *Anoplophora glabripennis*.
Asian longhorn beetle *Anoplophora glabripennis*.

Research Activity

At the Department of Entomology various aspects of insect biology are investigated in the scope of the long-term research program. Basic research is focused on the behaviour related to intra- and interspecific communication, the neuronal basis of behaviour, population genetics and the impact of diseases on the behaviour and physiology. The investigated animals include economically important species like honey bees, plant bugs, planthoppers, leafhoppers and beetles, as well as species living in extreme habitats like the cave cricket, which inhabits Slovenian karst. In the frame of communication studies we investigated the composition of mechanical and chemical signals, properties of their emission and the informational value, characteristics of transmission in the natural media, as well as their reception and perception. All these data help to understand the function of the neural networks at the level of individual neurons, from the receptor organs to the higher centers in the ventral cord and the brain. The studies of genetic variability were focused on the population structure and differentiation, evolutionary relationships, genetic flow, dispersion, and patterns of introgression and hybridisation. Based on the behavioural and molecular methods, trophic interactions were studied among the invertebrate predators and their prey. In the last years the scope of the research has broadened significantly to include studies of biology of honeybees, which are focused mainly on the impact of diseases and pesticides on the behaviour and the underlying physiology. The applied research, based on the findings of basic studies, is related to the impact of pesticides on the behaviour and the function of immune system of selected species, biological control and to application of laser technology into biological studies. In 2011 we have expanded our investigations also to the field of quarantine pest control management. Important novelty of the group research are studies in the field of chemical ecology. Together with the Department of Entomology of the University of California Riverside (USA) the group tests in the frame of the bilateral project the efficiency of chemical substances that attract different Coleoptera species into the pheromone traps.

Research activities of the Department of Entomology are divided into the topics presented below; (a) Insect behaviour and communication (b) Neurobiology, (c) Genetic and molecular investigations (d) Bee research, (e) Bioacoustic methods for pest management and (f) Chemical ecology and pheromone traps.

A) INSECT BEHAVIOUR AND COMMUNICATION

In the year 2011 the research group proceeded to investigate vibrational communication of different Hemiptera species like the bugs *Nezara viridula* (L.), *Eushistus heros* Fabricius), *Chinavia ubica* (Rolston), *Chinavia impicticornis* (Stal), *Palomena prasina* (L.), *Holcostethus abbreviatus* Uhler in *Podisus nigrispinus* (Dallas) (Heteroptera: Pentatomidae), and leafhoppers in the genus *Aphrodes* (Hemiptera: Cicadellidae), leafhopper *Hyalesthes obsoletus* Signoret and *Scaphoideus titanus* Ball. In the frame of

Vzorčenje poskusnih živali – stenic vrste *Nezara viridula*.
Collecting experimental animals – green stinkbugs of the species *Nezara viridula*.

Muha goseničarka *Trichopoda pennipes* zajeda na zeleni smrdljivki.
Tachinid fly *Trichopoda pennipes* is a parasite of the southern green stinkbug.

Dnevni ulov stenic.
Daily catch of stinkbugs.

nevretenčarskimi plenilci (pajki) in žuželčjim plenom (škržatki), ki so zasnovane na komunikaciji preko podlage. Pri stenicah in škržatkih smo proučevali preference samcev in samic do napevov partnerjev lastne vrste, prožilce njihovih vibracijskih napevov in vpliv šuma iz okolja na prepoznavanje partnerja, raziskovali smo mehanske lastnosti rastlin kot medijev za prevajanje vibracijskih signalov, ter testirali hipotezo, da pajki izkoriščajo vibracijsko komunikacijo škržatkov kot del strategije lovljenja plena. Na modelu roparske stenice *P. nigrispinus* in plena vrste *N. viridula* smo proučevali medsebojno odzivnost na vibracijske komunikacijske signale obeh vrst. Pri vrsti *E. heros* smo dokazali poleg vibracijske tudi zvočno komunikacijo in ugotovili, da samci spremenijo frekvenčno in amplitudno modulacijo signala kadar je le-ta prekrit s signalom samice. Za detekcijo in registracijo vibracijskih odzivov testiranih živali smo uporabljali lasersko vibrometrijo. V letu 2011 smo poglobili svojo raziskovalno dejavnost na področju kemične komunikacije.

Skupina je nadaljevala z raziskovanjem vpliva vibracijske komunikacije na vedenje povezano z iskanjem partnerja na rastlini. Ugotavljali smo sposobnost samcev vrste *N. viridula* in *A. makarovi* za prepoznavanje in razločevanje pozivnih napevov samic z različnimi časovnimi in amplitudnimi karakteristikami ter pozivnih napevov samic drugih vrst. To smo ugotavljali tako, da smo beležili vedenjske odzive samca med tem, ko smo rastlino hkrati na dveh različnih točkah tresli z različnimi signali. Pri vrsti *N. viridula* smo ugotovili, da napeve samice zamaskirajo signali, ki so daljši oz. je njihova jakost večja od normalnega napeva samice. To se kaže tako, da samci, ki jim hkrati predvajamo kombinacijo takih signalov, dalj časa porabijo za iskanje vira preferenčnega signala na rastlini.

Opravljali smo vedenjske poizkuse na zeleni smrdljivki (*Nezara viridula)*, s katerimi smo želeli ugotoviti prožilce vibracijskih napevov pri obeh spolih. Poizkuse smo izvajali na naravnih gostiteljskih rastlinah stenic, ki predstavljajo podlago za njihovo vibracijsko komunikacijo, in signale registrirali z laserskim vibrometrom. V vsakem sklopu poizkusov smo se osredotočili na drugo modaliteto dražljajev, pri čemer smo izključili vse ostale. Večino poizkusov smo zato opravili pri rdeči svetlobi, ki je žuželke ne zaznajo. Posamezno smo testirali optične, kemične in vibracijske dražljaje pri obeh spolih. Preizkušali smo vpliv sintetičnega feromona samcev v različnih koncentracijah. Izvedli smo obsežne poizkuse s pari samec-samica, z namenom ugotoviti kateri spol pogosteje začne vibracijsko komunikacijo in s katerim napevom. Pri analizi smo iskali vzorce pojavljanja različnih napevov in ugotavljali razlike v času, potrebnem za njihovo sprožitev pri različnih modalitetah dražljajev ter pogostost spontanega petja.

these studies we investigated the male and female preference for intraspecific signals, the influence of different modalities of signals on triggering vibrational communication in either sex, the influence of environmental noise on partner recognition and the mechanical properties of plants as transmission channels for vibratory signals. We started to investigate trophic interactions between invertebrate predators (spiders) and their prey and we tested the hypothesis that spiders exploit leafhopper vibrational signals. On the model of the predatory bug *P. nigrispinus* and prey species *N. viridula* we investigated the mutual responsiveness to communication signals of both species. In the stinkbug species *E. heros* we proved also airborne sound communication and demonstrated that males change the amplitude and frequency modulation of their signals overlapped by those of the female. Laser vibrometry was used for detection and registration of vibrational signals. In 2011 these studies were extended to the field of chemical communication.

The group proceeded with investigation of vibrational communication during mate search behaviour in *N. viridula* and *A. makarovi.* We tested the recognition and discrimination behaviour of males for different temporal and amplitude parameters of the intraspecific and heterospecific female calling song. We applied pre-recorded vibrational signals to two leaves simultaneously and recorded male behaviour. In *N. viridula* we found that when intraspecific female signals were masked by other signals of longer duration and/or higher amplitude, males responded less frequently and they needed more time to locate the source of the intraspecific signal.

We conducted behavioural experiments on the southern green stink bug *N. viridula* to determine which signal modality triggers vibrational communication in either sex. The experiments were conducted on fresh green bean plant, which represents their natural communication substrate. Vibrational songs were recorded by a laser vibrometer. We have focused on a single modality of signal in every set of experiments and excluded all the other modalities. Thus large part of our experiments was done at red light not seen by the insects. We have individually tested optical, chemical and vibrational signals in both sexes. We have also tested different doses of a synthetic pheromone. A number of experiments with pairs of bugs was conducted to find out which sex usually starts vibrational communication. We analysed the patterns of occurrence of different song types, differences in the time taken to trigger the vibrational communication by different modalities as well as the rate of spontaneous singing in both sexes.

We extended bioacoustics research of leafhoppers in genus *Aphrodes*. We found that in *A. makarovi*, the duration of female reply in a duet is influenced by the duration of male call to which she was responding, while longer female signal enabled the male to faster localize the female on the plant. Male searching behaviour was highly specific and they searched only for the source of those vibrational signals that corresponded to the natural parameters of female replies. We investigated the abilities of females of four species in this genus to recognize the vibrational calls of conspecific males. Results showed that female discriminate well between males from different species. We discovered a male call that differs from other previously described species-specific male signals and some female recognize only this type of male call. This acoustic biotype is widespread in S in W Slovenia. In 2011 we started also investigations on behaviour of the leafhopper species *Aphrodes makarovi*.

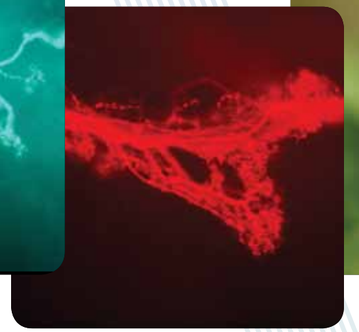
In cooperation with Instituto Agrario San Michele in Italy we investigated vibrational communication of the leafhopper *Scaphoideus titanus* which is the main vector of grapevine disease Flavescence dorée. Important element of vibrational communication in *S. titanus* is well developed intrasexual competition. While the male-female duet is essential for successful localization of female, it is easily disrupted by alternative tactics like disruptive signals emitted by rival male. Rival males use alternative tactics, such as disruptive vibrational signals to break up a duet what consequently results in significantly reduced number of copulations. Mating disruption is possible also by playback of disruptive signals. Experiments in vineyards demonstrated that disturbance signals reproduced over the wire with fixed plant are transmitted over longer distances and that their amplitude is high enough to prevent stable duetting between the male and the female. Investigations of the leafhopper *S. titanus* vibrational signals transmission also demonstrated that vibratory signals can be transmitted from one leaf to another also when there is no physical contact between them. The male and the female were duetting also when the distance between the leaves was 6 cm.

Razširili smo bioakustične raziskave škržatkov iz rodu *Aphrodes*. Ugotovili smo, da je v duetu pri vrsti *A. makarovi* dolžina odgovora samice pogojena z dolžino samčevega vibracijskega signala ter da daljši odgovor samice samcu omogoča, da jo na rastlini hitreje najde. Iskalno vedenje samca je bilo zelo specifično, saj so iskali samo vir tistih vibracijskih signalov, ki ustrezajo naravnim parametrom odgovorov samice. Raziskovali smo tudi preference samic štirih vrst škržatkov iz rodu *Aphrodes* do napevov samcev iste vrste. Rezultati so pokazali, da samice dobro prepoznavajo napeve samcev. Odkrili smo tudi napev samca, ki ne ustreza nobenemu do sedaj poznanemu napevu ter da nekatere samice prepoznajo samo ta napev. Ta akustično ločen biotip je splošno razširjen v J in Z Sloveniji. V letu 2011 smo pričeli tudi z raziskavami rivalnega vedenja pri škržatku vrste *Aphrodes makarovi*. V sodelovanju s Kmetijskim inštitutom v S. Michele-ju v Italiji smo raziskali vibracijsko komunikacijo ameriškega škržatka vrste *Schaphoideus titanus*, ki je glavni prenašalec fitoplazme, ki povzroča zlato trsno rumenico, eno najbolj nevarnih bolezni vinske trte. Pomemben element vibracijske komunikacije tega škržatka je močna tekmovalnost (kompeticija) med samci, ki je izražena v obliki alternativnih taktik. Z omenjenimi taktikami, kot so na primer motilni vibracijski signali, rivalni samec prekine duet med samcem in samico. Vibracijski duet med samcem in samico je nujen, da samec lahko lokalizira samico ter za uspešno parjenje, vendar je hkrati samec tako tudi izpostavljen rivalnim taktikam in ga rivalni samec z motilnimi signali brez težav prekine. Posledica teh prekinitev je bilo zmanjšano število uspešnih parjenj. Parjenje je možno prekiniti rudi s predvajanjem motilnih vibracijskih signalov. Poskusi v vinogradu so pokazali, da se predvajani motilni signali preko žice, na katero je navezana vinska trta prenašajo na daljše razdalje in da je amplituda teh signalov dovolj visoka, da bi lahko preprečila vzpostavitev stabilnega dueta med samcem in samico. Raziskave prenosa vibracijskih signalov ameriškega škržatka so tudi pokazale, da se vibracijski signali lahko prenesejo z lista na list vinske trte tudi v primeru, ko ni fizičnega kontakta med rastlinami. Samec in samica sta vzpostavila duet tudi v primeru, ko je razdalja med listi znašala 6 cm.

V sklopu raziskav mehanizmov komunikacije žuželk smo opravili serijo poizkusov, s katerimi smo preučevali paritveno vedenje pri rastlinski stenici *Holcostethus abbreviatus* na Oddelku za entomologijo Univerze v Kaliforniji, Riverside (ZDA). Cilj raziskave je bil primerjati paritveno vedenje in repertoar komunikacijskih signalov med geografsko ločenima vrstama, med ameriško *H. abbreviatus* in evropsko vrsto *H. strictus*. Rezultati kažejo, da pri obeh vrstah vibracijske signale oddajata oba spola. Spektralne lastnosti oddanih signalov so podobne pri obeh vrstah in so obenem značilne za celotno družino rastlinskih stenic Pentatomidae. Napevi samic se med vrstama razlikujejo po časovnih lastnostih. Več razlik med vrstama je prisotnih med napevi, ki jih oddajajo samci, predvsem glede na vrsto signalov in način produkcije le-teh. V letu 2011 smo raziskave s področja paritvenega vedenja komunikacije stenice *H. abbreviatus* še nadgradili in pričeli z analizami kemične komunikacije pri tej vrsti stenic.

Nadaljevali smo s študijem vedenja in komunikacije jamskih kobilic rodu *Troglophilus*. Pri jamski kobilici *Troglophilus cavicola* (Rhaphidophoridae) smo opravili sistematično raziskavo vzorca vedenja pred in tekom parjenja. Ugotovili smo, da je v primerjavi s simpatrično vrsto *T. neglectus* potek parjenja pri tej vrsti značilno daljši, predvsem zaradi močno podaljšane faze antenacije ter kopule, poleg tega *T. cavicola* med fazo antenacije in kopule ne oddaja vibracijskih signalov s potresavanjem zadka, kot je to značilno za vrsto *T. neglectus*, vendar pa tako kot njena simpatrična vrsta takoj po končani kopuli oddaja tremulacijske signale s potresavanjem celotnega telesa. Spektralne lastnosti vibracijskih signalov se med vrstama na enakem tipu naravne podlage značilno ne razlikujejo; v obeh primerih gre za izredno nizkofrekvenčne vibracije z dominantno frekvenco v območju med 30 in 40 Hz. Značilne razlike v poteku paritvenega procesa med vrstama smo opazili tudi v fazi pred začetkom dvorjenja. V tem času samčki *T. cavicola* ne izbočijo vonjalnih organov na površini zadka, kot je to značilno za samce vrste *T. neglectus*, ter prav tako ne izražajo agresivnega vedenja do rivalov. Razlike med vrstama ne pripisujemo spolni selekciji, saj sta reproduktivna cikla omenjenih vrst časovno zamaknjena, pač pa predvsem njunim ekološkim razlikam, vezanim na habitat parjenja. *T. cavicola* se namreč večinoma pari v jamah, takoj po končanem prezimovanju, *T. neglectus* pa se pari poleti pretežno zunaj jam. To lahko povežemo na eni strani z manjšim pritiskom predacije pri *T. cavicola* ter hkrati z neugodno podlago za vibracijsko komunikacijo pri tej vrsti (skala). Domnevamo, da so pri *T. cavicola* prilagoditve na parjenje v podzemlju vodile do redukcije vibracijske signalizacije in ob tem do podaljšanja paritvenega procesa, kar lahko obravnavamo kot izpeljano stanje za Rhaphidophoridae.

Obarvano aksonalno vlakno vibroreceptorskega nevrona v centralnem živčevju jamske kobilice.
Stained axonal fibre of a single vibroreceptor neurone in the central nervous system of a cave cricket.



Obarvane presinaptične razvejitve snopa vibroreceptorskih nevronov v centralnem živčevju jamske kobilice.
Stained presynaptic branches of a vibroreceptor axon bundle in the central nervous system of a cave cricket.

Škržatek na rastlini.
Cicada sitting on a plant.

In cooperation with the University of California, Riverside, we investigated mating behaviour of stink bug *Holcostethus abbreviatus* Uhler, in order to compare intra-specific communication of two geographically isolated (American and European) species from the genus Holcostethus. In both species males and females produced vibrational signals by vibrations of abdomen. The mean dominant frequencies of recorded signals are similar in both species and are characteristic of the whole family Pentatomidae. In contrast, greater differences between species were observed in temporal characteristics of songs, and in the song repertoire of males. In the year 2011 we broadened the research of mating behaviour of *H. abbreviatus*, and start with research on chemical communication of this species.

We continued with the investigation of behaviour and communication in cave crickets of the genus Troglophilus. We carried out a systematic study of behaviour before and during mating in species *Troglophilus cavicola* (Rhaphidophoridae). We found that duration of mating in *T. cavicola* is significantly longer compared to its simpatric species *T. neglectus*, mainly because of extremely prolonged antennation and copula phases. Unlike *T. neglectus*, *T. cavicola* does not emit vibratory signals by abdomen vibration during antennation and copula. It does, however, emit whole-body tremulatory signals immediately after completing copulation; the same was observed in its sympatric species *T. neglectus*. The spectral characteristics of vibratory signals do not differ between the two species when measured on the same type of substrate. They both emit vibrations at very low frequencies, with dominant peaks at 30 to 40 Hz. There were, however, some significant differences between the species in the mating sequences in the period before the start of courtship. During that time, the males of *T. neglectus* usually protrude scent glands on the abdomen surface and exhibit agressive behaviour towards rivals, while neither of these behaviours was observed in *T. cavicola*. Because the reproductive cycles of *T. cavicola* and *T. neglectus* are time-shifted, the differences between the species are not attributed to sexual selection, but rather to their ecological differences tied to their mating habitat. Namely, *T. cavicola* mates for the most part inside the caves, immediately after they come out of hibernation, while *T. neglectus* mate in summer mainly outside the caves. This can partly be explained by a lower predation pressure in *T. cavicola* and inconvenient surface for vibratory communication in that species (rock). We assume that in *T. cavicola* the adaptations to mating inside the caves lead to reductions of vibratory signalization and therefore prolonged mating process, which may be viewed as a derived position for Rhaphidophoridae.

We continued with the study of transmission of vibratory signals by the stink-bugs *Podisus maculiventris* and *N. viridula*, and artificial vibrational pulses along the model plant *Cyperus alternifolius*. We confirmed previous findings that vibrations transmit efficiently on long distances with very little attenuation, but they exhibit cyclical changes of intensity which depend on frequency. In collaboration with Dr. Daniel Svenšek from the Faculty of Mathematics and Physics, we developed a mathematical description of

Roparske stenice poddružine Asopinae se prehranjujejo z ličinkami drugih vrst žuželk in se uporabljajo pri biološki kontroli.
Predatory stinbugs of the subfamily Asopinae feed on larvae of other insect species and are used in biological control.

Raziskujemo vpliv strupenih snovi na vedenje pašnih čebel.
Effects of pesticides on behaviour of honeybee are studied.

Nadaljevali smo tudi s preučevanjem prenosa vibracijskih signalov stenic vrst *Podisus maculiventris* in *Nezara viridula* ter umetnih pulzov prek stebla modelne rastline *Cyperus alternifolius*. Potrdili smo tezo, da se vibracije prenašajo vzdolž celotne rastline na razdalji do enega metra z zelo malo dušenja. Ugotovili smo., da prihaja med prenosom do rednih cikličnih sprememb jakosti z razdaljo od vira vibracij, ki so odvisne predvsem od frekvenčnih lastnosti signalov. V sodelovanju z dr. Danielom Svenškom s Fakultete za matematiko in fiziko smo matematično opisali povezavo med resonančnimi lastnostmi zelnatega rastlinskega tkiva in opazovanimi pojavi, kar potrjuje hipotezo, da je opazovan pojav stacionarno valovanje. Iz izmerjene velikosti sprememb je možno sklepati, da gre za pomemben element vpliva medija na prenos vibracijskih signalov stenic med oddajnikom in sprejemnikom, ki bo odprl nove možnosti za raziskave osnovnih mehanizmov prepoznave ter iskanja spolnih partnerjev oz. plena pri teh stenicah.

Izvedli smo tudi manjšo raziskavo v sodelovanju z Oddelkom za raziskovanje sladkovodnih in kopenskih ekosistemov (NIB). S snemanjem osebkov rakov škrgonožcev vrste *Chirocephalus croaticus* v laboratoriju smo odkrili zvočne signale, ki imajo verjetno vlogo pri znotrajvrstni komunikaciji. Rezultati poskusov so obdelani in pripravljeni za objavo. To je prvi znan primer zvočne komunikacije v celotni skupini škrgonožcev (Anostraca).

Kot modelno skupino plena za testiranje hipoteze, da pajki izkoriščajo vibracijsko komunikacijo škržatkov kot del strategije lovljenja plena, smo izbrali škržatke iz rodu *Aphrodes*. Kot modelno skupino plenilcev smo izbrali pajke, ki so najpogostejši plenilci iz skupine členonožcev. Za testiranje hipoteze smo uporabili dva zelo različna pristopa. Za določanje nivoja plenjenja v naravi ter identifikacijo pajkov, ki so glavni plenilci škržatkov iz rodu *Aphrodes*, smo uporabili molekularne metode. Te pajke smo zatem uporabili v vedenjskih poskusih, v katerih smo določali, ali vibracijski signali teh škržatkov vplivajo na vedenje pajkov. S specifičnimi oligotidnimi začetniki, ki smo jih zasnovali, smo lahko zasledili DNA Aphrodesa v pajkih tudi še 3-5 dni po tem, ko so se hranili na škržatku. Testirali smo 283 na terenu nabranih pajkov iz devetih družin. Prevladujoča skupina so bili kroglasti pajki (družina Theridiidae), še posebej pajki iz rodu *Enoplognatha*. DNA škržatkov smo zasledili v 14% vseh testiranih pajkov. Samo pajki družin kroglastih pajkov in lijakarjev (Agelenidae) so se v času dveh terenskih sezon izkazali kot zanesljivi plenilci škržatkov. Kako se plenjenje spreminja tekom sezone smo zasledovali na kroglastih pajkih iz rodu *Enoplognatha* nabranih v letu 2008. Zasledili smo statistično značilno razliko med številom pozitivnih pajkov nabranih v začetku junija in v sredini julija. V juniju je bilo pozitivnih le 7% nabranih pajkov, medtem ko smo v sredini julija DNA škržatkov zasledili kar pri dobri četrtini kroglastih pajkov. Tudi struktura populacije škržatkov v teh dveh vzorčenjih se je bistveno razlikovala. V začetku junija so bile prisotne le ličinke, v sredini julija pa je bila večina nabranih škržatkov odraslih samcev. Da bi določili vpliv pajkov na

the plant's resonant properties which correspond to observations. This confirms the hypothesis that the changes represent stationary waves. Judging by the measured magnitude of changes, this phenomenon represents an important part of the influence of the medium on vibrational signal propagation, which in turn opens new questions about basic mechanisms of signal recognition and emitter localization in stink-bugs.

In 2011 we also performed a pilot experiment in collaboration with the Department of Freshwater and Terrestrial Ecosystems Research (NIB). We recorded the fairy shrimp *Chirocephalus croaticus* in laboratory environment and discovered that they emit sound pulses which are possibly used in intraspecific communication. The results are processed and ready for publication. This is the first known case of acoustic communication in the whole order Anostraca.

As a model prey group for studying exploitation of vibrational signals by generalist arthropod predators, we chose leafhoppers of the genus *Aphrodes*. As a model predator group we chose spiders since they are the most numerous group of generalist arthropod predators. To test our hypothesis we used two different approaches. We used molecular methods to determine which spiders are the most significant predators of *A. makarovi* in the field during the leafhopper's mating period. In the next step we used these spiders in behavioural experiments to determine whether vibrational signals of *A. makarovi* influence spider behaviour. We developed species-specific primers that amplify short fragments of *Aphrodes* mitochondrial DNA. Such approach enabled us to detect *Aphrodes* DNA in spiders for up to 5 days after ingestion. In the field we collected 283 spiders from nine families. Molecular screening of field samples indicated that only cobweb spiders (Theridiidae) and funnel-web spiders (Agelenidae) show consistently high rates of predation on *Aphrodes* leafhoppers. The influence of the sampling date on the number of spiders containing *Aphrodes* DNA in their gut was tested on the more numerous cobweb spider of the genus *Enoplognatha*. A significant difference was found between the number of spiders testing positive, collected on 10 June and 14 July, when 7.1 % and 25.5% of cobweb spiders tested positive, respectively. The structure of the *Aphrodes* population at the sampling site also differed between these two sampling dates. On the first sampling date only non-signalling nymphs were present, while by mid July 88.7% of leafhoppers collected were adults that were sexually active. We investigated the effect of spider predation on leafhoppers in microcosms and assessed the impact of wolf spiders (Lycosidae) and cobweb spiders on leafhopper survival. While wolf spiders of the genus *Pardosa* had no effect on leafhopper numbers, *E. ovata* significantly reduced the number of leafhoppers. Furthermore, although presence of *E. ovata* significantly reduced the numbers of both, males and females, the decline in the numbers of males was significantly more rapid. Direct evidence that spiders exploit *Aphrodes* vibrational signals to capture prey was obtained by playing pre-recorded vibrational signals of *A. makarovi* to spiders. Wolf spiders did not show any response to playbacks of *Aphrodes* vibrational signals, however, *E. ovata* spiders spent significantly more time on the plant in the presence of the male calling signal.

B) NEUROBIOLOGY

In the scope of neurobiology field of studies in the year 2011 we carried out some preliminary research on the cave cricket olfactory system. In the species *T. neglectus* we performed antennograms using different concentrations of the abdominal scent glands extract. We tested the efficacy of several organic solvents for the extraction of the scent's active component and established the responsiveness of the antennae to different concentrations of the extract in both sexes. By measuring the sum activity of the antennal nerve (antennogram) we showed that the antennae of both males and females respond to application of 100 µg of scent gland extract in hexane, while lower concentrations of the extract in hexane or the extract in methylene chloride did not evoke responses significantly different from the control treatment.

In 2011 we summarized and analyzed all the data acquired during research into the temporal parameter coding mechanisms of the model insect species *Nezara viridula*, carried out in 2010 and published a paper in a highly cited journal PLoSONE. The processing of temporal parameters of vibratory signals was investigated at the level of ascending interneurons that carry the information on the external stimuli from the sensory neurons towards the brain. The stimulus sequence consisted of 30 pulse duration/interval duration (PD/ID) combinations. The neurons' responses were analyzed and two response arrays were created for each neuron, showing the intensity of the response either as mean or as peak instantaneous spike rate. Mean spike rate response arrays mostly show preference for short pulse durations (below 500 ms) and no selectivity towards interval duration, while the peak spike rate response arrays

umrljivost škržatkov smo zastavili poskuse v mikrokozmosu. Prisotnost pajkov iz družine volkcev (Lycosidae) ni imela nobenega vpliva na število preživelih škržatkov, medtem ko se je v prisotnosti pajkov iz rodu *Enoplognatha* preživelih škržatkov statistično značilno zmanjšalo. Število preživelih samcev je upadalo hitreje kot število samic in statistična analiza je pokazala, da kroglasti pajki uplenijo statistično značilno več samcev kot samic. Da bi neposredno preverili, ali pajki izkoriščajo vibracijsko komunikacijo žuželk, smo pajke dražili s posnetimi vibracijskimi signali škržatkov v tako imenovanih playback poskusih. Pri pajkih iz družine volkcev nismo zasledili sprememb v vedenju medtem, ko so se kroglasti pajki statistično značilno dalj zadrževali na rastlini, ko smo jim predvajali vibracijski signal samcev škržatkov.

B) NEVROBIOLOGIJA

V okviru raziskav živčevja smo v letu 2011 opravljali preliminarne raziskave vonjalnega sistema jamskih kobilic. Pri vrsti *T. neglectus* smo testirali odzive anten na različne koncentracije ekstrakta vonjalnih žlez samcev. Testirali smo učinkovitost različnih organskih topil za ekstrakcijo aktivne komponente vonjave ter ugotavljali odzivnost anten na različne koncentracije ekstrakta pri obeh spolih. Z merjenjem sumarične aktivnosti antenalnega živca (antenografijo) smo ugotovili, da se tako antene samcev kot samic odzivajo na aplikacijo 100 µg ekstrakta vsebine vonjalnih žlez v heksanu, medtem ko se na manjše koncentracije oz. žlezni ekstrakt v v metilen kloridu antene niso odzivale značilno močneje kot na kontrolo.

Na podlagi raziskav mehanizmov kodiranja časovnih parametrov pri modelni vrsti *N. viridula* (zelena smrdljivka) iz leta 2010 smo v letu 2011 analizirali zbrane rezultate ter objavili članek v visoko citirani reviji PlosOne. Procesiranje časovnih parametrov vibracijskih signalov smo raziskali na nivoju vzpenjajočih nevronov, ki prevajajo informacijo o dražljaju s periferije proti možganom. Zaporedje dražljajev smo sestavili iz 30 kombinacij pulz/interval (pulse duration/interval duration (PD/ID)) z različnimi dolžinami obeh parametrov. Rezultate smo predstavili v obliki dveh tipov matrik; jakost odziva nevronov smo predstavili s povprečno frekvenco akcijskih potencialov ter z njihovo maksimalno frekvenco. Matrike prvega tipa so pokazale selektivnost nevronov za kratke pulze (pod 500 ms) in nobene selektivnosti glede dolžine intervalov, medtem ko so matrike drugega tipa pokazale ali selektivnost za kombinacijo kratek PD/dolg ID ali pa nobene selektivnosti. Najmanjši odziv pri vseh nevronih so sprožile kombinacije dolg PD/kratek ID. Nobena od matrik ni pokazala preference za konstantno periodo ali pa razmerje med pulzom in ponavljalnim intervalom. Selektivnost raziskanih vzpenjajočih nevronov se je ujemala s časovnimi parametri nekaterih napevov samcev pri *N. viridula*, kar kaže, da prihaja do filtriranja intraspecifičnih vibracijskih napevov že na nivoju vzpenjajočih nevronov in da razpoznavanje napeva iste vrste ni omejeno zgolj na možganski ganglij.

C) GENETSKO MOLEKULARNE RAZISKAVE

Po podrobnem vzorčenju v Sloveniji in Veliki Britaniji smo pričeli z molekularnimi analizami škržatkov iz rodu *Aphrodes*. Analizirali smo genetsko variabilnost mitohondrijske DNA med vrstami in med populacijami v Sloveniji in Veliki Britaniji. Analizo smo razširili z visoko ločljivimi jedrnimi označevalci (AFLP). Razvili smo specifične oligotidne začetnike (primerje), ki namnožijo manjše fragmente regij genov v mitohondrijski DNK. Uporabili smo jih za analizo muzejskih osebkov. Nadaljevali smo s študijami prehranjevalnih odnosov med nevretenčarskimi predatorji in žuželčjim plenom na osnovi molekularnih metod. Razvili smo specifične oligotidne začetnike (primerje) in jih uporabili za identifikacijo DNK škržatkov v prebavilu pajkov.

D) RAZISKAVE ČEBEL

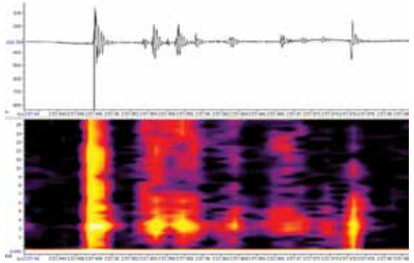
Nadaljevali smo z raziskavami vpliva akaricidov na vedenje pašnih čebel. Akaricidi so sredstva, ki se uporabljajo za zatiranje zajedavske pršice varoje *Varroa destructor*. Raziskovali smo vpliv akaricida kumafosa na asociativno in neasociativno učenje. Vpliv na učenje smo testirali s pomočjo habituacije in klasičnega pogojevanja refleksa iztegovanja rilčka (PER). Čebele, ki so prejele kumafos, so se hitreje habituirale in so dosegle slabši rezultat pri pogojevanju.

E) BIOAKUSTIČNE METODE ZA NADZOR VNOSA IN POTENCIALNEGA ŠIRJENJA ŠKODLJIVIH ORGANIZMOV

L. 2011 smo nadaljevali z razvojem neinvazivne metode za zaznavanje škodljivih organizmov v drevesih in lesnem materialu, ki temelji na laserski vibrometriji. Razvoj metode poteka v sklopu projekta Q-DETECT v 7. okvirnem programu EU, ki se je pričel v marcu l. 2010. Tarčni organizmi v delovnem sklopu Bioakustika, katerega vodja je dr. Andrej Čokl, so azijski kozliček (*Anoplophora glabripennis*), pekarski žagovinar (*Monochamus galloprovincialis*) in drugi kozlički iz rodu Monochamus

Vzorčenje pašnih čebel.
Collecting of forager bees.

Klasično pogojevanje iztegovanja jezička.
Classical conditioning of proboscis extending reflex.



Oscilogram in sonogram signalov, ki so nastali ob prehranjevanju ličinke azijskega kozlička (*Anoplophora glabripennis*) v lesu.
Oscillogram and sonogram of the Asian longhorn beetle larvae feeding sounds from inside the wood sample.

exhibited either short pulse duration/long interval duration selectivity or no selectivity at all. The long pulse/short interval stimulus combinations elicited the weakest responses in all neurons tested. No response arrays showed receiver preference for either constant period or duty cycle. The data gathered so far matches the temporal characteristics of *N. viridula* male calling songs and shows that temporal filtering of the vibratory signals takes place already at lower levels of signal processing and is not confined solely to the brain.

C) GENETIC AND MOLECULAR INVESTIGATIONS

After detailed species collection in Slovenia and Great Britain we started with molecular analyses of leafhoppers in genus *Aphrodes*. We analysed genetic variability between species and between populations in Slovenia and UK. We expanded the analysis to include nuclear markers (AFLP). We developed specific oligonucleotid primers that amplify short fragments of *Aphrodes* mitochondrial DNA cytochome oxidase I gene that we used to analyses archived museum specimens. We continued to study trophic interactions of invertebrate predators and their prey using molecular approach. We developed specific oligonucleotid primers that amplify short fragments of *Aphrodes* mitochondrial DNA cytochome oxidase I gene that we used to analyses archived museum specimens. We continued to study trophic interactions of invertebrate predators and their prey using molecular approach. We developed specific oligonucleotid primers that amplify short fragments of *Aphrodes* mitochondrial DNA cytochome oxidase I gene. These primers were used to detect degraded leafhopper DNA in spider guts.

D) BEE RESEARCH

We continued to study effects of acaricides on behaviour of honeybee foragers. Acaricides are medicaments used to control the parasitic mite varroa *Varroa destructor*. We studied the effect of acaricide coumaphos on associative and non-associative learning. Effects on learning were tested by habituation and classical conditioning of proboscis extension reflex (PER). Treated bees showed faster habituation and lower PER response in conditioning compared to control.

E) BIOACOUSTIC METHODS FOR PEST MANAGEMENT

In 2011 we continued with the development of the non-invasive bioacoustic method for early detection of insect pests in trees, wood and wood packaging material, which is based on laser vibrometry. The method is being developed as a part of the Q-detect project, which started in March 2010 inside the 7th EU framework program. Target organisms in the work package Bioacoustics, led by head of Entomology Dept. at NIB, prof. dr. Andrej Čokl, are the Asian longhorn beetle (*Anoplophora glabripennis*), *Monochamus galloprovincialis* (as vectors of the nematode that causes the pine wilt disease (PWD)) and the red palm weevil (*Rhynchophorus ferrugineus*). The aforementioned species attack ornamental trees in urban areas, fruit trees and forests, and palm trees planted for ornamental purposes (S Spain and S Italy), and in date palm plantations (the Middle East and North Africa). Therefore they pose a serious threat to agriculture and wood industry and in case of ornamental palm trees also to tourism. The

Palmov rilčkar *Rhynchophorus ferrugineus*.
Red palm weevil *Rhynchophorus ferrugineus*.

Palma *Phoenix canariensis*, ki so jo uničile ličinke rdečega palmovega ričkarja.
The palm tree *Phoenix canariensis* dies from the damage done by the larvae of the red palm weevil.

Pregledovanje feromonskih pasti na terenu.
Checking pheromone traps for beetles.

(predvsem kot vektorji borove ogorčice) ter palmov rilčkar (*Rhynchophorus ferrugineus*). Omenjene vrste napadajo okrasna drevesa v urbanih okoljih, sadno drevje v sadovnjakih in gozdove, ter palmova drevesa v okrasnih nasadih ter na datljevih in kokosovih plantažah, zato predstavljajo resno ekonomsko grožnjo kmetijstvu in lesni industriji, palmov rilčkar pa tudi turizmu, v Evropi predvsem v Španiji in Italiji. V državah na bližnjem vzhodu in v S Afriki palmov rilčkar že dolga leta predstavlja še bolj žgoč problem, saj prinaša ogromne ekonomske izgube pri pridelavi datljev. Metoda zaznavanja škodljivcev v lesu z laserskim vibrometrom ima potencial, da zagotovi novo orodje za zgodnje odkrivanje okužbe že v stadiju ličinke in tako omogoči monitoring ob morebitnem vnosu v novo okolje ter izpeljavo potrebnih ukrepov za preprečevanje oz. obvladovanje novih žarišč. V letu 2011 smo se osredotočili predvsem na palmovega rilčkarja ter v sklopu projekta obiskali Sredozemski kmetijski inštitut v Bariju IAMB in Univerzo v Bariju Aldo Moro. V sodelovanju z omenjenima inštitucijama smo z laserskim vibrometrom pridobili posneteke prehranjevanja ličink palmovega rilčkarja v listih palme *Phoenix canariensis*.

F) KEMIČNA EKOLOGIJA IN FEROMSKE PASTI

V letu 2011 smo v sodelovanju z Univerzo v Riversidu iz Kalifornije nadaljevali z raziskavami s področja kemične komunikacije žuželk. Kemični signali, še posebej feromoni, so bili do nedavnega slabo raziskani pri hroščih iz družine kozličkov (Cerambycidae). Poznavanje feromonov, njihove strukture in biološke funkcije je pomembno za razumevanje vedenja, ekologije in evolucije kozličkov, ki sodijo med ekološko in ekonomsko pomembnejše skupine žuželk. Dosedanje raziskave kemične komunikacije kozličkov so bile izvedene na vrstah iz S Amerike in Azije, medtem ko je pomen feromonov in hlapnih snovi gostiteljskih rastlin za vedenje in ekologijo evropskih vrst še vedno neznan. V letu 2011 smo pričeli testirati sposobnost 12 že znanih feromonov kozličkov za privabljanje kozličkov prisotnih na področju Slovenije. Živolovne feromonske pasti tipa Crossvane, tretirane s fluoropolymerom, smo postavili v transektih v dveh tipih gozda. Prvi rezultati so pokazali, da so pasti na osnovi testiranih kemičnih spojin učinkovite pri vzorčenju kozličkov sorodnih vrst tudi na področju Slovenije.

Glavni dosežki v letu 2011

V letih 2011 je Oddelek za entomologijo objavil 20 izvirnih člankov in 1 znanstveni prispevek na konferenci. Od skupno 20 znanstvenih del jih je bilo 19 objavljenih v revijah z IF (9 v prvem, 7 v drugem, 1 v tretjem in 2 v četrtem kvartilu). V 11 delih so bili sodelavci oddelka prvi avtorji. Znanstvena dela so bila objavljena na vseh nosilnih področjih raziskovalne dejavnosti skupine.

Mednarodna dejavnost Oddelka za entomologijo je bila tudi v letu 2011 intenzivna tako na področju formalnih kot neformalnih povezav ter aktivnosti. Sodelavka skupine dr. Meta Virant-Doberlet je na

method for early detection of wood boring beetle larvae using the laser vibrometer has the potential to provide a new tool for pest monitoring at possible entrance points into new areas and to permit necessary measures to be carried out in order to prevent a new outbreak or contain an existing one. In 2011 we focused mainly on the red palm weevil (RPW) and to gather recordings of the RPW larval activity from the infected ornamental palm trees *Phoenix canariensis* in the urban areas of Southern Italy, we visited the Mediterranean Agronomic Institute of Bari (IAMB) and the University of Bari.

F) CHEMICAL ECOLOGY AND PHEROMONE TRAPS

In 2011 we collaborated with University of California Riverside and continued with reserach of chemical communication of insects. Despite the economic importance of many long-horned beetles (Cerambycidae), until recently very little was known about their pheromones. Understanding the role of the pheromones is essential to determine ecology and behaviour of geographically isolated cerambycid species and their evolution. To date, almost all of the data on cerambycid semiochemicals is from research on species native to North America and Asia. There is still little known about the semiochemistry of Old World long-horned beetles. In 2011 we tested a library of 12 known cerambycid pheromones, as attractants for Slovenian ceramybids, in a variety of different forest types. We deployed lures baited with chemicals in cross-vane panel traps coated with Fluon. We suspended traps from tree branches and set out in transects. First field trials also showed promising results from the use of pheromone traps in sampling cerambycids at two different sites in Slovenia.

Important Achievements in 2011

In 2011 Department of Entomology published 20 original scientific articles and 1 scientific contribution at the conference. From 20 articles 19 were published in journals with IF (9 in the first, 7 in the second, 1 in the third and 2 in the fourth quartil). In 11 articles members of the group were the first author. Scientific contributions were published in all the main fields of the group research program.

Intensive international cooperation of the Department of Entomology was characteristic also in 2011 through formal and informal cooperation. Dr. Meta Virant-Doberlet continued her studies related to research of Aphrodes leafhoppers at the University of Cardiff. In 2011 Department proceeded with cooperation in the frame of Q-DETECT (7th EU Framework program) developing new methods for early detection of quarantine organisms. We also continued research in the frame of the bilateral project of scientific and technological cooperation with Brazil (BI-BR/10-12-003, EMBRAPA Brasilia) and in the frame of the bilateral project of cooperation with Turkey (Ondokuz Mayis Univerza, ARRS-MS--TR-05-A/2010). In 2011 Department started also cooperation with the Department of Entomology of the University of California Riverside (USA) at the basis of the bilateral project BI-US/12-13-018 that was accepted for financing in 2011. We have also started with investigations within the 3 years bilateral project between Slovenia and Italy of the title »Tuning of vibrational signals emitted by vectors of phytoplasma grapevine diseases with host plants: potential for an alternative approach of pest management«. In the frame of the COST programme the group performed the project to prevent losses of bee families (COST Action FA0803, COLOSS). In 2011 members of the group also started with investigations within the EU project BICOPOLL of the Core Organic II program.

Education at different levels is an important activity of the Department of Entomology. Its members give lectures at undergraduate and graduate level at Universities of Ljubljana, Nova Gorica and Maribor and on the High School for Environmental Protection in Velenje. Members of the group are tutoring undergraduate and graduate students and are mentors to several young researchers.

In 2011 Department broadened in collaboration with the group of Prof. Dr. Jocelyn G. Millar from the University of California Riverside applied research in the field of semiochemicals that represent an alternative and environmentally friendlier tool for monitoring and control of pest species of the beetle family Cerymbycidae, flies (Tephritidae) and stinkbugs (Pentatomidae).

In the frame of applied research the group continued with research within 2 projects of the CRP programme in the field of biological control and bee loss as well as within the COST COLOSS programme. Public articles about biology of bees and other insects are also an important contribution in popularization of group's research programme.

Univerzi v Cardiffu (Wales) nadaljevala delo v sklopu raziskav škržatkov iz rodu *Aphrodes*. V letu 2011 je Oddelek nadaljeval s sodelovanjem v projektu Q-DETECT (7. okvirni program EU), ki se ukvarja z razvojem novih metod za zgodnje odkrivanje karantenskih organizmov. Oddelek za entomologijo je v letu 2011 nadaljeval tudi raziskave v okviru bilateralnega projekta znanstvenega sodelovanja z Brazilijo (BI-BR/10-12-003, EMBRAPA Brasilia) ter ob bilateralnega projekta znanstvenega sodelovanja z Turčijo (Ondokuz Mayis Univerza, ARRS-MS-TR-05-A/2010). V letu 2011 je tudi potekalo sodelovanje z Oddelkom za entomologijo Univerze v Kaliforniji v Riversidu (ZDA) na podlagi programa bilateralnega projekta BI-US/12-13-018, ki je bil sprejet v financiranje novembra 2011. Pričeli smo z izvajanjem triletnega bilateralnega slovensko-italijanskega projekta z naslovom »Uglašenost vibracijskih signalov, s katerimi se sporazumevajo prenašalci trsnih rumenic, z gostiteljskimi rastlinami: možnost za razvoj alternativnega pristopa za nadzor škodljivcev« (BI-IT/11-13-006). V okviru programa COST smo izvajali projekt povezan z preprečevanjem izgube čebeljih družin (COST Action FA0803, COLOSS). V letu 2011 smo začeli izvajati raziskave v okviru projekta CORE Organic II programa (BI-COPOLL, 155).

Pedagoško delo na različnih nivojih je pomembna dejavnost Oddelka za entomologijo. Njegovi sodelavci poučujejo na do- in podiplomskem nivoju na Univerzah v Ljubljani, Mariboru in Novi Gorici ter na Visoki šoli za varstvo okolja v Velenju. Poleg tega so mentorji diplomantom in doktorandom ter več mladim raziskovalcem.

V letu 2011 je skupina, v sodelovanju s skupino prof. dr. Jocelyna Millarja iz Univerze v Kaliforniji, Riverside, razširila aplikativno dejavnost na področju semiokemikalij, ki predstavljajo alternativno, okolju bolj prijazno sredstvo za spremljanje pojavljanja in zatiranje škodljivih vrst iz družine kozličkov (Cerambycidae), sadnih muh (Tephritidae) in ščitastih stenic (Pentatomidae).

V okviru aplikativne dejavnosti je skupina nadaljevala delo na 2 projektih v okviru programa CRP na področju biološke kontrole in izgub čebel ter v COST COLOSS programu. Pomemben prispevek skupine so tudi poljudne publikacije o življenju čebel in drugih žuželk.

Sodelovanje z različnimi uporabniki

Oddelek za entomologijo se prvenstveno ukvarja s temeljnimi raziskavami na področju nevrobiologije, etologije, populacijske genetike in njim sorodnih področjih pri žuželkah. Zato so glavni in najpomembnejši partnerji Oddelka skupine s podobno usmeritvijo svoje dejavnosti tako doma kot v tujini. Te ustanove so poleg višje in visokošolskih ustanov v Sloveniji tudi najpomembnejši uporabniki rezultatov dela Oddelka.

Najpomembnejši partnerji v Sloveniji so Prirodoslovni muzej Slovenije, s katerim sodelujemo v okviru Programa 0255-0105 ARRS, Biotehniška fakulteta, Kmetijski inštitut Slovenije s katerim dolgoročno projektno sodelujemo na področju genetskih raziskav in čebelarstva in Kmetijsko-veterinarski zavod Nova Gorica (projektno sodelovanje). V povezavi z evropskim projektom Q-DETECT smo navezali tudi neformalno sodelovanje s Fitosanitarno upravo RS in z Oddelkom za gozdarstvo in obnovljive gozdne vire Biotehniške fakultete Univerze v Ljubljani. V tujini so glavni partnerji Oddelka za entomologijo School of Biosciences Univerze v Cardiffu (Wales), Inštitut za čebelarstvo Univerze v Frankfurtu v Oberurslu (Nemčija), Inštitut za zoologijo Karl-Franzens Univerze v Grazu (Avstrija), Oddelek za entomologijo Univerze Kalifornija v Riversidu (ZDA), Univerza v Pisi (Italija), IASMA Research and Innovative Centre San Michele (Italija), Univerza v Cambridgu (Velika Britanija), Inštitut za zoologijo Georg-August Univerze v Goettingenu (Nemčija), UMR PISC INRA Versailles (Francija), EMBRAPA inštitut v Brasilii (Brazilija) in Ondokuz Mayis Univerza v Samsunu (Turčija).

Gospodarski pomen dela Oddelka za entomologijo je v veliki meri indirekten predvsem v obliki pridobivanja novega znanja in aplikacije različnih metod v okviru biološke kontrole škodljivih vrst žuželk in laserske tehnologije. Na področju entomologije je Oddelek za entomologijo v Sloveniji največja raziskovalna skupina in kot taka center znanja na pomembnih področjih, ki posredno vplivajo na razvoj kmetijstva ter družbe v najširšem smislu te besede.

Kozliček (*Monochamus clamator*).
Longhorn beetle (*Monochamus clamator*).

Aeracijski sistem za zbiranje feromonov žuželk.
Aeration system for collecting insect pheromones.

Vzorci lesa listavcev, okuženih z ličinkami azijskega kozlička *Anoplophora glabripennis*. Puščice označujejo rane, ki so nastale na mestih, kjer je samica odložila jajčeca.
Wood samples of varios deciduous trees infested with larvae of the Asian longhorn beetle *Anoplophora glabripennis*. Arrows indicate oviposition sites.

Collaboration with Various Users

The professional activity of the Department of Entomology is primarily focused on basic research of neurobiology, ethology, population genetics and related fields in insects. Therefore the main and most important partners of the Department in Slovenia and abroad are groups with similar research interests. These institutions are together with high schools are also the main users of the group results.

The most important partners in Slovenia are the Natural History Museum of Slovenia in Ljubljana through cooperation within the Program P1-0255 ARRS, the Biotechnical Faculty of the University of Ljubljana, the Institute of Agronomy of Slovenia which we collaborate with on a long-term scale in the field of bee and genetic studies and the Agronomy-Veterinary Institute in Nova Gorica (project collaboration). In the scope of the European project Q-detect we started informal collaboration with the Phytosanitary Administration of Slovenian Ministry of Agriculture, Forestry and Food and with the the Department of Forestry and Renewable Forest Resources of the Biotechnical Faculty at the University of Ljubljana. The main partners outside Slovenia are the Department of Entomology of the School of Biosciences of the University of Cardiff (Wales), Institute for Bee Research of the J.W. Goethe University Frankfurt in Oberursl (Germany), Institute of Zoology of the Karl-Franzens University in Graz (Austria), Department of Entomology of the University of California Riverside (USA), University of Pisa (Italy), Cambridge University (UK), Institue of Zoology of the Georg-August University in Goettingen (Germany), UMR PISC INRA Institute in Versailles (France), EMBRAPA Institute in Brasilia (Brazil) and Ondokuz Mayis University in Samsun (Turkey).

The relevance of the research work of the Department of Entomology lies mainly in pushing the frontiers of basic science and the development and application of different methods for the insect pest biological control and of laser technology in biological research. Department of Entomology is the biggest research group in its field in Slovenia and as such concentrates knowledge in important areas that indirectly have an impact on the development of agriculture and society in the broad sense of view.

Snemanje vibracij, ki nastajajo ob prehranjevanju ličink azijskega kozlička v vzorcih lesa, s pomočjo laserskega vibrometra.
Recording vibrations produced by the larvae of the Asian longhorn beetle using a laser vibrometer.

Ličinka azijskega kozlička *Anoplophora glabripennis*.
Larva of the Asian longhorn beetle *Anoplophora glabripennis*.

Delo na terenu z laserskim vibrometrom v sklopu projekta Q-detect.
Fieldwork using a laser vibrometer in the scope of the Q-detect project.

Raziskovalna infrastruktura

Oddelek za entomologijo je opremljen z osnovnimi aparaturami za raziskave delovanja živčevja na celičnem nivoju, opremo za laboratorijsko in terensko registracijo ter analizo mehanskih dražljajev, ki se prevajajo po zraku ali podlagi, optično mikroskopijo z možnostjo laserske ablacije identificiranih celic v živem zarodku in laserskim sistemom za določanje resonančnih lastnosti bioloških materialov.

Mednarodno sodelovanje

V l. 2011 je Oddelek nadaljeval sodelovanje v projektu Q-DETECT 7. okvirnega programa EU. Projekt združuje 15 partnerjev iz devetih držav. Znotraj projekta tesneje sodelujemo z Avstrijskim inštitutom za gozdarstvo na Dunaju, neformalno pa smo se povezali s Fitosanitarno upravo RS, s Fitosanitarno in gozdarsko upravo Beneške regije v Italiji, Sredozemskim kmetijskim inštitutom v Bariju IAMB, z Univerzo v Bariju ter z Univerzo v Padovi (Italija). V letu 2011 se je tudi nadaljevalo sodelovanje z EMBRAPA inštitutom iz Brazilije (BI-BR/10-12-003, EMBRAPA Brasilia) ter vzpostavilo projektno sodelovanje z Ondokuz Mayis Univerzo v Samsunu (Turčija) Ondokuz Mayis Univerza, ARRS-MS-TR-05-A/2010). Velik pomen ima tudi sodelovanje z Oddelkom za entomologijo Univerze v Kaliforniji Riverside (ZDA) s katero nadaljujemo skupne raziskave v okviru sprejetega bilateralnega projekta (BI-US/12-13-018). Mednarodno sodelovanje se je bistveno poglobilo na področju raziskav čebel z začetkom izvajanja mednarodnega projekta BICOPOLL v okviru CORE Organic II programa. V tem programu sodelujemo z raziskovalci Finske, Estonije, Anglije, Nemčije, Italije in iz Turčije. V okviru programa COST smo izvajali projekt povezan z preprečevanjem izgube čebeljih družin (COST Action FA0803, COLOSS). Razvejano mednarodno sodelovanje omogoča skupini izmenjavo informacij, izkušenj in tehnologije, usposabljanje na podoktorskem nivoju in projektno sodelovanje v okviru različnih mednarodnih programov. To sodelovanje je pomembno tudi zaradi možnosti dela na področjih, za katere skupina ni opremljena oz. za katera nima potrebnih izkušenj. V slednji sklop spadajo skupne raziskave z Univerzo v Cardiffu na področju genetskih raziskav in raziskav, povezanih z kemičnimi signali z Univerzo Kalifornija v Riversidu ter UMR PISC INRA inštitutom v Versaillesu. Konkretne skupne raziskave potekajo tudi z Inštitutom za čebelarstvo Univerze v Frankfurtu v Oberurslu (Nemčija), Univerzo v Pisi (Italija) in Univerzo Karl-Franzens v Grazu (Avstrija). Po končanem doktorskem študiju odhajajo sodelavci Oddelka za entomologijo obvezno za vsaj pol leta na podoktorski študij v tujino.

Research Infrastructure

The Department of Entomology conducts its research program with basic equipment for neurobiological studies at the single cell level, equipment for field and laboratory registration and analyses of mechanical signals, transmitted through the air or substrate, optics with the possibility to ablate identified cells with laser in the living embryo and with the laser system for measuring the resonant properties of biological materials.

International Collaboration

In 2010 the Department joined the 7th Framework EU project Q-DETECT, connecting 15 collaborators from 9 countries worldwide. In the scope of this project we started collaboration with the Austrian Federal Forest Office (BFW) and we are also engaged in informal collaboration with the Phytosanitary and Forestry Services of the Veneto Region (Italy) and the University of Padoa (Italy). In 2011 we continued collaboration with the EMBRAPA Institute from Brasilia (BI-BR/10-12-003, EMBRAPA Brasilia) and started project collaboration with the Ondokuz Mayis University in Samsun (Turkey) (ARRS--MS-TR-05/2010). Most important is also collaboration with the Department of Entomology of the University of California Riverside (USA) with which we continue joint research in the frame of the bilateral project (BI-US/12-13-018). International cooperation has been significantly enhanced in the field of bee research starting with the international project BICOPOLL in the frame of the CORE Organic II program. Within this project we cooperate with scientists from Finland, Estonia, England, Germany, Italy and Turkey. In the frame of the COST programme the group performed the project to prevent losses of bee families (COST Action FA0803, COLOSS). The widespread international collaboration gives the group the opportunity to exchange information, experience and technology, training at the postdoctoral level and joint research within projects of international programs. Such cooperation is important also because of investigations in the fields for which the group lacks know-how and equipment. In such way the group collaborates with the University of Cardiff in the frame of the genetic studies and with the University of California, Riverside (USA) and UMR PISC INRA Institute in Versailles (France) to investigate problems connected with chemical signalling in insects. Direct joined research runs also in collaboration with Bee Institute of the J.W. Goethe University Frankfurt in Oberursl (Germany), University of Pisa (Italy) and the Karl-Franzens University in Graz (Austria). After completing the PhD studies members of the Department of Entomology conduct at least half a year of postdoctoral studies outside Slovenia.

Main Publications in 2011

BEVK, Danilo, KRALJ, Jasna, ČOKL, Andrej. Coumaphos affects food transfer between workers of honeybee Apis mellifera. *Apidologie*, 2011, 6 str., [in press], doi: 10.1007/s13592-011-0113-x. [COBISS. SI-ID 2500175], [JCR] kategorija: 1A1 (Z1, A'); uvrstitev: SCI, Scopus, MBP; tipologijo je verificiral OSICB

In the paper the authors investigated whether coumaphos affects trophallaxis in honeybees. Cumaphos is an organophosphate that is used to control the parasitic mite *Varroa destructor*. When donors received 5 µg of coumaphos they transferred significantly less amount of food. Side effects on trophallaxis could reduce distribution and decrease the efficiency of the agent in the colony.

DE GROOT, Maarten, ČOKL, Andrej, VIRANT-DOBERLET, Meta. Species identity cues : possibilities for errors during vibrational communication on plant stems. *Behav. ecol.*, 2011, vol. 22, str. 1209-1217. http://dx.doi.org/10.1093/beheco/arr115, doi: 10.1093/beheco/arr115. [COBISS.SI-ID 2404175], [JCR, WoS do 6. 12. 2011: št. citatov (TC): 0, čistih citatov (CI): 0, normirano št. čistih citatov (NC): 0, Scopus do 28. 11. 2011: št. citatov (TC): 0, čistih citatov (CI): 0, normirano št. čistih citatov (NC): 0] kategorija: 1A1 (Z1, A'); uvrstitev: SCI, ERIHB, Scopus, MBP; tipologijo je verificiral OSICB

Najpomembnejše objave v letu 2011

BEVK, Danilo, KRALJ, Jasna, ČOKL, Andrej. Coumaphos affects food transfer between workers of honeybee Apis mellifera. *Apidologie*, 2011, 6 str., [in press], doi: 10.1007/s13592-011-0113-x. [COBISS.SI-ID 2500175], [JCR] kategorija: 1A1 (Z1, A'); uvrstitev: SCI, Scopus, MBP; tipologijo je verificiral OSICB

V članku so avtorji pokazali vpliv kumafosa na trofalakso medonosne čebele in opisali dve novi metodi za opazovanje prenosa hrane med čebeljimi delavkami. Kumafos je organofosfat, ki se uporablja za zatiranje zajedavske pršice varoje *Varroa destructor*. Čebele dajalke, ki so prejele 5 µg kumafosa, so darovale bistveno manj hrane. Pokazani negativni stranski učinki lahko negativno vplivajo na razporeditev in učinkovitost kumafosa v čebelji družini.

DE GROOT, Maarten, ČOKL, Andrej, VIRANT-DOBERLET, Meta. Species identity cues : possibilities for errors during vibrational communication on plant stems. *Behav. ecol.*, 2011, vol. 22, str. 1209-1217. http://dx.doi.org/10.1093/beheco/arr115, doi: 10.1093/beheco/arr115. [COBISS.SI-ID 2404175], [JCR, WoS do 6. 12. 2011: št. citatov (TC): 0, čistih citatov (CI): 0, normirano št. čistih citatov (NC): 0, Scopus do 28. 11. 2011: št. citatov (TC): 0, čistih citatov (CI): 0, normirano št. čistih citatov (NC): 0] kategorija: 1A1 (Z1, A'); uvrstitev: SCI, ERIHB, Scopus, MBP; tipologijo je verificiral OSICB

V članku smo kot prvi pokazali, je na 1-dimenzionalnih rastlinskih steblih in listnih pecljih, razlikovanje med vibracijskimi signali, ki jih več oddaljenih oddajnikov na isti strani prejemnika oddaja signale istočasno, težavno, saj jih prejemnik zazna kot sestavljen signal in kot da bi le-ta izviral le iz enega samega vira. Raziskovali smo posledice interakcij med vibracijskimi signali iste vrste oddanimi iz dveh virov za prepoznavanje vrstno-specifičnih časovnih parametrov v eno-dimenzionalnem okolju na rastlinskih steblih. Samci stenice vrste Nezara viridula so zaznali napeva samic iste vrste predvajana z dveh listov v alternaciji kot en napev s ponavljalnim časom izven vrstno-specifične vrednosti. Odzivnost samcev je bila nizka in število samcev, ki so lokalizirali vir signala (samico iste vrste) je bil signifikantno nižji. Nasprotno pa prisotnost napeva in signalov druge vrste ni imela signifikantnega vpliva na proženje iskanja, vendar so v primeru, ko so se signali vrst prekrivali, samci naredili signifikantno več napak pri orientaciji in večina je lokalizirala vir signala druge vrste. Ker v obeh primerih, spregledanju samic iste vrste in izbiri samice druge vrste, napaka samcev v končni fazi pomeni zmanjšan reproduktivni uspeh, sklepamo, da enodimenzionalno okolje na rastlinah postavlja pomembne omejitve za vibracijsko komunikacijo.

ERIKSSON, Anna, ANFORA, G., LUCCHI, Andrea, VIRANT-DOBERLET, Meta, MAZZONI, Valerio. Inter-plant vibrational communication in a leafhopper insect. *PloS one*, 2011, vol. 6, no. 5, str. 1-6. http://dx.doi.org/10.1371/journal.pone.0019692, doi: 10.1371/journal.pone.0019692. [COBISS.SI-ID 2372943], [JCR, WoS do 8. 7. 2011: št. citatov (TC): 0, čistih citatov (CI): 0, normirano št. čistih citatov (NC): 0, Scopus do 13. 6. 2012: št. citatov (TC): 1, čistih citatov (CI): 0, normirano št. čistih citatov (NC): 0] kategorija: 1A1 (Z1, A'); uvrstitev: SCI, Scopus, MBP; tipologijo je verificiral OSICB

V članku smo kot prvi pokazali, da komunikacijska razdalja vibracijskih signalov ni omejena na neprekinjeno podlago ter da je vibracijska komunikacija med osebki na dveh rastlinah možna tudi v primeru, ko rastlini nista v fizičnem kontaktu. Pri škržatku vrste *Scaphoideus titanus* partnerja vzpostavita vibracijski duet tudi preko 6 cm zračne reže med listoma. Prenos vibracijskih signalov z enega lista na drugega preko zraka je verjetno splošen pojav. Visoka občutljivost receptorjev, v povezavi z uglašenostjo rastlin s frekvenčnimi lastnostmi vibracijskih signalov omogoča žuželkam povečanje komunikacijske razdalje preko meja ene rastline.

LAUMANN, Raúl Alberto, ČOKL, Andrej, LOPES, Ana P. S., FEREIRA, Jonatas B. C., MORAES, Maria C. B., BORGES, Miguel. Silent singers are not safe : selective response of a parasitoid to substrate-borne vibratory signals of stink bugs. *Anim. behav.*, 2011, vol. 82, no. 5, str. 1175-1183.http://dx.doi.org/10.1016/j.anbehav.2011.08.017, doi: 10.1016/j.anbehav.2011.08.017. [COBISS.SI-ID 2445135], [JCR, WoS do 6. 12. 2011: št. citatov (TC): 0, čistih citatov (CI): 0, normirano št. čistih citatov (NC): 0, Scopus do 5. 11. 2011: št. citatov (TC): 0, čistih citatov (CI): 0, normirano št. čistih citatov (NC): 0] kategorija: 1A1 (Z1, A'); uvrstitev: SCI, SSCI, ERIHA, Scopus, MBP; tipologijo je verificiral OSICB

Čebele se s pesticidi ne srečajo samo zunaj na paši ampak tudi v panju zaradi uporabe akaricidov za zatiranje pršice varoje.
Honeybees are exposed to the pesticides not only in the field but also in the hive due to use of acaricides to control varroa mite.

Čebele pripravljene na učenje.
Bees prepared for learning experiments.

Razvili in objavili smo dve novi metodi za opazovanje vpliva pesticidov na prenos hrane med delavkami (Bevk in sod. 2011)
A new method for observing effects of pesticides on food transfer was developed and published (Bevk et al. 2011)

In this paper we showed for the first time that in 1-dimensional environment encountered on plant stems and stalks discrimination between vibrational signals emitted from several sources positioned on the same side of a receiver is difficult, as the receiver perceives this compound signal as emanating from a single source. We examined the consequences of interactions between conspecific vibrational signals emitted from two sources for recognition of species-specific temporal patterns. In a 1- dimensional environment on a plant, males of the southern green stink bug *Nezara viridula* perceived conspecific female song emitted in alternation from two sources as a song with a signal repetition time outside the species-specific value. In such situation male responsiveness was low and the number of males locating a source (conspecific female) was significantly reduced. In contrast, in the presence of female signals of the green stink bug *Acrosternum hilare*, searching activity was not significantly affected however, when conspecific and heterospecific signals were overlapping, males made significant orientation errors and majority located the heterospecific source. Since both outcomes, missing the detection of a conspecific female and selecting a heterospecific female, may ultimately lead to a reduced reproductive success, the results suggest that 1-dimensional environment encountered on plant stems and branches imposes important constraints on communication system.

ERIKSSON, Anna, ANFORA, G., LUCCHI, Andrea, VIRANT-DOBERLET, Meta, MAZZONI, Valerio. Inter-plant vibrational communication in a leafhopper insect. *PloS one*, 2011, vol. 6, no. 5, str. 1-6. http://dx.doi.org/10.1371/journal.pone.0019692, doi: 10.1371/journal.pone.0019692. [COBISS.SI-ID 2372943], [JCR, WoS do 8. 7. 2011: št. citatov (TC): 0, čistih citatov (CI): 0, normirano št. čistih citatov (NC): 0, Scopus do 13. 6. 2012: št. citatov (TC): 1, čistih citatov (CI): 0, normirano št. čistih citatov (NC): 0] kategorija: 1A1 (Z1, A'); uvrstitev: SCI, Scopus, MBP; tipologijo je verificiral OSICB

In this paper we were the first one to show that communication range of vibrational signals is not limited by substrate continuity and we demonstrated interplant vibrational communication in absence of physical contact between plants. In the leafhopper *Scaphoideus titanus* partners established a vibrational duet up to 6 cm gap width between leaves. Transmission of vibrational signals from one leaf to another via air may be a common phenomenon. High receptor sensitivity, together with potential tuning of plant resonant frequencies with spectral properties of vibrational signals may enable the insect to extend the communication range beyond the limit of one plant.

Past tipa Crossvane s feromonsko vabo.
Crossvane panel trap with a pheromone lure.

Kozliček (*Spondylis buprestoides*).
Longhorn beetle (*Spondylis buprestoides*).

Pajek vrste *Pisaura mirabilis* med vedenjskim poskusom.
Spider *Pisaura mirabilis* in behavioural expriment.

V članku avtorji kot prvi opisujejo selektivni odgovor parazitoida na vrstno specifične komunikacijske signale raslinskih stenic, ki so njihovi gostitelji. Delo je nadaljevanje raziskav v katerih so isti avtorji dokazali usmerjeno gibanje parazitoidov, ki ga omogočajo vibracijski signali rastlinskih stenic. Usmerjeno gibanje in vrstna specifičnost odgovora sta novost v raziskavah odnosa med različnimi skupinami žuželk, ki odpirata temeljna vprašanja na nivoju zaznavanja in samega mehanizma tega fenomena.

RAY, Ann M., ŽUNIČ, Alenka, ALTEN, Ronald L., MCELFRESH, J. Steven, HANKS, Lawrence M., MILLAR, Jocelyn G. cis-vaccenyl acetate, a female-produced sex pheromone component of Ortholeptura valida, a longhorned beetle in the subfamily Lepturinae. *J. chem. ecol.*, 2011, vol. 37, no. 2, str. 173-178.http://dx.doi.org/10.1007/s10886-011-9908-5, doi: 10.1007/s10886-011-9908-5. [COBISS.SI-ID 2348111], [JCR, WoS do 6. 6. 2012: št. citatov (TC): 3, čistih citatov (CI): 3, normirano št. čistih citatov (NC): 1, Scopus do 13. 6. 2012: št. citatov (TC): 5, čistih citatov (CI): 5, normirano št. čistih citatov (NC): 2] kategorija: 1A2 (Z1); uvrstitev: SCI, Scopus, MBP; tipologijo je verificiral OSICB

Prvi smo opisali strukturo in na terenu potrdili biološko funkcijo spolno specifične sestavine feromona pri hrošču iz družine kozličkov vrste *Ortholeptura valida* (LeConte). Samice oddajajo hlapne izločke, ki vsebujejo spolno specifično komponento (Z)-11-octadecen-1yl-acetate. S pomočjo elektroantenografije smo ugotovili, da spojina izzove močan odziv na antenah samcev. Na terenu se je v feromonske pasti, ki so vsebovale (Z)-1octadecen-1yl-acetate, ujelo statistično značilno več samcev kot na kontrolne pasti, ki niso vsebovale spolno specifične komponente. Identificirani feromon, ki ga oddajajo samice, predstavlja novo strukturo med feromoni kozličkov in je prvi feromon identificiran za vrsto, ki sodi v poddružino Lepturinae.

VIRANT-DOBERLET, Meta, KING, R. Andrew, POLAJNAR, Jernej, SYMONDSON, William O. C. Molecular diagnostics reveal spiders that exploit prey vibrational signals used in sexual communication. *Mol. ecol.*, 2011, vol. 20, no. 10, str. 2204-2216. http://dx.doi.org/10.1111/j.1365-294X.2011.05038.x, doi: 10.1111/j.1365-294X.2011.05038.x. [COBISS.SI-ID 2349903], [JCR, WoS do 6. 6. 2012: št. citatov (TC): 4, čistih citatov (CI): 2, normirano št. čistih citatov (NC): 1, Scopus do 13. 6. 2012: št. citatov (TC): 5, čistih citatov (CI): 2, normirano št. čistih citatov (NC): 1] kategorija: 1A1 (Z1, A'); uvrstitev: SCI, Scopus, MBP; tipologijo je verificiral OSICB

V članku smo kot prvi pokazali, da generalistični predatorji izkoriščajo vibracijsko komunikacijo plena. S kombinacijo terenskega dela in laboratorijskih poskusov smo testirali hipotezo, da plenilci lahko izkoriščajo vibracijske signale, ki jih plen oddaja med spolno komunikacijo. Najprej smo razvili oligotidne začetnike specifične za škržatke iz rodu *Aphrodes* ter posebej še

LAUMANN, Raúl Alberto, ČOKL, Andrej, LOPES, Ana P. S., FEREIRA, Jonatas B. C., MORAES, Maria C. B., BORGES, Miguel. Silent singers are not safe : selective response of a parasitoid to substrate-borne vibratory signals of stink bugs. *Anim. behav.*, 2011, vol. 82, no. 5, str. 1175-1183. http://dx.doi.org/10.1016/j.anbehav.2011.08.017, doi: 10.1016/j.anbehav.2011.08.017. [COBISS.SI-ID 2445135], [JCR, WoS do 6. 12. 2011: št. citatov (TC): 0, čistih citatov (CI): 0, normirano št. čistih citatov (NC): 0, Scopus do 5. 11. 2011: št. citatov (TC): 0, čistih citatov (CI): 0, normirano št. čistih citatov (NC): 0] kategorija: 1A1 (Z1, A'); uvrstitev: SCI, SSCI, ERIHA, Scopus, MBP; tipologijo je verificiral OSICB

The authors describe the selective response of a parasitoid to species specific communication signals of their host stinkbugs. This study upgrades investigations in which the same authors demonstrated directional movement of parasitoids mediated by stinkbug vibrational signals. Directional movement and response species specificity are novelty in the research of relations between different insect groups opening basic questions at the level of sensing and mechanism of this phenomenon.

RAY, Ann M., ŽUNIČ, Alenka, ALTEN, Ronald L., MCELFRESH, J. Steven, HANKS, Lawrence M., MILLAR, Jocelyn G. cis-vaccenyl acetate, a female-produced sex pheromone component of Ortholeptura valida, a longhorned beetle in the subfamily Lepturinae. *J. chem. ecol.*, 2011, vol. 37, no. 2, str. 173-178. http://dx.doi.org/10.1007/s10886-011-9908-5, doi: 10.1007/s10886-011-9908-5. [COBISS.SI-ID 2348111], [JCR, WoS do 6. 6. 2012: št. citatov (TC): 3, čistih citatov (CI): 3, normirano št. čistih citatov (NC): 1, Scopus do 13. 6. 2012: št. citatov (TC): 5, čistih citatov (CI): 5, normirano št. čistih citatov (NC): 2] kategorija: 1A2 (Z1); uvrstitev: SCI, Scopus, MBP; tipologijo je verificiral OSICB

We report the identification, synthesis, and field bioassays of a female-produced sex attractant pheromone component of the cerambycid beetle *Ortholeptura valida* (LeConte). Headspace volatiles from females contained a female specific compound, (Z)-11-octadecen1-yl-acetate, which elicited a strong response from antennae of adult males in coupled gas chromatography-electroantennogram analyses. In field bioassays, significant numbers of males were collected by traps baited with this compound. The pheromone represents a new structural class of cerambycid pheromones, and is the first pheromone identified for a cerambycid species in the subfamily Lepturinae.

VIRANT-DOBERLET, Meta, KING, R. Andrew, POLAJNAR, Jernej, SYMONDSON, William O. C. Molecular diagnostics reveal spiders that exploit prey vibrational signals used in sexual communication. *Mol. ecol.*, 2011, vol. 20, no. 10, str. 2204-2216. http://dx.doi.org/10.1111/j.1365-294X.2011.05038.x, doi: 10.1111/j.1365-294X.2011.05038.x. [COBISS.SI-ID 2349903], [JCR, WoS do 6. 6. 2012: št. citatov (TC): 4, čistih citatov (CI): 2, normirano št. čistih citatov (NC): 1, Scopus do 13. 6. 2012: št. citatov (TC): 5, čistih citatov (CI): 2, normirano št. čistih citatov (NC): 1] kategorija: 1A1 (Z1, A'); uvrstitev: SCI, Scopus, MBP; tipologijo je verificiral OSICB

In this was paper we were the first ones to demonstrate that generalist predators exploit vibrational communication of their prey. A combination of fieldwork and laboratory experiments was used to test the hypothesis that predators can intercept and exploit sexual communication signals of their prey. First, we developed and characterized PCR primers specific for leafhoppers of the genus *Aphrodes* and specifically for the species *A. makarovi*. Spiders were collected from sites where leafhoppers were present and screened with these primers to establish which spider species were significant predators of this species during the mating period of these leafhoppers. Analysis using PCR of the gut contents of tangle-web spiders, *Enoplognatha ovata* (Theridiidae), showed that they consume leafhoppers in the field at a greater rate when signalling adults were present than when nymphs were dominant, suggesting that the spiders were using these vibrations signals to find their prey. Playback and microcosm experiments then showed that *E. ovata* can use the vibrational signals of male leafhoppers as a cue during foraging and, as a result, killed significantly more male than female *A. makarovi*.

za vrsto *A. makarovi*. Pajke smo nabrali na lokacijah, kjer so bili ti škržatki prisotni, ter s pomočjo omenjenih začetnikov analizirali vsebino prebavila pajkov z molekularnimi metodami, da bi ugotovili, katere vrste pajkov so pomembni plenilci teh škržatkov v naravi. Analize so pokazale, da vrsta pajka *Enoplognatha ovata* požre več škržatkov v času, ko so prisotni odrasli osebki, ki se sporazumevajo z vibracijskimi signali. Poskusi v mikrokozmusu in s predvajanjem posnetih vibracijskih signalov škržatkov so pokazali, da pajek te vrste lahko izkoristi vibracijske signale samcev škržatkov kot del strategije lovljenja plena in kot rezultat ubije signifikantno več samcev kot samic škržatka.

ZOROVIĆ, Maja. Temporal processing of vibratory communication signals at the level of ascending interneurons in Nezara viridula (Hemiptera: Pentatomidae). *PloS one*, 2011, vol. 6, no. 10, str. 1-8. http://dx.doi.org/10.1371/journal.pone.0026843, doi: 10.1371/journal. pone.0026843. [COBISS.SI-ID 2450767], [JCR, WoS do 6. 6. 2012: št. citatov (TC): 1, čistih citatov (CI): 1, normirano št. čistih citatov (NC): 0, Scopus do 13. 6. 2012: št. citatov (TC): 1, čistih citatov (CI): 1, normirano št. čistih citatov (NC): 0] kategorija: 1A1 (Z1, A'); uvrstitev: SCI, Scopus, MBP; tipologijo je verificiral OSICB

V članku se prvič lotevamo raziskave kodiranja časovnih parametrov vibracijsih signalov žuželk na nivoju centralnega živčevja. Komunikacija z vibracijskimi signali po rastlinah ima velik pomen za številne žuželke; zlasti so pomembni vrstno- in spolno-specifični signali, združeni v napeve, ki jih oddajajo v času parjenja. Pri zeleni smrdljivki (*N. viridula*), smo raziskali procesiranje časovnih parametrov vibracijskih signalov na nivoju vzpenjajočih nevronov, ki prevajajo informacijo o dražljaju s periferije proti možganom. Zaporedje dražljajev smo sestavili iz 30 kombinacij pulz/interval z različnimi dolžinami obeh parametrov (*pulse duration/interval duration* (PD/ID) *combinations*). Najmanjši odziv pri vseh nevronih so sprožile kombinacije dolg PD/kratek ID. Noben nevron ni pokazal preference ne za konstantno periodo ne za razmerje med pulzom in ponavljalnim intervalom. Ujemanje selektivnosti raziskanih vzpenjajočih nevronov s časovnimi parametri nekaterih napevov samcev pri *N. viridula* kaže na to, da prihaja do filtriranja intraspecifičnih vibracijskih napevov že na nivoju vzpenjajočih nevronov in da razpoznavanje napeva iste vrste ni omejeno zgolj na možganski ganglij.

Samček zelene smrdljivke (*Nezara viridula*) na listu fižola (*Phaseolus vulgaris*).
Male of a green stink bug (*Nezara viridula*) on a green bean (*Phaseolus vulgaris*).

Vibracija rastline s pobudno glavo.
Vibrating the leaf using a minishaker.

Registracija vibracij škodljivca na steblu navadne juke s pomočjo laserskega vibrometra.
Registration of vibrations produced by a pest on a yucca tree using laser vibrometry.

ZOROVIĆ, Maja. Temporal processing of vibratory communication signals at the level of ascending interneurons in Nezara viridula (Hemiptera: Pentatomidae). PloS one, 2011, vol. 6, no. 10, str. 1-8. http://dx.doi.org/10.1371/journal.pone.0026843, doi: 10.1371/journal.pone.0026843. [COBISS.SI-ID 2450767], [JCR, WoS do 6. 6. 2012: št. citatov (TC): 1, čistih citatov (CI): 1, normirano št. čistih citatov (NC): 0, Scopus do 13. 6. 2012: št. citatov (TC): 1, čistih citatov (CI): 1, normirano št. čistih citatov (NC): 0] kategorija: 1A1 (Z1, A'); uvrstitev: SCI, Scopus, MBP; tipologijo je verificiral OSICB

In this paper coding of temporal parameters of vibratory signals in insects at the level of the CNS is tackled for the first time. Communication using vibratory signals through plants is very important for a number of insect groups. In *N. viridula*, the southern green stinkbug, males and females produce sex- and species-specific calling and courtship songs. We examined temporal processing of their communication signals by the first order vibratory interneurons, which ascend from the central ganglion towards the brain. The stimulus sequence consisted of 30 pulse duration/interval duration (PD/ID) combinations. Two response arrays were created for each neuron, showing the intensity of the response either as mean or as peak instantaneous spike rate. The long pulse/short interval stimulus combinations elicited the weakest responses in all neurons tested. No response arrays showed receiver preference for either constant period or duty cycle. The data gathered so far matches the temporal characteristics of *N. viridula* male calling songs and shows that temporal filtering of the vibrational signals occurs already at lower levels of signal processing and is not limited solely to the brain.

RAZISKOVALNI PROGRAM, KI GA FINANCIRA JAVNA AGENCIJA ZA RAZISKOVALNO DEJAVNOST REPUBLIKE SLOVENIJE
RESEARCH PROGRAM FINANCED BY SLOVENIAN RESEARCH AGENCY

- Združbe, odnosi in komunikacije v ekosistemih = *Societies, relations and communications in ecosystems* (P1-0255-0105) – vodja programa prof. dr. Anton Brancelj

RAZISKOVALNI PROJEKTI, KI JIH FINANCIRA JAVNA AGENCIJA ZA RAZISKOVALNO DEJAVNOST REPUBLIKE SLOVENIJE
RESEARCH PROJECTS FINANCED BY SLOVENIAN RESEARCH AGENCY

- Vibracijski čutilni sistem jamske kobilice *Troglophilus neglectus* (Rhaphidophoridae): od signalov do živčnih mrež (vodja projekta prof. Dr. Andrej Čokl) (J1-0823; 2008-2011).
- *Picromerus bidens-Nezara viridula:* modelna študija odnosa predator-plen kot osnova biološke kontrole invazivnih žuželk (vodja projekta dr. Andrej Čokl) (J1-2133; 2009-2012).
- Vibracijski signali, reproduktivna izolacija in nastanek vrst v rodu Aphrodes (Hemiptera; Cicadellidae) (vodja projekta dr. Meta Virant-Doberlet) (J1-4921; 2009-2012).
- Interakcije med nanodelci z različno površino in modelnimi biološkimi sistemi (vodja projekta dr. Damjana Drobne) (J1-4109; 2011-2014).
- Trsne rumenice: metoda zgodnjega odkrivanja in obvladovanja (vodja projekta dr. Marina Dermastia) (V4-1103; 2011-2014).
- Kumulativni in sinergijski učinki različnih kemikalij na čebele (vodja projekta dr. Janko Božič) (V1-1129; 2011-2012).
- Čebelarjenje v AŽ panju in zagotavljanje kakovostnih in varnih pridelkov (vodja projekta dr. Aleš Gregorc) (V4-1114; 2011-2014).

MEDNARODNI RAZISKOVALNI PROJEKTI
INTERNATIONAL RESEARCH PROJECTS

- Q-DETECT, »Developing quarantine pest detection methods for use by national plant protection organizations (NPPO) and inspection services«. 7th EU Framework programme (Grant agreement no.: 245047), Theme KBBE-2008-1-4-01; Call: FP7-KBBE-2009-13) (koordinator WP6 dr. Andrej Čokl)
- Tarčno precizna biokontrola in pospeševanje v ekoloških poljedelskih sistemih BICOPOLL (pog. štev. 2311-11-000180), ERA-NET CORE Organic 2 (koordinator za SLO dr. Andrej Čokl)
- COST Action FA0803 : Prevetion of honeybee COlony LOSSes (COLOSS) (koordinator dr. Jasna Kralj)
- Komunikacija pentatomid in njih uporaba pri zatiranju škodljivcev na soji (BI-BR/10-12-003, EMBRAPA Brasilia) (koordinator dr. Andrej Čokl).
- Določanje načinov intraspecifične zvočne komunikacije stenice vrste *Palomena prasina* L. (Heteroptera: Pentatomidae) (Ondokuz Mayis Univerza, ARRS-MS-TR-05-A/2010).(koordinator dr. Andrej Čokl)
- Monitoring hroščev družine Cerambycidae v Sloveniji s pomočjo spolno specifičnih in agregacijskih feromonov v kombinaciji s hlapnimi snovmi gostiteljskih rastlin, s poudarkom na potencialno škodljivih in zavarovanih vrstah kozličkov. Bilateralni projekt med Repunliko Slovenijo in ZDA (BI-US/12-13-1018). (koordinator dr. Andrej Čokl)
- Pentatomidae communication and their application to soybean pest management. Bilateralni projekt med Republiko Brazilijo in Republiko Slovenijo (BI-BR/10-12-003) (koordinator dr. Andrej Čokl)
- Tuning of vibrational signals emitted by vectors of phytoplasma grapevine seceases with host plants: potential for an alternative approach of pest management. Bilateralni project med Republiko Italijo in Republiko Slovenijo (koordinator dr. Meta Virant-Doberlet)

OBISKI IN ŠTUDIJSKA IZPOLNJEVANJA NA TUJIH RAZISKOVALNIH INŠTITUCIJAH
VISITS AND SCIENTIFIC STUDIES AT INSTITUTIONS ABROAD

- dr. Meta Virant-Doberlet, School of Bioseciences, University of Cardiff, Wales,
- dr. Alenka Žunič, Oddelek za entomologijo Univerze v Kaliforniji, Riverside
- dr. Andrej Čokl, Ondokuz Mayis Univerza Samsun, Turčija
- dr. Andrej Čokl, Embrapa, Brasilia, Brazilija
- dr. Maja Zorović, Universita di Bari, Italija
- dr. Maja Zorović, *L'Istituto Agronomico Mediterraneo di Bari* IAMB, Italija

OBISKI IZ TUJINE
VISITORS FROM ABROAD

- Sandor Koszor, Department of Entomology, Plant Protection Institute, Hungarian Academy of Sciences
- Dr. Raul A. Laumann, EMBRAPA, Brasilia (Brazilija)
- Dr. Miguel Borges, Embrapa, Brasilia (Brazilija)
- Prof. dr. Celal Tuncer, Ondokuz Mayis Univerza Samsun, Turčija
- Dr. Islam Saruhan, Ondokuz Mayis Univerza Samsun, Turčija

ČLANSTVA V ODBORIH MEDNARODNIH ORGANIZACIJ, DELOVNIH TELES, EKSPERTNIH SKUPINAH
MEMBERSHIP OF INTERNATIONAL BOARDS AND EXPERT GROUPS

- Royal Entomological Society London
- Entomological Society of America
- Entomological Society of Brasil
- The New York Academy of Science
- National Geographic Society
- The American Association of Advancement of Science
- COLOSS
- Društvo biologov Slovenije
- Slovensko entomološko društvo
- Društvo biofizikov Slovenije
- Komisija za alternativne opraševalce pri Čebelarski zvezi Slovenije

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SODELUJOČE ORGANIZACIJE
COOPERATING INSTITUTIONS

Domače
National

- Kmetijski inštitut Slovenije, Ljubljana
- Univerza v Ljubljani, Biotehniška fakulteta, Oddelek za biologijo
- Univerza v Ljubljani, Biotehniška fakulteta, Oddelek za lesarstvo
- Univerza v Novi Gorici, Fakulteta za znanosti o okolju
- Univerza v Mariboru, Fakulteta za naravoslovje in matematiko
- Kmetijsko-gozdarski zavod, Nova Gorica
- Visoka šola za varstvo okolja, Velenje
- Veterinarski inštitut Veterinarske fakultete Univerze v Ljubljani
- Čebelarska zveza Slovenije

Tuje
International

- Instut fuer Bienenkunde der J.W. Goethe Universitat Frankfurt, Oberursel, Nemčija,
- BEEGroup, Biozentrum Universität Am Hubland, Würzburg, Germany
- Zoologisches Institut, Karl-Franzens Universität Graz, Avstrija
- Department C.D.S.L., Section of Agricultural Entomology, University of Pisa, Italy
- Zoologisches Institut, Abteilung Neurobiologie, Georg-August-Universität, Göttingen, Nemčija
- Unite de Phytopharmacie et Mediateurs Chimiques, Institut National de la Recherche Agronomique (INRA), Versailles, Francija
- Department of Biodiversity and Systematic Biology, National Museums & Galleries of Wales, Cardiff, Wales, UK
- Department of Biology & Environmental Science, School of Life Sciences, University of Sussex, UK
- School of Biosciences, Cardiff University, Wales, UK
- Department of Entomology, University of California, Riverside, ZDA
- EMBRAPA Resursos Geneticos e Biotecnologia, Brasilia, Brazilija
- Department of Zoology, Cambridge, UK

UREDNIŠKI ODBORI
EDITORS

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- Blejec A.: Metodološki zvezki/Advances in Methodology and Statistics, ISSN 1854-0031, član uredniškega odbora, 2004 –
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PREDAVANJA IN SEMINARJI
LECTURES AND SEMINARS

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PEDAGOŠKA DEJAVNOST IN MENTORSTVA
TEACHING AND MENTORSHIP

Dodiplomski študij
Graduate Studies

- Blejec A.: Statistika = *Statistics,* Univerza v Ljubljani, BF, Oddelek za biologijo
- Blejec A.: Bioinformatika = *Bioinformatics,* Univerza v Ljubljani, BF, Oddelek za biologijo
- Blejec A.: Vzorčenje in statistično načrtovanje poskusov = *Sampling and statistical design of experiments,* Univerza v Ljubljani , BF , Oddelek za biologijo
- Čokl A.: Ekofiziologija = *Ecophysiology,* Univerza v Novi Gorici, Fakulteta za znanosti o okolju
- Čokl A.: Vplivi okolja na življenske procese, Visoka šola za varstvo okolja Velenje

Podiplomski študij
Postgraduate Studies

- Blejec A.: Statistična analiza bioloških podatkov = *Statistical analysis of biological data, doktorski študij Bioznanosti, Univerza v Ljubljani*
- Blejec A.: Uvod v znanstveno-raziskovalno delo = *Introduction to scientific research work*, Varstvo okolja, Univerza v Ljubljani
- Blejec A.: Računalniško podprta statistika = *Computational statistics*, doktorski študij Statistika, Univerza v Ljubljani
- Čokl A.: Komunikacija živali = *Animal communication*, Univerza v Ljubljani, Biotehniška fakulteta
- Čokl A.: Izbrana poglavja iz komunikacije živali = *Selected topics og animal communication*, Univerza v Mariboru, Fakulteta za naravoslovje

Diplomska dela
Graduate Theses

- BUH, Barbara. *Morfološka in funkcionalna karakterizacija vibracijskih receptorskih nevronov pri jamskih kobilicah rodu Troglophilus (Orthroptera, Rhaphidophoridae) : diplomsko delo : univerzitetni študij = Morphological and functional characterization of vibratory receptor neurones in cave crickets of the genus TRoglophilus (Orthoptera, Rhaphidophoridae) : graduation thesis : university studies*. Ljubljana: [B. Buh], 2011. VIII, 58 f., graf. prikazi. http://www.digitalna-knjiznica.bf.uni-lj.si/dn_buh_barbara.pdf. [COBISS.SI-ID 2454095]

Doktorska dela
Doctoral Theses

- DE GROOT, Maarten. *Recognition, search initiation and localization in hemipteran insects mediated by vibrational signals : doctoral dissertation = Razpoznavanje, proženje in lokalizacija pri hemipterih s pomočjo vibracijskih signalov : doktorska disertacija*. Ljubljana: [M. de Groot], 2011. XIII, 139 f., [6] f. pril., ilustr., tabele. [COBISS.SI-ID 750199]

Nezaključena dela – teme
Unfinished Theses – Themes

- Bevk Danilo, univ. dipl. biol.: »Vpliv akaracida kumafosa na pašno dejavnost, socialno vedenje in učenje medonosne čebele *Apis mellifera*«, Univerza v Ljubljani, zagovor julija 2012.
- Derlink Maja, univ. dipl. biol.: »Vibracijski signali, reproduktivna izolacija in nastanek vrst v rodu *Aphrodes* (Hemiptera: Cicadellidae)«, Univerza v Ljubljani, zagovor v letu 2013.
- Kavčič Andreja, univ. dipl. biol.: »Prepoznavanje plenilcev na osnovi vibracijskih signalov pri stenici *Nezara viridula* L.«, Univerza v Ljubljani, zagovor v letu 2013.
- Kuhelj Anka, univ. dipl. biol.: predlog teme v obravnavi na Univerzi v Ljubljani, zagovor v letu 2014.
- Polajnar Jernej, univ. dipl. biol., »Vpliv izbranih biotskih in abiotskih dejavnikov okolja na vibracijsko komunikacijo stenice zelene smrdljivke (*Nezara viridula* L.)«, Univerza v Ljubljani, zagovor v letu 2013.
- Zgonik Vera, univ. dipl. biol.: »Ugotavljanje prožilcev petja pozivnega napeva samca in samice ter rivalnega napeva samcev stenice *Nezara viridula* (Heteroptera: Pentatomidae)«, Univerza v Ljubljani, zagovor v letu 2013.

5.0

Oddelek za biotehnologijo in sistemsko biologijo - FITO

0105-003

Department of Biotechnology and Systems Biology - FITO

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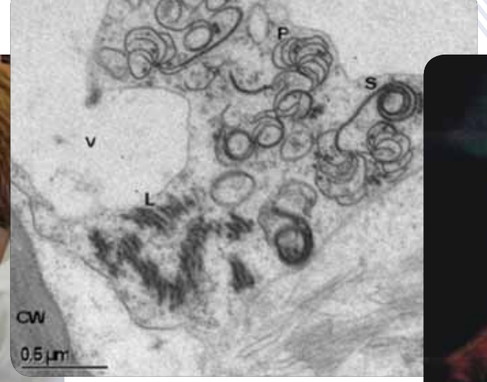
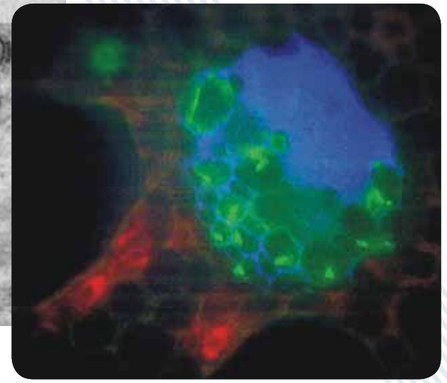
7. Selma Dobnik, poslovna sekretarka

Pregledovanje izdelanega modela interakcij med rastlino in virusom
Examining the model of interactions between plant and virus.



Celica povrhnjice lista z različnimi citoplazemskimi inkluzijskimi telesci
Epidermal leaf cell with different cytoplasmic inclusion bodies



Imunolokalizacija fitoplazme in proteina SUS-SH1 na prečnem prerezu glavnih prevodnih svežnjev v listu
Immunolocalization of phytoplasma and SUS-SH1 in a cross section of major vascular bundles in stem

Raziskovalna dejavnost

Z raziskavami na Oddelku za biotehnologijo in sistemsko biologijo ustvarjamo vrhunsko znanje za celostno razumevanje bioloških procesov s poudarkom na interakcijah med rastlinami in škodljivimi organizmi.

Naša prednost so visoko usposobljeni in motivirani sodelavci, ki prihajajo tudi iz mednarodnega okolja, uporaba najmodernejše opreme in vpeljan sistem kakovosti. Poznani smo po uporabi kvantitativne molekulske biologije in razvijanju pristopov sistemske biologije, vključno z bioinformatiko in biostatistiko.

Dobra organiziranost in fleksibilnost nam omogočata uspešno povezavo med znanjem in njegovo uporabo. Ustvarjeno znanje o biologiji patogenih in gensko spremenjenih organizmov (GSO) ter razvite metode za njihovo določanje, uspešno prenašamo na področja kmetijstva, ekologije, farmacije in medicine.

Naši partnerji so državne in evropske institucije, akademske institucije in industrija. Skupaj z njimi prispevamo k reševanju aktualnih problemov s področja našega delovanja in smo dobro vpeti v družbeno ekonomski prostor.

RAZISKOVALNI PROGRAM P4-0165: "BIOTEHNOLOGIJA IN SISTEMSKA BIOLOGIJA RASTLIN"

Vodja programa: prof. dr. Maja Ravnikar

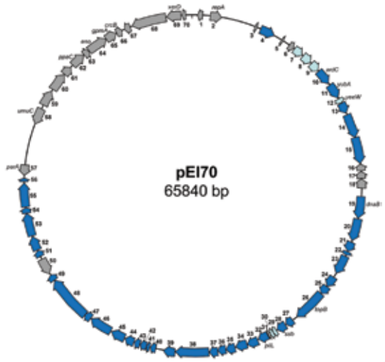
Raziskovalni program podpira odličnost v raziskovalni in pedagoški dejavnosti ter je osnova našemu delu za različne proračunske uporabnike in gospodarska podjetja na področju biotehnologije, kmetijstva, farmacije, okolja in varne hrane.

Glavni cilji raziskovalnega programa so:

- pridobivanje novega znanja o interakcijah med gostitelji in patogeni/škodljivci s pristopi sistemske biologije
- boljše razumevanje biologije, raznolikosti, patogenosti in epidemiologije mikroorganizmov in na osnovi novega znanja razvijati boljše metode za njihovo detekcijo in zatiranje
- razvijanje novih metodoloških biotehnoloških pristopov za bolj učinkovito identifikacijo in detekcijo gensko spremenjenih organizmov, glede na njihovo pričakovano povečano uporabo v prihodnjih letih.

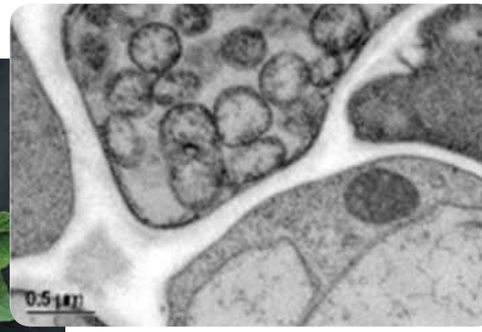
V letu 2011 smo raziskovali interakcije med gostitelji in patogeni/škodljivci na različnih ravneh. Za doseganje tega cilja programa smo izdelali novo metodologijo za semantično analizo podatkov, pridobljenih z mikromrežami. Proučevali smo dinamiko odgovorov v kompatibilni reakciji med krompirjem ter krompirjevim virusom Y in ugotovili, da je vanjo vključena salicilna kislina. Z različnimi molekulskimi tehnikami in uporabo elektronske mikroskopije smo ugotovili, kako je virus PVY razporejen v krompirju. Zaključili smo raziskavo o povezanosti encima saharoza sintaza z okužbo koruze s fitoplazmo pritlikavosti koruze.

V okviru raziskav biologije, raznolikosti, patogenosti in epidemiologije mikroorganizmov smo proučili genomsko zaporedje, evolucijo, virulenčne determinante in biogeografijo plazmida pEI70 v povzročiteljici hruševega ožiga, bakteriji *Erwinia amylovora.*



Krožni prikaz plazmida pEi70
Circular representation of plasmid pEI70.

Božična zvezda okužena z bakterijo *Xanthomas axonopodis* pv. *poinsettiicola*
Bacterial LeafSpot of *Euphorbia pulcherrima* caused by *Xanthomas axonopodis* pv. *poinsettiicola*



Fitoplazme v floemski celici
Phytoplasmas in the phloem cell

Research Activity

At the Department of Biotechnology and Systems Biology we are committed to generating highest quality scientific knowledge about biological processes with an emphasis on interactions between plants and harmful organisms. Our advantages lie in up-to-date equipment, an established quality control system and an international community that is highly educated and motivated. We are recognized for our applications in quantitative molecular biology and development of tools for systems biology, including bioinformatics and statistics.

Our successful combination of knowledge and application is the result of good organization and flexibility of work. We transmit newly created knowledge about the biology of pathogenic and genetically modified organisms together with new methods for their determination to the fields of agriculture, ecology, pharmacy and medicine.

Our partners are governmental and European organizations, academic institutions and industry. Together we participate in solving practical problems related to our research work, and we are thus an indispensable contributor to the socio-economic sphere of Slovenia.

RESEARCH PROGRAMME P4-0165: "BIOTECHNOLOGY AND PLANT SYSTEMS BIOLOGY"

Project Leader: Associate Prof. Dr. Maja Ravnikar

The research program supports excellence in research and teaching activities, as well as providing the basis of our work for different governmental and commercial users in the fields of biotechnology, agriculture, pharmacy, and environmentand food safety.

The main objectives of the program are:

- to gain better understanding of host--pathogen/pest interactions using systems biology approaches
- to gain better insight into the biology of microorganisms in order to understand their diversity, pathogenicity and epidemiology, and on this basis to develop better detection and eradication methods
- to develop new methodological approaches in biotechnology as the background for more efficient identification and detection of GMOs in view of their expected increase on the world market in the coming years.

To achieve these goals we have studied interactions between hosts and pathogens at various levels. We developed new methodology for semantic analysis of microarray data by exploiting general biological knowledge, and a new workflow environment with integrated support for web services. We investigated the dynamics of the potato – *Potato virus Y* (PVY) compatible interaction in relation to salicylic acid. We demonstrated the distribution of PVY in infected potato by using various molecular techniques and electron microscopy. We concluded a study on induction of the enzyme sucrose synthase in maize infected with maize bushy stunt phytoplasma.

Določanje virusov na terenu
In-field virus detection

Udeleženci delavnice o identifikaciji in dokumentaciji živih spremenjenih organizmov
Workshop on the Identification and Documentation of Living Modified Organisms

Molekulsko določanje mikroorganizmov
Molecular detection of microorganisms

Raziskali smo tudi njegovo razširjenost pri izolatih te bakterije v Sloveniji. V pridelavi božičnih zvezd smo potrdili prisotnost bakterije *Xanthomas axonopodis* pv. *poinsettiicola*. Z namenom povečanja kakovosti našega dela smo vpeljali postopke črtnih kod (*angl.* barcoding), ki nam omogoča natančno in hitro identifikacijo bakterij. Pripravili smo pregled pojavljanja fitoplazem in njihovih prenašalcev v Sloveniji.

Nadaljevali smo z razvijanjem metodologije za terensko detekcijo rotavirusov iz okoljskih voda in njihovo koncentriranje z uporabo RT-kvantitativne PCR in monolitnih kromatografskih nosilcev. Razvili smo metodologijo mikromrež za potrditev RT--PCR produktov norovirusov.

Kot partnerji v mednarodni skupini smo razvili nov kombiniran pristop k visokozmogljivostni analizi več tarč DNA, ki temelji na kapilarni elektroforezi več mikrokapljičnih PCR. S tem smo prispevali k metodologiji biotehnoloških pristopov za učinkovitejšo identifikacijo in detekcijo gensko spremenjenih organizmov. Novi pristopi so nujni, glede na pričakovano povečano uporabo gensko spremenjenih organizmov v prihodnjih letih.

Glavni dosežki v letu 2011

ODOBRITEV EVROPSKEGA MEROSLOVNEGA RAZISKOVALNEGA PROJEKTA INFECT-MET

V projektu »Metrology for monitoring infectious diseases, antimicrobial resistance, and harmfull microorganisms«, ki ga koordinira LGC Limited iz VB, so člani Oddelka za biotehnologijo in sistemsko biologijo ključni sodelavci. Cilj projekta je razviti nove postopke za merjenje in ovrednotiti obstoječe kot tudi nastajajoče molekulske pristope za diagnostiko, nadzor in spremljanje nalezljivih bolezni. S tem bo uporabnikom (izvajalcem zdravstvenih storitev, biotehnološki in diagnostični industrija) omogočena uporaba zanesljivih metod, temelječih na ustrezni sledljivosti in primerljivosti.

SOORGANIZACIJA DELAVNICE »CENTRAL AND EASTERN EUROPEAN REGIONAL TRAINING OF TRAINERS WORKSHOP ON THE IDENTIFICATION AND DOCUMENTATION OF LIVING MODIFIED ORGANISMS UNDER THE CARTAGENA PROTOCOL ON BIOSAFETY«

Delavnico je gostilo Ministrstvo za okolje in prostor in je potekala v organizaciji Sekretariata Konvencije o Biološki raznolikosti od 11.-15. aprila 2011 v Ljubljani v izvedbi članov Oddelka za biotehnologijo in sistemsko biologijo ter Kmetijskega inštituta Slovenije. Glavni namen delavnice je bil seznanitev udeležencev iz različnih držav z zahtevami Kartagenskega protokola o biovarnosti za identifikacijo in dokumentacijo živih spremenjenih organizmov in tehnikami in metodologijami, ki se lahko uporabijo za implementacijo teh zahtev.

Within the scope of biology, diversity, pathogenicity and epidemiology of microorganisms, we studied the genomic sequence, evolution, virulence determinants and biogeography of the pEI70 plasmid in a plant pathogenic bacterium that is the causal agent of fire blight disease, *Erwinia amylovora*. We have also examined its occurrence in the Slovenian strains of *E. amylovora*. We confirmed the presence of the bacterium *Xanthomas axonopodis* pv. *poinsettiicola* in a commercial greenhouse in Slovenia which cultivates poinsettia plants. In order to improve a quality of our work, we introduced barcoding for accurate and fast bacterium identification. We made a survey of the phytoplasma species extant in Slovenia.

We continue to develop monolithic chromatographic supports in combination with quantitative real-time PCR for in-field concentration and identification of human rotaviruses. We also developed a new microarray method for the confirmation of norovirus RT-PCR products.

Together with our partners we developed a novel combined approach for high-throughput analysis of multiple DNA targets based on multiplex microdroplet PCR implemented capillary gel electrophoresis, a two-step PCR amplification strategy. Given the increasing number of GMOs on the market, whose products must be monitored, and consequently a large number of requested analyses, the described system provides a promising alternative for high--throughput analysis of multiple DNA targets.

Important Achievements in 2011

ACCEPTANCE OF THE EUROPEAN RESEARCH PROJECT INFECT-MET

We are a major partner in the project "Metrology for monitoring infectious diseases, antimicrobial resistance, and harmful microorganisms", which is coordinated by LGC Limited, UK. The main goal of the project is development of new and emerging diagnostic technologies for the rapid detection of infectious agents, which will be accurate, traceable and comparable and thus suitable for end-users.

CO-ORGANIZATION OF THE "CENTRAL AND EASTERN EUROPEAN REGIONAL TRAINING OF TRAINERS WORKSHOP ON THE IDENTIFICATION AND DOCUMENTATION OF LIVING MODIFIED ORGANISMS UNDER THE CARTAGENA PROTOCOL ON BIOSAFETY"

The Slovenian Ministry of Environment and Spatial Planning hosted the Central and Eastern European Regional Training of Trainers' Workshop on the Identification and Documentation of Living Modified Organisms under the Cartagena Protocol on Biosafety through the National Institute of Biology and Agricultural Institute of Slovenia. The workshop was organized by the Secretariat of the Convention on Biological Diversity, in Ljubljana, from 11 to 15 April 2011. The main objective of the workshop was to introduce customs officers and other border-control personnel to the requirements of the Cartagena Protocol on Biosafety regarding the identification and documentation of LMOs and to techniques and methodologies that may be used for the implementation of these requirements.

INTERNATIONAL WORKSHOP FOCUSED ON REAL-TIME PCR

The workshop focused on the application of real-time PCR in plant pathology diagnostics and research. The workshop was organized in collaboration with European projects COST action 873 and QDetect. It attracted participants from seven European countries.

PUBLISHING OF THE MANUAL "VDOR PATOGENIH MIKROBOV V NOVA OKOLJA: HITRA DIAGNOSTIKA IN OCENA TVEGANJA"

The manual was the first one in the new NIB series "Vse živo". It includes methods and protocols for the in-field concentration and diagnostics of rotaviruses from environmental waters and fast serological assays for the detection of viruses of vegetables and ornamental plants. In addition, a new, simple and quick risk assessment screening for organisms harmful for plants is described. All methods are equipped with clear and illustrated instructions for use, and therefore are also suitable for less skilled operators.

ORGANIZACIJA DELAVNICE ZA PCR V REALNEM ČASU

V soorganizaciji z EU projektoma COST Action 873 in Q-detect ter z našim odcepljenim podjetjem BioSistemika d.o.o. smo konec leta 2011 izvedli laboratorijsko izobraževanje na področju visoko tehnoloških raziskav in molekulske diagnostike povzročiteljev bolezni. Udeleženci delavnice so prišli iz raziskovalnih in diagnostičnih laboratorijev iz sedmih evropskih držav.

IZDAJA PRIROČNIKA VDOR PATOGENIH MIKROBOV V NOVA OKOLJA: HITRA DIAGNOSTIKA IN OCENA TVEGANJA

Kot uvod v novo zbirko priročnikov »Vse živo«, ki jih je v letu 2011 začel izdajati NIB, smo pripravili priročnik, ki vključuje metode za koncentriranje in diagnostiko rotavirusov iz okoljskih vzorcev vode na mestu odvzema ter hitre serološke teste za določanje virusov, ki okužujejo vrtnine in okrasne rastline. V priročniku smo tudi opisali novo, preprosto in hitro presejalno analizo tveganja zaradi škodljivih organizmov rastlin. Zbrane metode so jasno predstavljene, opremljene s slikovnimi navodili in tako primerne za uporabo tudi manj izkušenim operaterjem.

VKLJUČITEV NAŠE DIAGNOSTIČNE METODE V EVROPSKO MEDLABORATORIJSKO PRIMERJAVO

V okviru projekta COST action FA 0807: Integrated management of phytoplasma epidemics in different crop systems so bili trije naši novi postopki za detekcijo fitoplazem iz skupine AP z metodo PCR v realnem času sprejeti v obsežno medlaboratorijsko primerjavo. Metodo je že uvedlo nekaj evropskih laboratorijev v svojo rutinsko diagnostiko.

PATENT

Urad za intelektualno lastnino RS je sprejel naš patent za uporabo glikozidaz in glikoziltransferaz pri povečani proizvodnji proteinov. Patent je prijavljen za evropski patent.

MLADA RAZISKOVALKA DOBITNICA ŠTIPENDIJE »ZA ŽENSKE V ZNANOSTI«

Mikrobiologinja Ana Rotter, ki se je v okviru doktorskega študija statistike ukvarjala z razvojem in implementacijo orodij sistemske biologije, je bila ena od treh dobitnic štipendije nacionalnega programa Za ženske v znanosti 2011. Štipendijo so ji podelil L'Oreal Slovenija, Slovenska nacionalna komisija za UNESCO in Slovenska znanstvena fundacija.

Sodelovanje z različnimi uporabniki

UPORABNOST NAŠIH RAZISKAV IN POVEZAVE Z UPORABNIKI IZ GOSPODARSTVA

Kot člani Centra odličnosti za biosenzoriko, instrumentacijo in procesno kontrolo (COBIK) smo sodelovali v dveh laboratorijih, kjer smo razvijali biosenzorje ter različne aplikacije virusov za cepiva in eliminacijo bakterij.

V Kompetenčnem centru za biološki razvoj in inovacije (BRIN) smo razvijali orodja sistemske biologije za povečanje zdravilnih učinkovin v bakterijah.

S podjetjem BIA Separations d.o.o. smo razvijali metode za koncentriranje virusov na monolitnih kromatografskih nosilcih.

S projektnimi transkriptomskimi raziskavami z Lek Sandoz d.d. smo izboljševali industrijske mikroorganizme.

Z odcepljenim podjetjem Biosistemika smo sodelovali na področju izobraževanj, tečajev in razvoja produktov.

Za različna podjetja in ustanove smo opravljali pogodbene raziskave na področju karantenskih bakterij in virusov ter določanja gensko spremenjenih rastlin.

Priročnik za določanje mikroorganizmov
Manual for detection of microorganisms

Ana Rotter - dobitnica nagrade L'Oreal Slovenija
Ana Rotter won a fellowship awarded by L'Oreal Slovenija

COBIK

Sodelovanje v centru odličnosti COBIK
Participation in the the Centre of Excellence COBIK

INTRODUCTION OF OUR DIAGNOSTIC METHOD IN THE EUROPEAN INTERLABORATORY RING TEST

Three protocols for detection of phytoplasmas from the group AP with real-time PCR were included in a large interlaboratory ring test under the umbrella of the project COST action FA 0807: Integrated management of phytoplasma epidemics in different crops. Our method has been already implemented in routine diagnostics by some European laboratories.

PATENT

The Slovenian Intellectual Property Office registered our patent for use of glycosidases and glycotransferases for the increased production of proteins. The patent is pending for a European patent.

OUR YOUNG SCIENTIST AWARDED WITH A FELLOWSHIP, "FOR WOMEN IN SCIENCE"

Doctoral research by the microbiologist Ana Rotter included development and implementation of systems biology tools. For her work she won a prestigious fellowship from the national program Za ženske v znanosti 2011 awarded by L'Oreal Slovenija, Slovenska nacionalna komisija za UNESCO and Slovenska znanstvena fundacija.

Collaboration with Various Users

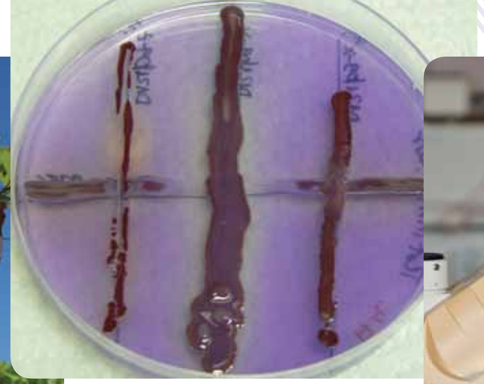
APPLICATIONS OF OUR RESEARCH AND LINKS WITH COMMERCIAL ENTITIES

As a member of the Centre of Excellence for Biosensors, Instrumentation and Process Control (COBIK) we participated in two projects in which we developed biosensors and various applications of virus vaccine and bacteria elimination. In the competence center for biological research and innovation (BRIN) we developed systems biology tools to increase the active ingredients in bacteria.

Together with BIA Separations d.o.o. we developed methods for concentrating viruses on monolithic chromatographic supports.

Using project-oriented transcriptome research we studied the possibilities of improvement of industrial microorganisms in collaboration with Lek dd, Sandoz.

Trta okužena s fitoplazmo FD
Grapevine infected with FD phytoplasma



Medsebojna inhibicija bakterij
Inhibition of the bacterial growth

Delo v laboratoriju
Laboratory work

POMEN NAŠIH RAZISKAV ZA DRŽAVO IN POLITIKE

Kot akreditirani nacionalni referenčni laboratorij za detekcijo GSO smo po odločbah Ministrstva za kmetijstvo, gozdarstvo in prehrano ter Ministrstva za okolje in prostor v letu 2011 opravljali monitoring in analize GSO v hrani, krmi in semenih za uradno kontrolo pristojnih inšpekcijskih služb in Ministrstev ter za trg.

Kot uradno imenovani »The National Laboratories Responsible for the Enforcement of the EU Regulations for GMO« s strani EC JRC IHCP smo opravili validacije metod in opravljali laboratorijske analize v okviru spremljanja prisotnosti GSO, ki so dovoljeni za pridelavo, v kmetijskih rastlinah, krmi, hrani in pridelkih na kmetijskih gospodarstvih.

Kot pooblaščeni laboratorij za opravljanje nalog na področju varstva rastlin smo za Fitosanitarno upravo in Fitosanitarno inšpekcijo opravljali ekspertno svetovanje, še posebej za bolezen zlata trsna rumenica, in diagnostične analize za več kot 40 mikroorganizmov.

Opravljali smo dejavnosti in izpolnjevali obveznosti nosilca nacionalnega etalona enote za množino snovi/hrana rastlinskega izvora.

Po 15-letni pogodbi z Upravo za zaščito in reševanje pri Ministrstvu za obrambo RS sodelujemo s svetovanjem pri materialnih in kadrovskih pripravah na ukrepanje v primeru napada z biološkimi orožji ali sredstvi za množično uničevanje.

Raziskovalna infrastruktura

Oddelek za biotehnologijo in sistemsko biologijo je najsodobneje opremljen in skupaj z visokokvalificiranimi operaterji zagotavlja odlične rezultate. Poleg dobro opremljenega biokemijskega in molekulsko biološkega laboratorija vso najsodobnejšo veliko raziskovalno opremo vzdržuje skladno s standardom ISO 17025 v okviru instrumentalnega Centra PLANTA. V letu 2011 je bil Oddelek partner v Centru za funkcijsko genomiko in mikročipe in v Centru za površinsko plazmonsko resonanco.

V letu 2011 je bil v celoti prenovljen karantenski rastlinjak, ki sedaj omogoča bolj nadzorovano in varno delo s posebej nevarnimi škodljivimi organizmi rastlin v večjem obsegu.

In association with our spin-off company BioSistemika d.o.o. we participated in education, training courses and product development.

For various companies and institutions we offered a service of testing for quarantine bacteria and viruses and determination of genetically modified plants.

THE IMPORTANCE OF OUR RESEARCH FOR THE STATE AND POLITICS

As an accredited national reference laboratory for GMO detection, we carried out monitoring and analysis of GMOs in food, feed and seeds for official control by inspection services and ministries, and the market. As the officially appointed "National Laboratories Responsible for the Enforcement of EU Regulations for the GMO" by EC JRC IHCP we performed validation of methods and laboratory analyses for monitoring the presence of GMOs that are authorized for cultivation in agricultural crops, feed, food and crops on farms.

As an accredited laboratory for diagnostics in the field of plant protection, we performed diagnostic tests for more than 40 microorganisms for the Phytosanitary Administration and Phytosanitary Inspection. We also offered them expert advice on Flavescence dorée grapevine yellows disease.
As a national holder for the amount of substance: food of plant origin we met the obligations that followed from this appointment.

In a 15-year-long contract with the Administration for Civil Protection and Disaster Relief of the Ministry of Defense we took part in advising and preparing for actions in the event of an attack with biological weapons or the means of mass destruction.

Research Infrastructure

The Department of Biotechnology and Systems Biology has the most up-to-date research equipment. Besides a well equipped biochemical laboratory and basic molecular laboratory, all large and most recently acquired research equipment was maintained in the Instrumental center Planta. The center operates within a quality system according to ISO 17025, which together with highly qualified operators guarantees excellence in analytical results. In 2011 the Department of Biotechnology and Systems Biology was a partner in the Center for Functional Genomics and Bio-Chips and in the infrastructural centre for Surface Plasmon Resonance.

In 2011 we completely renovated a quarantine greenhouse, which is now suitable for more controlled and safe work with particularly dangerous harmful organisms.

International Collaboration

In 2011 the Department of Biotechnology and Systems Biology participated in large-scale international cooperation at different levels. It had 23 formally signed contracts which included cooperation in multilateral and bilateral projects. We were involved in six European FP projects, eight COST and six bilateral projects.

Educational Activities and Promotion of Science

The members of the Department of Biotechnology and Systems Biology were actively involved in various educational Bologna programs at first and second level at the University of Ljubljana and the University of Nova Gorica. As lecturers and mentors we also participated in doctoral studies in Biomedicine and Biosciences of the University of Ljubljana. In 2011 efforts toward joining the International Graduate School IJS were intensified.

We were intensively involved in programs of popular science as participants at science festivals, writers of popular science papers for newspapers, popular science or youth journals, authors of text books for secondary and tertiary educational levels and as interviewees in educational and professional broadcasts.

Mednarodno sodelovanje

Oddelek za biotehnologijo in sistemsko biologijo je v letu 2011 sodeloval s številnimi tujimi partnerji na različnih ravneh. Na formalni ravni je imel z njimi podpisanih 23 pogodb, ki so vključevale sodelovanje v več-partnerskih projektih ali bilateralna sodelovanja. V letu 2011 smo kot partnerji sodelovali v šestih evropskih projektih okvirnih programov. V enem od njih – VITISENS, smo vodili dva delovna paketa. Sodelovali smo tudi v treh mednarodnih projektih, osmih projektih COST in šestih bilateralnih projektih.

Izobraževalne dejavnosti in promocija znanosti

Člani Oddelka za biotehnologijo in sistemsko biologijo sodelujejo v programih prve in druge bolonjske stopnje na Univerzi v Ljubljani in Univerzi v Novi Gorici. Prav tako kot predavatelji in mentorji sodelujejo v obeh doktorskih študijih Univerze Ljubljani - Biomedicini in Bioznanostih. V letu 2011 smo se začeli dejavno vključevati v delo Mednarodne podiplomske šole Jožef Stefan.

Intenzivno se vključujemo v promocijo in popularizacijo znanosti s sodelovanjem na festivalih znanja, pisanjem člankov za dnevni tisk in poljudno-znanstvene revije, sodelovanjem z mladinskimi revijami, intervjuji za različne medije, pisanjem učbenikov za primarno, sekundarno in terciarno izobraževanje. V letu 2011 smo posneli dve poljudni TV oddaji v seriji Ugriznimo znanost ter več prispevkov v oddajah Ljudje in zemlja v katerih smo prikazali naše delo in njegov pomen za družbo.

Najpomembnejše objave v 2011

PROGRAMIRANA CELIČNA SMRT MED ABSCIZIJO PARADIŽNIKA

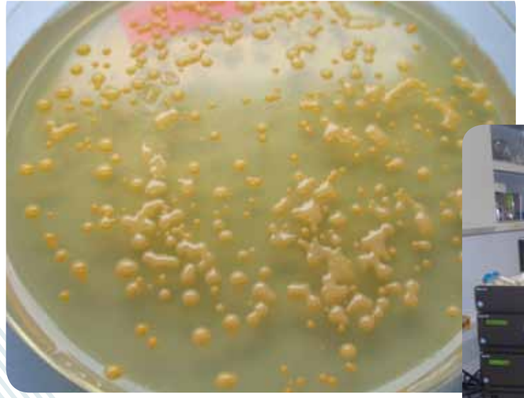
V članku, objavljenem v vrhunski znanstveni reviji The Plant Cell, smo s sodelavci iz izraelskega centra Volcani in Oddelka za biologijo, BF pokazali, da je programirana celična smrt razporejena asimetrično med steblom in organom, ki odpada. Asimetrična je viabilnost celic, morfologija jeder, fragmetacija DNA in izražanje genov, ki so s programom smrti povezani. Potrdili smo tudi povezanost ribonukleaze LX s procesom abscizije.

BAR-DROR, Tal, DERMASTIA, Marina, KLADNIK, Aleš, TUŠEK-ŽNIDARIČ, Magda, POMPE NOVAK, Maruša. Programmed cell death occurs asymmetrically during abscission in tomato. Plant cell.], 2011, vol. 23, no. 11, str. 4146-4163, doi: 10.1105/tpc.111.092494. [COBISS.SI-ID 2469199], [JCR IF 9.396]

RAZPOREDITEV VIRUSA PVY V SISTEMSKO OKUŽENEM KROMPIRJU

S PCR v realnem času, in situ hibridizacijo in presevno elektronsko mikroskopijo smo pokazali, da se krompirjev virus Y kopiči v krompirjevih listih, steblu, stebelnih vršičkih, koreninah, gomoljih in trihomih. Virusna RNA, virusni delci in citoplazemska inkluzijska telesca se pojavljajo v istih tipih rastlinskih celic ali v njihovi bližini.

KOGOVŠEK, Polona, KLADNIK, Aleš, MLAKAR, Jana, TUŠEK-ŽNIDARIČ, Magda, DERMASTIA, Marina, RAVNIKAR, Maja, POMPE NOVAK, Maruša. Distribution of Potato virus Y in potato plant organs, tissues and cells. Phytopathology. [Print ed.], 2011, vol. 101, no. 11, str. 1292-1300. http://dx.doi.org/10.1094/PHYTO-01-11-0020, doi: 10.1094/PHYTO-01-11-0020. [COBISS.SI-ID 2401359]



Bakterijske kolonije
Bacterial colonies

Laboratorij
Laboratory

Delo v rastlinjaku
Greenhouse work

Main Publications in 2011

PROGRAMMED CELL DEATH DURING ABSCISSION IN TOMATO

In the scientific paper which was published in the prestigious journal The Plant Cell, we described in collaboration with the Volcani Center from Israel and Department of Biology, Biotechnical Faculty, UL that programmed cell death is distributed asymmetrically between the stem and the organ to be abscessed. Asymmetrical distribution was detected at the level of cell viability, nucleus morphology, DNA fragmentation and expression of PCD-associated genes. The correlation between LX ribonuclease and abscission was also shown.

BAR-DROR, Tal, DERMASTIA, Marina, KLADNIK, Aleš, TUŠEK-ŽNIDARIČ, Magda, POMPE NOVAK, Maruša. Programmed cell death occurs asymmetrically during abscission in tomato. Plant cell., 2011, vol. 23, no. 11, pp. 4146-4163, doi: 10.1105/tpc.111.092494. [COBISS.SI-ID 2469199], [JCR IF 9.396]

DISTRIBUTION OF POTATO VIRUS Y IN SYSTEMICALLY INFECTED POTATO

Potato virus Y (PVY) accumulates in infected potato plants in leaf and stem tissues, in shoot tips, roots, tubers and trichomes as shown with real-time PCR, in situ hybridization and transmission electron microscopy. Viral RNA, viral particles and cytoplasmic inclusion bodies colocalize within the same type of cells or in close vicinity.

KOGOVŠEK, Polona, KLADNIK, Aleš, MLAKAR, Jana, TUŠEK-ŽNIDARIČ, Magda, DERMASTIA, Marina, RAVNIKAR, Maja, POMPE NOVAK, Maruša. Distribution of Potato virus Y in potato plant organs, tissues and cells. Phytopathology. [Print ed.], 2011, vol. 101, no. 11, pp. 1292-1300. http://dx.doi.org/10.1094/PHYTO-01-11-0020, doi: 10.1094/PHYTO-01-11-0020. [COBISS.SI-ID 2401359]

Odmiranje okuženih rastlin
Dieback of infected plants

FP7 projekt VITISENS
FP7 project VITISENS

Sodelovanje na 17. Slovenskem festivalu znanosti
Participation on the 17th Slovenian Science Festival

DINAMIKA KOMPATIBILNE INTERAKCIJE MED PVY IN KROMPIRJEM JE POVEZANA S SALICILNO KISLINO

Interakcijo med najagresivnejšim sevom krompirjevega virusa Y in različnim transgenim in netransgenim krompirjem smo spremljali na ravni pomnoževanja virusa in rastlinskih odgovorov. Na ravni genskega izražanja smo ugotovili, da interakcija ni odvisna le od ene regulatorne komponente, temveč so fenotipske lastnosti rezultat različnih odgovorov na molekulski ravni.

BAEBLER, Špela, STARE, Katja, KOVAČ, Maja, BLEJEC, Andrej, PREZELJ, Nina, STARE, Tjaša, KOGOVŠEK, Polona, POMPE NOVAK, Maruša, ROSAHL, S., RAVNIKAR, Maja, GRUDEN, Kristina. Dynamics of responses in compatible potato - potato virus Y interaction are modulated by salicylic acid. PLoS one, 2011, vol. 6, issue 12, str. 1-12. http://dx.doi.org/10.1371/journal.pone.0029009, doi: 10.1371/journal.pone.0029009. [COBISS.SI-ID 2492751]

DYNAMICS OF RESPONSES IN COMPATIBLE POTATO - POTATO VIRUS Y INTERACTION ARE MODULATED BY SALICYLIC ACID

To investigate the dynamics of the potato – PVY compatible interaction in relation to salicylic acid we followed outcomes at the level of virus multiplication and plant responses using non-transgenic and transgenic plants. The differential gene expression pattern indicates that the outcome of the interaction does not rely simply on one regulatory component, but similar phenotypical features can result from distinct responses at the molecular level.

BAEBLER, Špela, STARE, Katja, KOVAČ, Maja, BLEJEC, Andrej, PREZELJ, Nina, STARE, Tjaša, KOGOVŠEK, Polona, POMPE NOVAK, Maruša, ROSAHL, S., RAVNIKAR, Maja, GRUDEN, Kristina. Dynamics of responses in compatible potato - potato virus Y interaction are modulated by salicylic acid. PLoS ONE, 2011, vol. 6, issue 12, pp. 1-12. http://dx.doi.org/10.1371/journal.pone.0029009, doi: 10.1371/journal.pone.0029009. [COBISS.SI-ID 2492751]

RAZISKOVALNI PROGRAM, KI GA FINANCIRA JAVNA AGENCIJA ZA RAZISKOVALNO DEJAVNOST REPUBLIKE SLOVENIJE
RESEARCH PROGRAM FINANCED BY SLOVENIAN RESEARCH AGENCY

- Biotehnologija in sistemska biologija rastlin (P4-0165), vodja programa / the research programme leader prof. dr. Maja Ravnikar.

RAZISKOVALNI PROJEKTI, KI JIH FINANCIRA JAVNA AGENCIJA ZA RAZISKOVALNO DEJAVNOST REPUBLIKE SLOVENIJE
RESEARCH PROJECTS FINANCED BY SLOVENIAN RESEARCH AGENCY

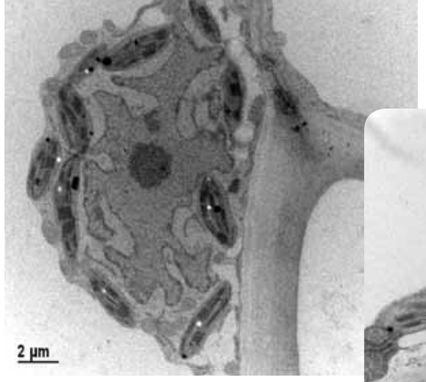
- Proučevanje trsne rumenice in inducirane rezistence na to bolezen na molekularnem nivoju / Molecular basis of grapevine yellows and induced resistance to the disease (J4-0813), nosilka projekta / principal investigator prof. dr. Kristina Gruden.
- Biološka raznovrstnost virusa PVY in njen vpliv na obrambni odgovor rastlin krompirja / Biological variability of potato virus Y and its influence on potato defense response (L1-2278), nosilka projekta / principal investigator prof. dr. Maja Ravnikar.
- Funkcionalna analiza proteinov za odpornost proti suši ali žuželkam / Functional analysis of proteins responsible for resistance to drought and insects (J4-2022), nosilka projekta / principal investigator prof. dr. Jana Žel.
- Pristopi sistemske biologije za analizo interakcije med rastlino in patogenom / Systems biology approaches in potato – pathogen interaction studies (J4-2228), nosilka projekta / principal investigator prof. dr. Kristina Gruden.
- Sistematično odkrivanje zakonitosti v okolju spletnih servisov (Sistematični SoKD) / Semantic Service oriented Knowledge Discovery (J2-2353), (NIB - prof. dr. Kristina Gruden), pridruženi / joint partners.
- Vpliv metabolitov arzenovega trioksida na zdravljenje akutne promielocitne levkemije in multiplega mieloma / Influence of arsenic trioxide metabolites on treatment of various cancer types (J3-0161) (NIB – dr. Magda Tušek), pridruženi / joint partners.
- Razvoj enostavne in hitre metode za določanje rastlinskih povzročiteljev bolezni na terenu (akronim: ARRS-Q-finder) / Developing simple, rapid and on-site methods for plant pathogens detection (L4-3642),nosilec projekta / principal investigator dr. Dany Morisset.
- Funkcijska genomika interakcije med krompirjem in PVY / Functional genomics of potato – PVY interaction (J1-4268),), nosilka projekta / principal investigator prof. dr. Jana Žel.
- Kompromisi obrambe in razvoja v večtrofični interakciji med krompirjem in dvema glavnima škodljivcema / Growth and defense trade-offs in multitrophic interaction between potato and its two major pests (J4-41659), nosilka projekta / principal investigator prof. dr. Kristina Gruden.
- Geni, ki pogojujejo aromatiko vina / Genes behind aroma compounds in wine (J4-4300), (NIB – dr. Špela Baebler), pridruženi / joint partners.
- Inovativni proizvodni sistemi za cepiva in regenerativno medicino / Innovative production systems for vaccines and regenerative medicine (L4-4277), (NIB – dr. Dany Morisset), pridruženi / joint partners.
- Razvoj novih tehnologij za odstrajevanje patogenih mikrobov in toksinov iz različnih vodnih virov / Development of new technologies for the removal of pathogenic agents and toxins from different water sources (L2-4314), (NIB – dr. Ion Gutierrez), pridruženi / joint partners.
- Vloga okolja in gostitelja pri pojavu in razvoju okužbe s Clostridium difficile / The role of environmental and host factors in development of Clostridium difficile infection (J3-4298), (NIB – dr. Tanja Dreo), pridruženi / joint partners.

MEDNARODNI RAZISKOVALNI PROJEKTI
INTERNATIONAL RESEARCH PROJECTS

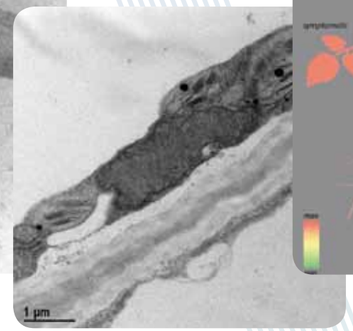
- EU projekt 245047, Q-DETECT, Razvoj metod za določanje karantenskih škodljivih organizmov za uporabo v nacionalnih programih in inšpekcijskih službah / Developing quarantine pest detection methods for use by national plant protection organizations (NPPO) and inspection services, koordinator / coordinator Food and environment research organisation (FERA), dr. Neil Boonham.
- EU projekt 262032, VITISENS, Stroškovno učinkovito ročna naprava za hitro odkrivanje Flavenscence dorée fitoplazem v vinski trti / Cost-Effective Hand-Held Device For Rapid In-Field Detection of Flavenscence doree Phytoplasma in Grapevines , koordinator / coordinator The Secretary of State for Environment, Food and Rural Affairs acting through Food and Environment Research Agency, Mr. Adrian Belton / Mr. Mike Wray.
- EU projekt 265264, CytoThreat, Učinki citostatikov v okolju in identifikacija biomarkerjev za izboljšanje ocene tveganja v okolju / Fate and effects of cytostatic pharmaceuticals in the environment and the identification of biomarkers for and improved risk assessment on environmental exposure-CytoThreat , koordinator / coordinator NIB, prof.dr. Metka Filipič.
- EU projekt 226482, QBOL, Razvoj novega diagnostičnega orodja z uporabo DNA kode za identifikacijo karantenskih škodljivih organizmov kot podpora varstvu rastlin / Development of a new diagnostic tool using DNA barcoding to identify quarantine organisms in support of plant health, koordinator / coordinator Plant Research International, Wageningen, dr. Peter Bonants.
- Mednarodni projekt 4302-38/2006/4, INREMOS-SYSTHER, Orodja sistemske biologije pri raziskavah celične terapije in zdravil / Systems Biology Tools Development for Cell Therapy and Drug Development - SYSTHER, Mio Knežević.
- ERA NET, Bicopoll, Tarčno precizna biokontrola in pospeševanje v ekoloških poljedelskih sistemih, Targeted precision biocontrol and pollination enhancement in organic cropping system, NIB, ENTOMO, Andrej Čokl.
- ERA NET, mednarodni projekt 08200, GMO Seek, Development of screening methods of GMO (SafefoodEra) / Development of screening methods of GMO, Dany Morisset.
- IRMM,IRMM Stability studies / Stability studies.
- GSO CRL ISPRA, Validacije / Validations studies.

BILATERALNI RAZISKOVALNI PROJEKTI
BILATERAL RESEARCH PROJECTS

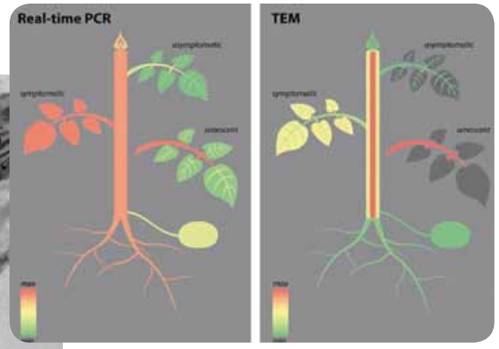
- BI-FR/10-11-PROTEUS-016: Študij genetske variabilnosti krompirjevega virusa Y za zanesljivo detekcijo nevarnih različkov / Genetic variability study of potato virus Y to enable accurate detection of severe strains, nosilka projekta / principal investigator prof. dr. Maja Ravnikar.



Ameboidno jedro v abscizinski plasti lista paradižnika
Ameboidal nucleus in the abscission zone of the tomato leaf



Programirana celična smrt med abscizijo paradižnika
Programmed cell death during abscission in tomato



Shematska predstavitev razporeditve virusne RNA v krompirju
Schematic presentation of the distribution of viral RNA in potato

- BI-CZ/10-11-015: Varna hrana in krma. Strategije vzorčenja in analiz / Food and feed safety. Sampling and Analytical Strategies, nosilka projekta / principal investigator prof. dr. Jana Žel.
- BI-PL/10-11-019: Profil izražanja genov pri linijah krompirja z različnim odzivom na okužno s krompirjevim virusom Y (PVY) / Global transcriptome analyses of potato lines exhibiting different phenotypes of defence response to potato virus Y (PVY) infection, nosilka projekta / principal investigator doc.dr. Maruša Pompe Novak .
- BI-HR/10-11-019: Ločevanje viroidov in filamentoznih rastlinskih virusov z monolitno kromatografijo / Separation of viroids and filamentous plant viruses using monolithic cromatographic supports, nosilka projekta / principal investigator prof. dr. Maja Ravnikar.
- BI-IN/10-12-010: Nova ekonomična metoda za določanje GSO: Prilagoditev indijskim in slovenskim potrebam / Novel cost-effective methods for GMO detection: application to the Indian and Slovenian context , nosilka projekta / principal investigator prof. dr. Jana Žel.
- BI-AT/11-12-013: Analiza sprememb metaboloma v krompirju in vinski trti po okužbi s patogenom / Analysis of potato and grapevine metabolom changes after pathogen infection, nosilka projekta / principal investigator prof. dr. Kristina Gruden.

COST RAZISKOVALNI PROJEKTI
COST RESEARCH PROJECTS

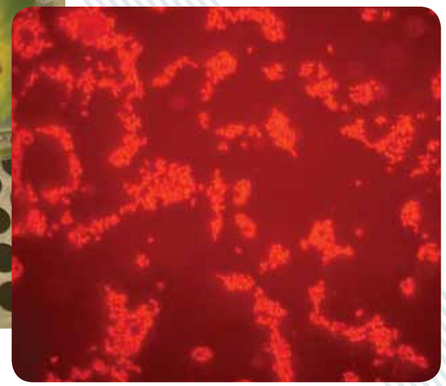
- COST 864, Zdravje pečkarjev: kombiniranje tradicionalnih in naprednih postopkov zdravstvenega varstva pri gojenju pečkarjev / Combining traditional and advanced strategies for plant protection in pome fruit growing, UL, BF, Franci Štampar, for NIB Tanja Dreo.
- COST 873, Bakterijske bolezni koščičarjev in lupinarjev / Bacterial diseases of stone fruits and nuts, Tanja Dreo.
- COST929, European Network for Environmental and Food Virology (ENVIRONET) / European Network for Environmental and Food Virology (ENVIRONET), Ion Gutierrez.
- COST FA 0807, Integrirano upravljanje fitoplazemskih epidemij pri različnih kmetijsko pomembnih rastlinah / Integrated Management of Phytoplasma Epidemics in Different Crop Systems, Marina Dermastia.
- COST FA 0804, Molekularno kmetijstvo: rastline kot proizvodna platforma za proteine visoke vrednosti, Molecular farming: plants as a production platform for high value proteins, Jana Žel.
- COST FA 0806, Kontrola rastlinskih virusov z uporabo RNA cepiv: novi ne-transgeni pristopi / Plant virus control employing RNA-based vaccines: A novel non-transgenic strategy, Špela Baebler.
- COST FA 603, Plant proteomics in Europe (EUPP) / Plant proteomics in Europe (EUPP), UL, BF, Branka Javornik.
- COST FA0605, Signalizacijska kontrola tolerance na abiotski stres in produkcija protistresnih snovi v rastlinah, / The signalling control of abiotic stress tolerance and production of stress protective compounds in plants, Kristina Gruden

CILJNI RAZISKOVALNI PROJEKTI
TARGER RESEARCH PROJECTS

- CRP "Zagotovimo.si hrano za jutri": Trsne rumenice: metode zgodnjega odkrivanja in obvladovanja / Grapevine yellows: methods for their early detection and control (V4-1103), nosilka projekta/principal investigator prof. dr. Marina Dermastia.
- CRP "Zagotovimo.si hrano za jutri": Reševanje problematike ustaljenih karantenskih bolezni sadnih vrst Prunus spp. za ohranitev pridelave/ Solving problems of quarantine diseases for protection of stone fruit (Prunus spp.) production) (V4-1102), (NIB – prof. dr. Marina Dermastia), pridruženi / joint partners.

Test preobčutljivostne reakcije na tobaku
Testing of teh hypersensitive response in tobacco

Preverjanje patogenosti bakterij na listih češenj
Patogenicity test on the cherry leaves



Bakterije označene z obarvano sondo
Color probe marked bacteria

RAZVOJNI PROJEKTI
DEVELOPMENT PROJECTS

- MO MKGP FURS, Strokovne naloge s področja zdravstvenega varstva rastlin / Expert projects in plant health protection field, Maja Ravnikar.
- MO MKGP IRSKGH, Določanje in testiranje diagnostičnih vzorcev na MO / Detection and analysing on MO samples, Maja Ravnikar.
- GSO monitoring, MKGP monitoring GSO v živilih in krmi, / GMO monitoring in food and feed, Jana Žel.
- GSO Soobstoj, Monitoring GSO v kmetijskih rastlinah in pridelkih / GMO monitoring in the of agricultural plants and products, Jana Žel.
- GSO IRSKGH krma, Testiranje GMO vzorcev v krmi / Testing of GMOs in feed (Ministry of Agruculture, Forestry and Food), Jana Žel.
- GSO IRSKGH hrana, Testiranje GMO vzorcev v hrani / Testing of GMOs in food , Jana Žel.
- GSO analize, Določanje gensko spremenjenih organizmov (naročnik: Inštitut za kontrolo in certifikacijo v kmetijstvu in gozdarstvu, MB) / Detection of genetically modified organisms, Jana Žel.
- GSO MOP ref lab, Referenčni laboratorij / Reference Laboratorij, Jana Žel.
- MORS, Sofinanciranje organizacijskih, materialnih in kadrovskih priprav v Nacionalnem inštitutu za biologijo, za strokovno svetovanje in ukrepanje v primeru napada z orožji ali sredstvi za množično uičevanje ter s klasičnimi sredstvi./ Cofinancing of preparations regarding the organizational schemes, equipment, and personnel (ali pa human resources) at the National Institute of Biology for the purposes of advising and action in case of an attack by weapons of mass destruction and by classical means., NIB, FITO in GEN dr. Bojan Sedmak, Marina Dermastia.
- MIRS, Opravljanje dejavnosti in izpolnjevanje obveznosti nosilca nacionalnega etalona enote za množino snovi/hrana rastlinskega izvora / Activities and performance as the holder of national etalon unit for amount of substance / food of plant origin, Marjana Camloh.

DRUGI RAZISKOVALNI PROJEKTI
OTHER RESEARCH PROJECTS

- KC BRIN, Kompetenčni center za biološki razvoj in inovacije / Center of Competence for the biological development and inovations.
- COBIK, Center odličnosti za biosenzoriko, instrumentacijo in procesno kontrolo CO BIK / Center of Excellence for Biosensors, Instrumentation and Process Control.

ORGANIZACIJA ZNANSTVENIH IN STROKOVNIH SREČANJ
ORGANIZATION OF SCIENTIFIC AND PROFESSIONAL MEETING

- 10. slovensko posvetovanje o varstvu rastlin / The 10th Slovenian Conference on plant protection, 1. in 2. marec 2011, Podčetrtek, Slovenija. NIB (Oddelek za biotehnologijo in sistemsko biologijo), Društvo za varstvo rastlin, Biotehniška fakulteta Univerze v Ljubljani.
- Organizacija delovnega sestanka Evropskega projekta Q-detect, april 2011.
- Organizacija delovnega sestanka Evropskega projekta Vitisens, avgust 2011.
- So-organizacija Delavnice Central and Eastern European Regional Training of Trainers' Workshop on the Identification and Documentation of Living Modified Organisms under the Cartagena Protocol on Biosafety, ki jo je gostilo Ministrstvo za okolje in prostor, skupaj z NIB in KIS v organizaciji Sekretariata Konvencije o Biološki raznolikosti, aprila 2011.
- So-organizacija delavnice »Real-Time PCR workshop in Plant Pathology: Diagnostics and Research«. november 2011.

OBISKI IN ŠTUDIJSKA IZPOLNJEVANJA NA TUJIH RAZISKOVALNIH INŠTITUCIJAH
VISITS AND SCIENTIFIC STUDIES AT INSTITUTIONS ABROAD

- Dobnik D., Lazar A. Varšava, Poljska, 27. 6. - 29. 6. 2011: Obisk v okviru bilaterale s Poljsko, IBB,Polish Academy of Sciences.
- Dobnik D. Wageningen, Nizozemska, 30. 8.- 28. 10.2011: Delo v tujem laboratoriju, Wageningen University and Research Center.
- Dobnik D. New Delhi, Indija, 14.11. - 24 12. 2011: Obisk v okviru bilaterale z Indijo, NBPGR.
- Rupar M. Rennes, Francija, 18. 7-12. 8. 2011: delo v partnerskem laboratoriju INRA (bilaterala).
- Prezelj N. Dunaj, Avstrija, 4. 3. - 15. 3. 2011; 14. - 15. 12. 2011: Tehnična Univerza na Dunaju, Oddelek za molekularno sistemsko biologijo (MoSys) Fakultete za vede o življenju.
- Lazar A. Varšava, Poljska, 24. 10. 2011 – 17.11. 2011: Delo v tujem laboratoriju, IBB, Polish Academy of Sciences.
- Gruden K. Cambridge, UK, 1.6. - 30.9. 2011: Pedagoško in raziskovalno delo na tuji univerzi, University of Cambridge.

OBISKI IZ TUJINE
VISITORS FROM ABROAD

- Dr. Jacek Hennig, Institute of Biochemistry and Biophysics PAS, Varšava, Poljska, Bilateralni obisk, 18/5 do 20/5/2011.
- Dr. Gurinder Jit Randhawa, Referral Centre for Molecular Diagnosis of Transgenic Planting Material National Research Centre on DNA Fingerprinting National Bureau of Plant Genetic Resources New Delhi, Bilateralni obisk, 1/9/ - 30/9/2011.
- Dr. Laurent Glais and dr. Maryse Guillet, IE INRA--FNPPPT, FNPPPT-INRA, Bilateralni obisk, 11/9 do 16/9/2011.
- Karolina Woreniecka, Institute of Biochemistry and Biophysics PAS, Varšava, Poljska, Bilateralni obisk, 18/10/do 15/12/2011.
- Jan Hodek, Aleš Vrablik , Crop Researh Institute (CRI), Bilateralni obisk, 7.-11.11. 2011.
- Dr. Mladen Krajačič, Univerza v Zagrebu, Prirodoslovna fakulteta, Bilateralni obisk, 16/12/2011.
- Jelena Ruščić, Univerza v Zagrebu, Prirodoslovna fakulteta, Bilateralni obisk, 5.-16.12.11.

ČLANSTVA V ODBORIH MEDNARODNIH ORGANIZACIJ, DELOVNIH TELES, EKSPERTNIH SKUPIN
MEMBERSHIP OF INTERNATIONAL BOARDS AND EXPERT GROUPS

Maja Ravnikar:
- članica upravnega odbora IWGLVV (International Working Group on Legume and Vegetable Viruses) v vlogi naslednjega izvoljenega predsednika skupine
- expert pri prijavi projekta ERA-NET PLANT HEALTH EUPHRESCO / Ministrstvo za kmetijstvo, gozdarstvo in prehrano
- članica panela - delovne skupine za »quality control« v diagnostičnih laboratorijih, Evropskega združenja za varstvo rastlin (EPPO)
- članica iniciativnega odbora za ustanovitev Evropskega združenja za fitobakteriologijo (European Association of Phytobacteriology)

Jana Žel:
- članica CEN/TC 275/WG 11 genetsko modificirani organizmi
- članica upravnega odbora Evropske mreže laboratorijev, ki določajo GSO (ENGL- European Network of GMO laboratories) sedež v ISPRI
- članica delovne skupine za merilno negotovost pri ENGL
- članica delovne skupine verifikacija metod za določanje GSO

Marina Dermastia:
- članica UO COST FA0807
- namestnica predstavnika RS v EPSO

Maruša Pompe Novak:
- predstavnica RS v EPSO

Tanja Dreo:
- članica panela - delovne skupine za bakteriologijo, Evropskega združenja za varstvo rastlin (EPPO)
- članica iniciativnega odbora za ustanovitev Evropskega združenja za fitobakteriologijo (European Association of Phytobacteriology)

Mojca Milavec:
- članica EBSA Conference Programme Working Group

Nataša Mehle
- članica International Working Groups on Legume (IWGLV) and Vegetable Viruses (IWGVV)

Dany Morisset:
- član delovne skupina-nedovoljeni GSO pri ENGL.

ČLANSTVA V ODBORIH SLOVENSKIH ORGANIZACIJ, DELOVNIH TELES, EKSPERTNIH SKUPIN
MEMBERSHIP OF SLOVENIAN BOARDS AND EXPERT GROUPS

Maja Ravnikar:
- članica Znanstveno-raziskovalnega sveta za naravoslovje ARRS,
- članica Strokovne skupine za zdravstveno varstvo rastlin v sadjarstvu, vinogradništvu in hmeljarstvu,
- dolgoletna članica skupščine družbenikov Tehnološkega Parka Ljubljana, zastopnik za NIB,
- članica senata Visoke šole za vinogradništvo in vinarstvo Nova Gorica,
- članica senata fakultete za okolje Nova Gorica,
- članica upravnega odbora Centra odličnosti s področja farmacije in biotehnologije,
- članica projektne skupine (upravljalna skupina) za pripravo dokumentacije za vzpostavitev informacijskega sistema FitoLab in njegovo povezavo v fitosanitarni informacijski sistem.

Jana Žel:
- članica znanstvenega odbora za namerno sproščanje GSO v okolje in dajanje izdelkov na trg,
- članica platforme »Food for Health« pri GZS Slovenije.

Marina Dermastia:
- članica znanstvenega odbora za delo z GSO v zaprtih sistemih,
- članica programskega sveta študija Biomedicina, UL,
- članica programskega sveta študija Bioznanosti, UL,
- članica programskega sveta Mednarodne podiplomske šole IJS.

Kristina Gruden:
- članica upravnega odbora Centra odličnosti s področja farmacije in biotehnologije,
- članica upravnega odbora Centra za funkcijsko genomiko in bio-čipe,
- članica znanstvenega odbora za delo z GSO v zaprtih sistemih.

Tanja Dreo:
- članica Komisije za varstvo rastlin pri MKGP.

Mojca Milavec:
- članica znanstvenega odbora za namerno sproščanje GSO v okolje in dajanje izdelkov na trg.

Špela Baebler:
- članica upravnega odbora Centra za funkcijsko genomiko in bio-čipe.

Nataša Mehle:
- članica projektne skupine (tehnična skupina) za pripravo dokumentacije za vzpostavitev informacijskega sistema FitoLab in njegovo povezavo v fitosanitarni informacijski sistem.

SODELUJOČE ORGANIZACIJE
COOPERATING INSTITUTIONS

Domače
National

- ARRS – Agencija za raziskovalno dejavnost RS
- Ministrstvo za okolje in prostor
- Ministrstvo za obrambo, Uprava RS za zaščito in reševanje
- Ministrstvo za kmetijstvo, gozdarstvo in prehrano
- Ministrstvo za visoko šolstvo znanost in tehnologijo
- Urad RS za meroslovje, MVZT
- Fitosanitarna uprava RS
- Inšpektorat RS za kmetijstvo, gozdarstvo in hrano
- Inštitut za kontrolo in certifikacijo v kmetijstvu in gozdarstvu
- Kmetijsko gozdarski zavod Nova Gorica
- Kmetijsko gozdarski zavod Novo mesto
- Zavod za zdravstveno varstvo Maribor
- Ekonomska fakulteta, UL
- Fakulteta za elektrotehniko, UL
- Fakulteta za računalništvo in informatiko, UL
- Oddelek za biologijo, Biotehniška fakulteta, UL
- Oddelek za živilstvo, Biotehniška fakulteta, UL
- Oddelek za agronomijo, Biotehniška fakulteta, UL
- Fakulteta za znanosti o okolju, Univerza v Novi Gorici
- Visoka šola za vinogradništvo in vinarstvo, Univerza v Novi Gorici
- Medicinska fakulteta, Univerza Maribor
- Inštitut Jožef Stefan
- Kemijski inštitut
- Kmetijski inštitut Slovenije
- Inštitut za hmeljarstvo in pivovarstvo Slovenije
- LEK Sandoz d.d.
- KRKA d.d.
- Bia Separations d.o.o.
- BIA d.o.o.
- Omega d.o.o.,
- EDUCELL podjetje za celično biologijo d.o.o. Ljubljana
- Centralna čistilna naprava Domžale Kamnik
- BioSistemika d.o.o.
- COBIK - Center odličnosti za biosenzoriko, instrumentacijo in procesno kontrolo
- Instrumentation Technologies d,d.,
- Cosylab d .d
- Zavod za biotehnološke inovacije - KC BRIN
- MEDIS podjetje za proizvodnjo in trženje d.o.o.
- ACIES BIO, biotehnološke raziskave in razvoj, d.o.o.
- MLEKARNA CELEIA d.o.o.
- CLINRES d.o.p.
- LEK VETERINA d.o.o.
- VITIVA, d.d.

Tuje
International

- Plant Research International, Wageningen, Nizozemska
- FERA – The Food and environment research Agency, Sand Hutton, Velika Britanija
- Mercier Fr res S.A.R.L, Francija
- Weingut S.A. PRÜM, Nemčija
- Cantine d'Alfonso Del Sordo SRL, Italija
- Forsite Diagnostics LTD, Velika Britanija
- Sediag SAS, Francija
- Centre de recerca i investigacio de Catalunya S.A, Španija
- Food and Standard Agency, Velika Britanija
- INRA, Francija
- Crop Research Institute, Prague, Republika Češka
- University of Zagreb, Faculty of Science, Department of Biology, Hrvaška
- INRA-Agrocampus Le Rheu Cedex, Francija
- Institute of Biochemistry and Biophysics, Polish Academy of Sciences, Varšava, Poljska
- Institute for reference materials and measurements, Belgija
- Universität Wien, Department Molecular Systems Biology, Avstrija
- National Bureau of Plant Genetic Resources, New Delhi, Indija
- Chemonics International Inc., Washington, USA
- Centre wallon de Recherches agronomiques (CRA-W), Belgija
- Own Equity of the Institute for Agriculture and Fisheries Research (EV ILVO), Belgija
- Scientific Institute of Public Health (IPH), Belgija
- Novel Foods Additives & Supplements Division, Food Standard Agency, Velika Britanija

UREDNIŠKI ODBORI
EDITORS

- BMC Plant Biology. Gruden, Kristina (član uredniškega odbora 2011-). London: BioMed Central, ISSN 1471-2229. http://www.biomedcentral.com/bmcplantbiol/.
- Food analytical methods. Žel, Jana (član uredniškega odbora 2008-). New York: Springer, 2008-. ISSN 1936-9751
- National Geographic. Dermastia, Marina (član uredniškega odbora 2006-). Ljubljana: Rokus, 2006-. ISSN 1854-4851
- Phytopathogenic mollicutes. Mehle, Nataša (član uredniškega odbora 2011-). New Delhi: Indian.Journals.com, 2011

NAGRADE IN PRIZNANJA
AWARDS

- Ana Rotter: štipendija nacionalnega programa Za ženske v znanosti 2011, ki jo podeljujejo L'Oreal Slovenija, Slovenska nacionalna komisija za UNESCO in Slovenska znanstvena fundacija.
- Marko Petek s sodelavci: Rektorjeve nagrade za naj-inovacijo UL za poslovni načrt za podjetje, ki se ukvarja s prodajo multifunkcionalnih magnetnih nanodelcev za aplikacije v biomedicini.

PREDAVANJA IN SEMINARJI
LECTURES AND SEMINARS

- BAEBLER, Špela. Ko krompir "nima krompirja" : Hiša eksperimentov, četrtek, 10.11.2011 ob 20.30. Ljubljana: Hiša eksperimentov, 2011. http://vimeo.com/33066340
- BAEBLER, Špela, GRUDEN, Kristina. Methods in systems biology. Predavanje na International Summer School, Piran, 26.8. - 03.09.2011. ISS 2011: advanced molecular biology methods in biotechnology.
- BAEBLER, Špela. Array portal in lasten dizajn mikromrež : predavanje na Genomics Workshop, 31. maj 2011, Zgornji Brnik. 2011.

Nezreli plodovi hrušk, okuženi s hruševim ožigom
Unripe pears infected by the fire blight

Okuženi listi vodenke
Infected impatiens leaves

Bakterijska okužba marelic
Apricot bacteria infection

- CAMLOH, Marjana, MILAVEC, Mojca, ŽEL, Jana. Initial presentation of quality management system of MIRS/NIB for EURAMET TC-Quality : [predavanje na 6th meeting of EURAMET TC-Quality, Belgrade, Serbia, 10 March 2011]. 2011; Belgrade.
- DERMASTIA, Marina. Molecular diversity of FD associated phytoplasmas in Slobvenian grapevine, Clematis and other potential hosts : Follow up meeting „GDF and ST 2011", Phytosanitary measures against grapevine flavescence Dorée phytoplasma, 01 February 2011, Graz, Austria. 2011; Graz.
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PEDAGOŠKA DEJAVNOST IN MENTORSTVA
TEACHING AND MENTORSHIP

Diplomska dela
Graduate Theses

Dermastia Marina, mentorica

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Ravnikar Maja, mentorica

- VIDIC, Urška. Preživetje filamentoznih virusov v vodnem okolju in možnost okužbe rastlin preko korenin : diplomsko delo = Survival of filamentous viruses in the aqueous environment and possibility of plant infection trough [i.e. through] roots : graduation thesis, (Biotehniška fakulteta, Študij biotehnologije, Diplomska dela, 72). Ljubljana: [U. Vidic], 2011. XII, 58 f., [18] f. pril., ilustr., preglednice.

Žel Jana, mentorica/somentorica

- MOHORIČ, Barbara. Postopki regeneracije rastlin pri genski transformaciji : diplomsko delo = Regeneration procedures of plant gene transformation : graduation thesis, (Biotehniška fakulteta, Študij biotehnologije, Diplomska dela, 52). Ljubljana: [B. Mohorič], 2011. XII, 77 f., ilustr., preglednice.
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Magistrska dela
Master's Theses

Gruden Kristina, mentorica

- TURNŠEK, Neža. Molekulski dejavniki odziva koloradskega hrošča (Leptinotarsa decemlineata) na obrambni odgovor rastlin : magistrsko delo = Molecular basis of colorado potato beetle (Leptinotarsa decemlineata) response to plant defense response : master of science thesis. Ljubljana: [N. Turnšek], 2011. XI, 96 f., ilustr.

Doktorska dela
Doctoral Theses

Dermastia Marina, mentorica
Gruden Kristina, somentorica

- NIKOLIĆ, Petra. Vzorci izražanja genov v listih vinske trte, okužene s fitoplazmo, povezano s počrnelostjo lesa : doktorska disertacija = Gene expression patterns in grapevine leafs infected with phytoplasma associated with bois noir disease : doctoral dissertation. Ljubljana: [P. Nikolić], 2011. XII, 155 f., pril., ilustr.

Gruden Kristina, somentorica

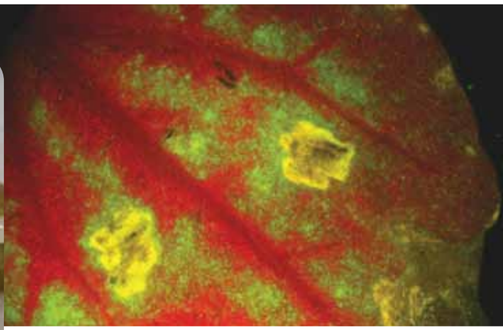
- ROTTER, Ana. Razvoj in implementacija orodij sistemske biologije: primer analize podatkov v rastlinski fiziologiji : doktorska disertacija = Development and implementation of system biology tools: a case study of plant physiology data analysis : doctoral dissertation. Ljubljana: [A. Rotter], 2011. X, 77 f., pril., ilustr.

Ravnikar Maja, mentorica

- ČEPIN, Urška. Genetska raznolikost in določanje virusa pahljačavosti listov vinske trte (GFLV) : doktorska disertacija = Genetic variability and detection of grapevine fanleaf virus (GFLV) : doctoral dissertation. Ljubljana: [U. Čepin], 2011. XVIII, 172 f., pril., ilustr.

Okužena vinska trta
Infected grapevine

Hruška okužena z bakterijo *Erwinia amylovora*
Pear infected with *Erwinia amylovora*



Fluorescenca poškodb na listu zaradi okužbe
Fluorescence of lesions on the infected leaf

6.0

Infrastrukturni Center Planta
Infrastructural Centre Planta

0105-003

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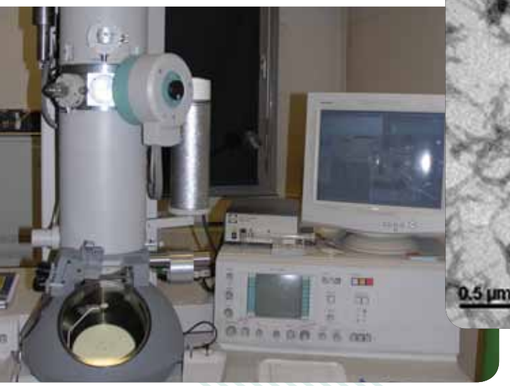
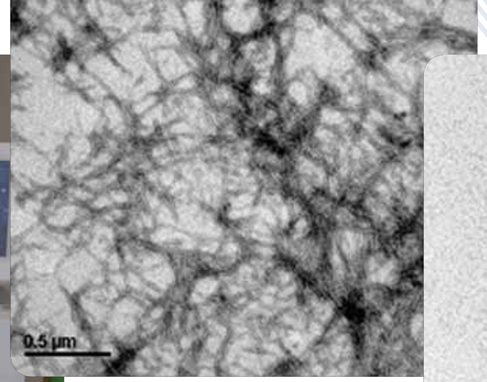
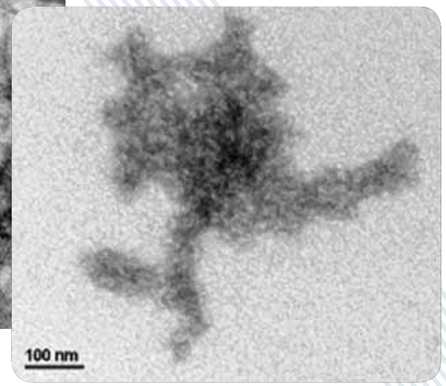


presevni elektronski mikroskop
transmission electron microscope



beljakovine
proteins



beljakovine
proteins

Infrastrukturna dejavnost

Infrastrukturni center Planta (IC Planta) je eden od dveh programsko in organizacijsko zaključenih infrastrukturnih centrov, ki sestavljata infrastrukturni program Nacionalnega inštituta za biologijo (IP NIB). IC Planta deluje v okviru Oddelka za biotehnologijo in sistemsko biologijo Nacionalnega inštituta za biologijo.

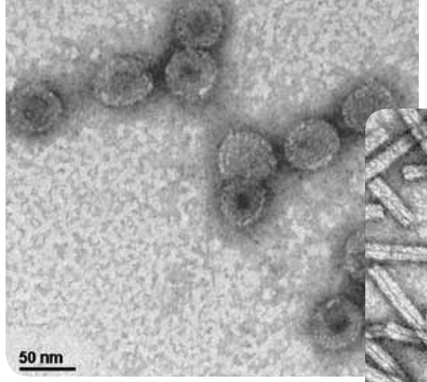
IC Planta služi kot podpora raziskovalni dejavnosti, državnim organom, podjetjem in pedagoški dejavnosti. IC Planta zagotavlja sodelovanje med raziskovalci različnih raziskovalnih programov, projektov in institucij, kakor tudi povezovanje raziskovalcev z uporabniki raziskav iz vrst drugih proračunskih uporabnikov in industrije ter stik pedagoškega procesa z raziskovalno dejavnostjo.

IC Planta obstaja že od leta 1991. Najprej je bil ustanovljen kot tehnološko jedro Center za rastlinske tkivne kulture in virologijo. Leta 1994 je bil na Nacionalnem inštitutu za biologijo skupaj s tovarno zdravil Krka d.d. in Semenarno d.o.o. preoblikovan v Tehnološki center Planta. V letu 1998 se je Tehnološki center Planta preoblikoval v Instrumentalni center Planta in od takrat je na segmentu transmisijske elektronske mikroskopije izredno močno povezan s Katedro za zoologijo Oddelka za biologijo Biotehniške fakultete Univerze v Ljubljani, katere predstojnica je prof. dr. Jasna Štrus. Od leta 2004 IC Planta deluje kot infrastrukturni center.

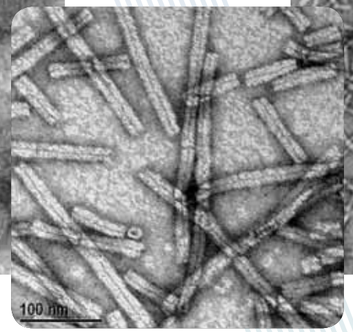
Veliko infrastrukturno opremo IC Planta sestavljajo:

- presevni elektronski mikroskop (Philips CM100) s CCD kamero
- kriomikrotom (Leica EM FC6) in mikrotom (Leica)
- aparatura za PCR v realnem času (ABI 7900)
- aparatura za PCR v realnem času (ABI 7900HT Fast)
- aparatura za PCR v realnem času (Roche Light Cycler 480)
- prenosna aparatura za PCR v realnem času (Cepheid Smart Cycler)
- robot za pipetiranje (PerkinElmer MultiProbe II)
- komore za gojenje rastlin in tkivnih kultur (Kambič)
- komore za ločeno gojenje rastlin (Kambič)
- karantenski rastlinjak ter
- karantenski rastlinjak s podtlakom.

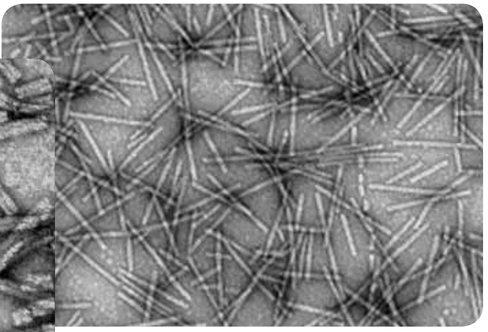
Vsa velika infrastrukturna oprema IC Planta je tehnološko izjemno zahtevna. Visoka tehnološka zahtevnost opreme zahteva skrbno, redno in strokovno vzdrževanje, zato ima vsak kos opreme svojega skrbnika in namestnike skrbnika, ki skrbijo za redno vzdrževanje in brezhibno delovanje opreme. Opremo IC Planta upravljajo in vzdržujejo visoko kvalificirani kadri, saj stalno skrbimo za ustrezno izobraževanje zaposlenih. Moderna in dobro vzdrževana raziskovalna oprema IC Planta (v skaldu s standardom ISO/IEC 17025) tako omogoča izvajanje konkurenčnih raziskav v naravoslovju. Zelo pomembna je tudi kvalitetna in dobro vzdrževana dodatna oprema, nujno potrebna za delovanje velike infrastrukturne opreme, kateri tudi posvečamo potrebno skrb in jo stalno posodabljamo.



rastlinski virusi
plant viruses



rastlinski virusi
plant viruses



rastlinski virusi
plant viruses

Infrastructure Activity

The Infrastructural Centre Planta (IC Planta) is one of two program and organization integrated infrastructural centers that forms the Infrastructural program of the National Institute of Biology (ID NIB). IC Planta is a part of the Department of Biotechnology and Systems Biology at the National Institute of Biology.

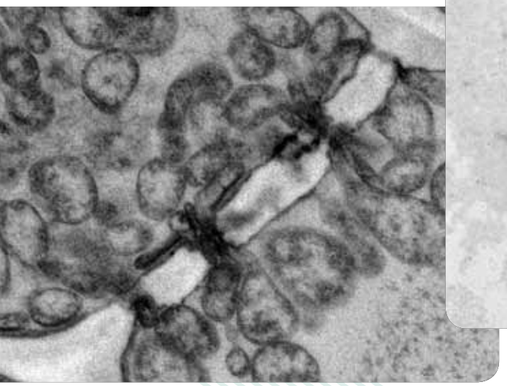
IC Planta's equipment supports research activities, bodies of ministries, enterprises and educational activities. IC Planta ensures collaboration between researchers of different research programs, projects and institutions. It facilitates connections of researchers with the users of this research that are other budget users and various industries, as well as it facilitates connections between research activities and educational processes.

Centre Planta exists since 1991, firstly as Technological Core – Centre for tissue culture and virology. Technological Centre Planta was founded in 1994 by the National Institute of Biology, the pharmaceutical company Krka d.d. and the seed company Semenarna d.o.o. In 1998 Technological Centre Planta was retransformed to Instrumental Centre Planta. Since than it is very tightly connected to Chair of Zoology at Department of Biology at Biotechnical Faculty at University of Ljubljana, led by Prof. Dr. Jasna Štrus in the segment of electron microscopy. Since 2004, IC Planta operates as an infrastructural centre.

The large infrastructural equipment of IC Planta consists of:

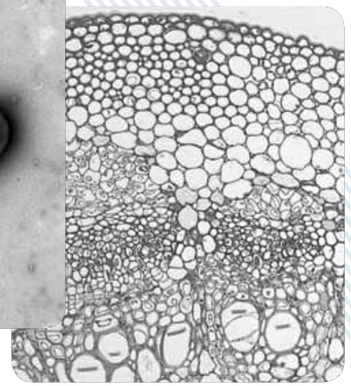
- Transmission electron microscope (Philips CM100) with CCD camera
- Cryo-ultramicrotome (Leica EM FC6) and ultramicrotome (Leica)
- Real-time PCR instrument (ABI 7900)
- Real-time PCR instrument (ABI 7900HT Fast)
- Real-time PCR instrument (Roche Light Cycler 480)
- Portable real-time PCR instrument (Cepheid Smart Cycler)
- Robot for pipetting (PerkinElmer MultiProbe II)
- Growth chambers for plant and tissue culture breeding (Kambič)
- Plant growth chambers for separate breeding (Kambič)
- Quarantine greenhouse, and
- Quarantine greenhouse with negative pressure.

All large equipment of IC Planta is technologically exceptionality exacting. High technological pretentiousness of the equipment demands careful, regular and professional maintenance of the equipment, therefore each piece of equipment has its caretaker and his substitutes that take care of regular maintenance and faultless working of the equipment. IC Planta's equipment is managed and kept by highly skilled workers as we facilitate adequate permanent education of the employees. IC Planta has modern and well treated research equipment (in accordance with the ISO/IEC 17025 system) which is an essential



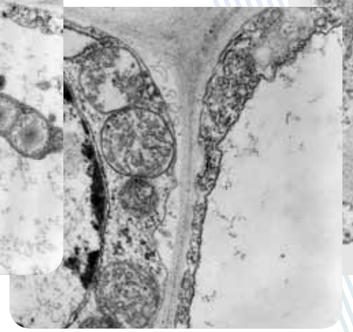
fitoplazme v rastlinski celici
phytoplasmas in plant cell

bakterija
bacteria

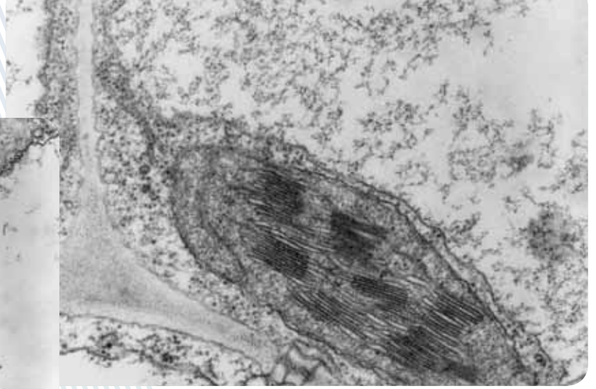


struktura rastlinskega tkiva
structure of plant tissue

struktura rastlinskega tkiva
structure of plant tissue



struktura rastlinskega tkiva
structure of plant tissue



struktura rastlinskega tkiva
structure of plant tissue

Preko IC Planta je potekal nakup velike raziskovalne opreme z združevanjem sredstev več virov in institucij, oprema pa se hkrati uporablja tudi za manjše raziskovalne programe, projekte in zunanje uporabnike, ki nimajo možnosti nabave in vzdrževanja tako drage opreme. Zaradi tako široke možnosti uporabe je raziskovalna oprema IC Planta polno izkoriščena, kar je predpogoj za dobro izrabo vseh vloženih sredstev.

IC Planta s skrbnim razmislekom in usklajevanjem pri nabavah opreme skrbi za to, da se velika infrastrukturna oprema v Sloveniji brez potrebe ne podvaja, da pa se hkrati smiselno dopolnjuje. Zato se IC Planta povezuje tudi v infrastrukturna omrežja, kar uporabnikom omogoča uporabo opreme različnih infrastrukturnih programov v različnih fazah raziskav in aplikacij, pri čemer oprema IC Planta zavzema pomembno mesto. Na področju molekularne biologije se IC Planta preko Oddelka za biotehnologijo in sistemsko biologijo Nacionalnega inštituta za biologijo povezuje z drugimi centri: Centrom za funkcijsko genomiko in biočipe s sedežem na Medicinski fakulteti Univerze v Ljubljani, Centrom za površinsko plazmonsko resonanco s sedežem na Oddelku za biologijo Biotehniške fakultete Univerze v Ljubljani in Centrom za proizvodnjo in strukturo proteinov s sedežem na Inštitutu Jožef Stefan ter dejavno deluje v slovenski tehnološki mreži Rastline za prihodnost.

Glavni dosežki v letu 2011

Zelo pomembna pridobitev IC Planta v letu 2011 je novi karantenski rastlinjak s podtlakom. Na mestu starega rastlinjaka, ki ni več dosegal standardov za delo, so v letu 2011 od začetka januarja do konca avgusta potekala prenovitvena dela, rezultat katerih je karantenski rastlinjak s podtlakom, ki omogoča tudi gojenje rastlin, okuženih z okolju nevarnimi povzročitelji bolezni, in gensko spremenjenih rastlin, saj so zagotovljeni ustrezni varnostni mehanizmi. Zaradi nekaterih napak pri izdelavi, so bila v dveh od štirih komor v karantenskem rastlinjaku s podtlakom potrebna obsežnejša popravila, zato sta dve komori pričeli z obratovanjem v septembru 2011, preostali dve pa šele v februarju 2012.

Poleg tega so v letu 2011 od začetka avgusta do konca oktobra potekala obnovitvena dela tudi v karantenskem rastlinjaku IC Planta, v katerem so bili obnovljeni tlaki in rekonstruiran vhod.

Sodelovanje z različnimi uporabniki

V letu 2011 je veliko infrastrukturno opremo IC Planta uporabljalo 66 različnih uporabnikov, od tega 61% iz lastne raziskovalne organizacije (RO) in 39% iz drugih RO. Tematike raziskav in analiz, za katere se uporablja oprema IC Planta, so bile izjemno raznolike, kar je razvidno tudi iz seznama uporabnikov.

condition for competitive research performance in the life sciences. For the proper functioning of large equipment of IC Planta, quality and well maintained supplementary equipment, which is essential for working of large infrastructural equipment, is very important. Therefore special care and permanent modernization is devoted also to the supplementary equipment.

At IC Planta, large infrastructural equipment has been purchased by merging funds from different sources and institutions. Large equipment is also used by small research programs, research projects and other users that cannot purchase and keep such expensive equipment themselves. Such a broad spectrum of usage assures maximal exploitation of the equipment and consequently a good yield of all invested funds.

With careful consideration and reconciliation before purchase of new equipment, IC Planta takes care that large infrastructural equipment is not senseless duplicated in Slovenia but that it is being reasonable complemented. Therefore through its equipment, IC Planta is joining the laboratory networks, what enables for its users the usage of the equipment of different infrastructural programs in the different stages of researches and applications, where IC Panta's equipment takes an important place. In the field of molecular biology through the Department of Biotechnology and Systems Biology, IC Planta is connected with other centers: the Center for Functional Genomics and Bio-Chips with the seat at Medical Faculty of the University of Ljubljana, the Infrastructural Centre for Surface Plasmon Resonance with the seat at Biotechnical Faculty at the University of Ljubljana and the Centre for protein production and structure with the seat at Jožef Stefan Institute. Besides, IC Planta takes an active role in Slovenian technological network Plants for the Future.

Important Achievements in 2011

In the year 2011, we upgraded IC Panta's large equipment with Quarantine greenhouse with negative pressure. It enables breeding of plants infected with pathogens that are harmful for the environment, and genetically modified plants, as all the safety mechanisms are assured. One half of the Quarantine greenhouse with negative pressure started to work in September 2011 and the other half in February 2012.

Besides, floor and entrance were reconstructed in Quarantine greenhouse in 2011.

karantenski rastlinjak s podtlakom
quarantine greenhouse with negative pressure

karantenski rastlinjak
quarantine greenhouse

karantenski rastlinjak
quarantine greenhouse

Infrastrukturna oprema IC Planta se je v letu 2011 uporabljala za izvajanje raziskovalne dejavnosti različnih raziskovalnih skupin iz 8 različnih RO. Uporabljala se je za izvajanje 7 raziskovalnih programov, ki jih je financirala Agencija za raziskovalno dejavnost Republike Slovenije, od tega 2 iz lastne RO in 5 iz drugih RO, za izvajanje 5 raziskovalnih projektov, ki jih je financirala Agencija za raziskovalno dejavnost Republike Slovenije, od tega 2 iz lastne RO in 3 iz drugih RO, za izobraževanje 19 mladih raziskovalcev, od tega 12 iz lastne RO in 7 iz druge RO, ter za izvajanje 4 mednarodnih raziskovalnih projektov, od tega 2 EU projekta 7. okvirnega programa.

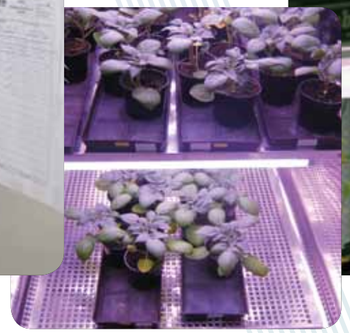
Infrastrukturna oprema IC Planta se je v letu 2011 uporabljala za izvajanje 8 projektov za podporo državnih in drugih vladnih organov za izvajanje javne službe drugim resorjem. Posebno intenzivno se je uporabljala kot podpora za delovanje Fitosanitarne uprave Republike Slovenije in Inšpektorata Republike Slovenije za kmetijstvo, gozdarstvo in hrano preko strokovne naloge na področju varstva rastlin. Infrastrukturna oprema IC Planta je služila tudi v podporo MOP, MORS in MIRS.

Oprema IC Planta se je v letu 2011 uporabljala za izvajanje 12 aplikativnih projektov za gospodarska podjetja, kar je predstavljalo direktno podporo industriji, okoljevarstvu in kmetijstvu z razvijanjem novih tehnologij in izvajanjem visoko specializiranih analiz na osnovi dobre laboratorijske prakse. Oprema IC Planta je služila za podporo tehnološkemu razvoju na področju rastlinske, živalske, farmacevtske, medicinske, mikrobne in prehrambene biotehnologije ter za razvoj metod in za izvajanje specializiranih analiz v diagnostiki rastlinskih patogenih bakterij, virusov in fitoplazem ter gensko spremenjenih rastlin in rastlinskih proizvodov.

Infrastrukturna oprema IC Planta se je v letu 2011 uporabljala kot podpora za izvajanje 11 predmetov 2 univerz.

Raziskave in analize, pri katerih se je v letu 2011 uporabljala infrastrukturna oprema IC Planta, še posebno raziskave in analize v zvezi z GSO, so pomembno prispevale k povečevanju kvalitete življenja, ozaveščanju o okoljski problematiki in s svojo odmevnostjo k oblikovanju javnega mnenja.

komore za ločeno gojenje rastlin
plant growth chambers for separate breeding



komore za ločeno gojenje rastlin
plant growth chambers for separate breeding

komore za gojenje rastlin
growth chambers for plant breeding

Collaboration with Various Users

In the year 2011, 66 different users used IC Planta's large infrastructural equipment, 61% of these from our own research organization (RO) and 39% from other ROs. Subjects of research and analyses, carried out by Centre Planta's equipment, were extremely diverse, which is evident in the list of users.

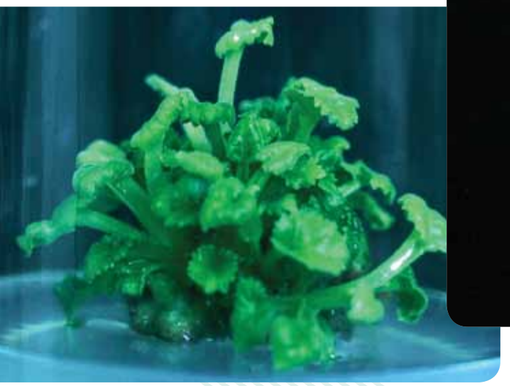
In the year 2011, IC Planta's infrastructural equipment was used for the research activity of different research groups from 8 different ROs. It was used for performance of 7 research programs financed by the Slovenian Research Agency (2 from our own RO and 5 from other ROs), for the performance of 5 research projects financed by the Slovenian Research Agency (2 from our own RO and 3 from other ROs), for the training of 19 young researchers (12 from our own RO and 7 from and other RO), and for 4 international research projects, among them 2 EU 7th framework projects.

In the year 2011, IC Planta's infrastructural equipment was used for 8 projects that have served to support different bodies of ministries and the performance of public service. In the frame of the annual Expert projects in the field of plant health protection, the equipment was especially intensively used for the support of the activities of the Phytosanitary Administration of the Republic of Slovenia and the Inspectorate of the Republic of Slovenia for Agriculture, Forestry and Food. IC Planta's infrastructural equipment was also used to support the Ministry of the Environment and Spatial Planning, the Ministry of Defence and the Metrology Institute of the Republic of Slovenia.

In 2011, IC Planta's infrastructural equipment was used for 12 applied projects which were ordered by economical enterprises what directly support the industry, environmental protection and agriculture with the development of new technologies and performance of highly specialized analyses on the basis of good laboratory practice. IC Planta's equipment supported technological progress in the fields of plant, animal, pharmaceutical, medical microbial and food biotechnology, and development of methods for specialized analyses in diagnostics of plant pathogenic bacteria, viruses and phytoplasmas and genetically modified plants and plant products.

IC Planta's infrastructural equipment was used to support the performance of 11 subjects at 2 universities in 2011.

Research and analyses that have used IC Planta's infrastructural equipment in the year 2011, especially that in connection with GMOs, importantly contributed to the increase of the quality of life, to awareness of various environmental issues and because of its wide response, also to the creation of public opinion.



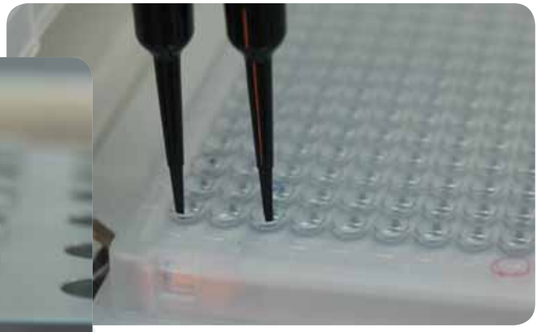
rastlinska tkivna kultura
plant tissue culture

rastlinska tkivna kultura
plant tissue culture

rastlinska tkivna kultura
plant tissue culture

robot za pipetiranje
robot for pipetting

robot za pipetiranje
robot for pipetting



robot za pipetiranje
robot for pipetting

RAZISKOVALNI PROGRAMI, KI JIH FINANCIRA JAVNA AGENCIJA ZA RAZISKOVALNO DEJAVNOST REPUBLIKE SLOVENIJE, KI SO V LETU 2011 UPORABLJALI VELIKO INFRASTRUKTURNO OPREMO IC PLANTA
RESEARCH PROGRAMS FINANCED BY SLOVENIAN RESEARCH AGENCY, THAT WERE USING IC PLANTA LARGE EQUIPMENT AND FACILITIES IN 2011

- Raziskovalni program / Research program P4-0165, Rastlinska fiziologija in biotehnologija / Plant physiology and biotechnology, Nacionalni inštitut za biologijo / National institute of Biology, Maja Ravnikar
- Raziskovalni program / Research program P1-0245, Ekotoksiologija, toksikološka genomika in karcinogeneza / Ecotoxicology, toxicological genomics and carcinogenesis, Nacionalni inštitut za biologijo / National institute of Biology, Tamara Lah Turnšek
- Raziskovalni program / Research program P1-0184, Zoološke in speleobiološke raziskave / Investigations in zoology and speleobiology, Univerza v Ljubljani, Biotehniška fakulteta / University of Ljubljana, Biotechnical faculty, Boris Sket
- Raziskovalni program / Research program P3-0083, Odnosi parazitskega obstajanja / Existence of Parasitic Relationship, Univerza v Ljubljani, Medicinska fakulteta / University of Ljubljana, Medical faculty, Tatjana Avšič-Županc
- Raziskovalni program / Research program P4-0053, Endokrini, imunski in encimski odzivi pri zdravih in bolnih živalih / Endocrine, immune, nervous and enzyme responses in healty and sick animals, Univerza v Ljubljani, Veterinarska fakulteta / University of Ljubljana, Veterinary faculty, Vojteh Cestnik
- Raziskovalni program / Research program P1-0140, Proteoliza in njena regulacija / Proteolysis and its regulation, Institut Jožef Stefan / Institute Jožef Stefan, Boris Turk
- Raziskovalni program / Research program P3-0371, Človeške matične celice - napredno zdravljenje s celicami, Zavod Republike Slovenije za transfuzijsko medicino / Blood Transfusion Centre of Slovenia, Primož Rožman

RAZISKOVALNI PROJEKTI, KI JIH FINANCIRA JAVNA AGENCIJA ZA RAZISKOVALNO DEJAVNOST REPUBLIKE SLOVENIJE, KI SO V LETU 2011 UPORABLJALI VELIKO INFRASTRUKTURNO OPREMO IC PLANTA
RESEARCH PROJECTS FINANCED BY SLOVENIAN RESEARCH AGENCY, THAT WERE USING IC PLANTA LARGE EQUIPMENT AND FACILITIES IN 2011

- Aplikativni raziskovalni projekt / Applied research project L1-2278, Biološka raznovrstnost virusa PVY in njen vpliv na obrambni odgovor rastlin krompirja / Biological variability of potato virus Y and its influence on potato defense response, Nacionalni inštitut za biologijo / National institute of Biology, Maja Ravnikar
- Aplikativni raziskovalni projekt / Applied research project L2-4314, Razvoj novih tehnologij za odstranjevanje patogenih mikrobov in toksinov iz različnih vodnih virov / Developing simple, rapid and on-site methods for plant pathogens detection, Bia Separations, Aleš Štrancar
- Temeljni raziskovalni projekt / Basic research project J4-2154, Moduliranje medceličnega komuniciranja mikroorganizmov zaradi dejavnikov okolja, Univerza v Ljubljani, Biotehniška fakulteta / University of Ljubljana, Biotechnical faculty, Peter Raspor
- Temeljni raziskovalni projekt / Basic research project J4-3618, Tatarska ajda - nov vir za funkcijska živila / Tartary buckwheat as a new source for functional foods, Univerza v Ljubljani, Biotehniška fakulteta / University of Ljubljana, Biotechnical faculty, Ivan Kreft
- Temeljni raziskovalni projekt / Basic research project J1-005, Kemično in biološko kroženje snovi, ki povzročajo motnje v endokrinem sistemu med postopkom čiščenja odpadnih voda / Chemical and biological cycling of endocrine disrupting compounds in wastewater treatment, Institut Jožef Stefan / Institute Jožef Stefan, Janez Ščančar
- MR / Young researcher Ana Lazar, Nacionalni inštitut za biologijo / National institute of Biology, Jana Žel
- MR / Young researcher David Dobnik, Nacionalni inštitut za biologijo / National institute of Biology, Jana Žel
- MR / Young researcher Ida Istinič, Nacionalni inštitut za biologijo / National institute of Biology, Jana Žel
- MR / Young researcher Jana Erjavec, Nacionalni inštitut za biologijo / National institute of Biology, Maja Ravnikar
- MR / Young researcher Marko Petek, Nacionalni inštitut za biologijo / National institute of Biology, Kristina Gruden
- MR / Young researcher Matevž Rupar, Nacionalni inštitut za biologijo / National institute of Biology, Maja Ravnikar
- MR / Young researcher Nina Prezelj, Nacionalni inštitut za biologijo / National institute of Biology, Marina Dermastia
- MR / Young researcher Jana Vojvoda, Nacionalni inštitut za biologijo / National institute of Biology
- MR / Young researcher Alja Štraser, Nacionalni inštitut za biologijo / National institute of Biology
- MR / Young researcher Anja Bubik, Nacionalni inštitut za biologijo / National institute of Biology
- MR / Young researcher Marko Pezdirc, Nacionalni inštitut za biologijo / National institute of Biology
- MR / Young researcher Neža Podergajs, Nacionalni inštitut za biologijo / National institute of Biology
- MR / Young researcher Dejan Gmajner, Univerza v Ljubljani, Biotehniška fakulteta / University of Ljubljana, Biotechnical faculty , Nataša Poklar Ulrih
- MR / Young researcher Miloš Vittori, Univerza v Ljubljani, Biotehniška fakulteta / University of Ljubljana, Biotechnical faculty
- MR / Young researcher Peter Prislan, Univerza v Ljubljani, Biotehniška fakulteta / University of Ljubljana, Biotechnical faculty
- MR / Young researcher Simona Kamenšek, Univerza v Ljubljani, Biotehniška fakulteta / University of Ljubljana, Biotechnical faculty
- MR / Young researcher Špela Hoefferle, Univerza v Ljubljani, Biotehniška fakulteta / University of Ljubljana, Biotechnical faculty, Ines Mandič Mulec
- MR / Young researcher Mira Polajner, Institut Jožef Stefan / Institute Jožef Stefan
- MR / Young researcher Andreja Mirtič, Kemijski inštitut / National Institute of Chemistry

MEDNARODNI RAZISKOVALNI PROJEKTI, KI SO V LETU 2011 UPORABLJALI VELIKO INFRASTRUKTURNO OPREMO IC PLANTA
INTERNATIONAL RESEARCH PROJECTS, THAT WERE USING IC PLANTA LARGE EQUIPMENT AND FACILITIES IN 2011

- EU projekt 245047, Razvoj metod za določanje karantenskih škodljivih organizmov za uporabo v nacionalnih programih in inšpekcijskih službah, Food and environment research organisation (FERA), Neil Boonham, za / for Nacionalni inštitut za biologijo / National institute of Biology Maja Ravnikar
- EU projekt 7.OP EU projekt 262032, Stroškovno učinkovito ročna naprava za hitro odkrivanje Flavenscence dorée fitoplazem v vinski trti / Cost-Effective Hand-Held Device for Rapid In-Field, The Secretary of State for Environment, Food and Rural Affairs acting through Food and Environment Research Agency, Adrian Belton in Mike Wray, za / for Nacionalni inštitut za biologijo / National institute of Biology Maja Ravnikar

- Mednarodni projekt 4302-38/2006/4, Orodja sistemske biologije pri raziskavah celične terapije in zdravil / Systems Biology Tools Development for Cell Therapy and Drug Development, za / for Nacionalni inštitut za biologijo / National institute of Biology Mio Knežević

BILATERALNI RAZISKOVALNI PROJEKTI, KI SO V LETU 2011 UPORABLJALI VELIKO INFRASTRUKTURNO OPREMO IC PLANTA
BILATERAL RESEARCH PROJECTS, THAT WERE USING IC PLANTA LARGE EQUIPMENT AND FACILITIES IN 2011

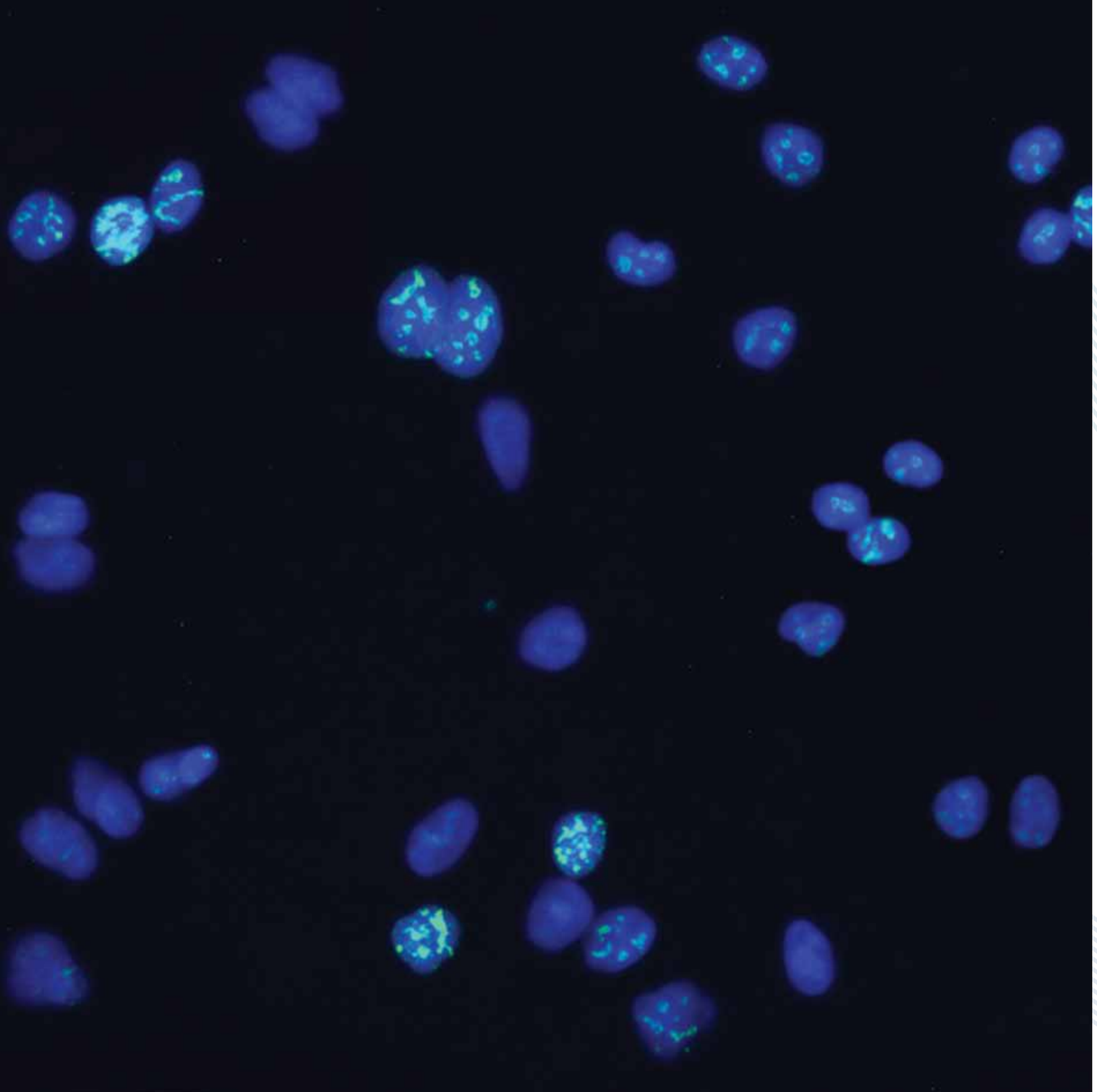
- Bilateralni projekt med Slovenijo in Poljsko BI-PL/10-11-019, Profil izražanja genov pri linijah krompirja z različnim odzivom na okužbo s krompirjevim virusom Y (PVY) / Global transcriptome analyses of potato lines exhibiting different phenotypes of defence response to potato virus Y (PVY) infection, Nacionalni inštitut za biologijo / National institute of Biology, Maruša Pompe Novak

DRUGI RAZISKOVALNI PROJEKTI, KI SO V LETU 2011 UPORABLJALI VELIKO INFRASTRUKTURNO OPREMO IC PLANTA
OTHER RESEARCH PROJECTS, THAT WERE USING IC PLANTA LARGE EQUIPMENT AND FACILITIES IN 2011

- Pogodba / Contract 2321-09-210045 s / with FURS, Strokovne naloge s področja zdravstvenega varstva rastlin / Expert projects in plant health protection field, Nacionalni inštitut za biologijo / National institute of Biology, Maja Ravnikar
- Pogodba / Contract C2314-10-000020 z / with IR-SKGH, Določanje in testiranje diagnostičnih vzorcev na MO / Detection and analysing on MO samples, Nacionalni inštitut za biologijo / National institute of Biology, Maja Ravnikar
- Pogodba / Contract 2314-07-000010 z / with IR-SKGH, Nacionalni inštitut za biologijo / National institute of Biology, Jana Žel
- Pogodba / Contract 2314-10-000011 z / with IR-SKGH, Nacionalni inštitut za biologijo / National institute of Biology, Jana Žel
- Pogodba / Contract 2311-11-000101 z / with MKGP, Monitoring GSO v živilih in krmi, Nacionalni inštitut za biologijo / National institute of Biology, Jana Žel
- Pogodba / Contract 2311-11-000104 z / with MKGP, Monitoring GSO v kmetijskih rastlinah in pridelkih, Nacionalni inštitut za biologijo / National institute of Biology, Jana Žel
- Pogodba / Contract 2511-07-200132 z / with MOP, Referenčni laboratorij / Reference Laboratorij, Nacionalni inštitut za biologijo / National institute of Biology, Jana Žel
- Pogodba / Contract 4300-102/2007-1 z / with MORS, Sofinanciranje organizacijskih, materialnih in kadrovskih priprav v Nacionalnem inštitutu za biologijo, za strokovno svetovanje in ukrepanje v primeru napada z orožji ali sredstvi za množično uničevanje ter s klasičnimi sredstvi / The purposes of advising and action in case of an attack by weapons of mass destruction and by classical means, Nacionalni inštitut za biologijo / National institute of Biology, Maja Ravnikar
- Pogodba / Contract 1981/2006 s / with CRL Ispra, Validacije / Validations, Nacionalni inštitut za biologijo / National institute of Biology, Jana Žel
- Pogodba / Contract 1145/2007 z / with BiaSeparations, Analize qPCR / RT PCR Analyses, Nacionalni inštitut za biologijo / National institute of Biology, Maja Ravnikar
- Pogodba / Contract 802/2006 z / with BiaSeparations, Analize TEM / Analyses on Electronic Microscopy, Nacionalni inštitut za biologijo / National institute of Biology, Maruša Pompe Novak
- Pogodba / Contract z / with Biosistemiko, Sodelovanje na področju izobraževanj in tečajev / Cooperation on workshops, Nacionalni inštitut za biologijo / National institute of Biology, Maja Ravnikar
- Pogodba / Contract z / with Inštitut za kontrolo in certifikacijo v kmetijstvu in gozdarstvu (IKCK) 1-6/5-2007, Določanje gensko spremenjenih organizmov / Detection of genetically modified organisms, Nacionalni inštitut za biologijo / National institute of Biology, Jana Žel
- Pogodba / Contract z / with Lek 5-057/2003 R002/03 s področja molekularne biologije / in the field of molecular biology, Nacionalni inštitut za biologijo / National institute of Biology, Kristina Gruden
- Pogodba / Contract z / with ZTM, Analiza markerskih genov na posameznih matičnih celicah / Analysis of individual marker genes in stem cells, Nacionalni inštitut za biologijo / National institute of Biology, Kristina Gruden
- Posamezna naročila / Separate orders IRMM, Stability, Copy No., Homogenity , Nacionalni inštitut za biologijo / National institute of Biology, Jana Žel
- MR iz Gospodarstva / Young researcher from industry, MR Anastazija Jež, RRA Severne Primorske
- Pogodba / Contract s / with Center odličnosti za biosenzoriko, instrumentacijo in procesno kontrolo / Center of Excellence for Biosensors, Instrumentation and Process Control CO BIK, Univerza v Ljubljani, Ekonomska fakulteta, Rebeka Koncilja
- Pogodba / Contract 3211-10-000466 s / with Kompetenčni center za biološki razvoj in inovacije / Competence for the biological development and inovations, Zavod za biotehnoloke inovacije, Matejka Štemplej
- Pogodba / Contract z / with MF s področja uporabe EM / in the field of TEM, Univerza v Ljubljani, Biotehniška fakulteta / University of Ljubljana, Biotechnical faculty

PEDAGOŠKA DEJAVNOST, KI JE V LETU 2011 UPORABLJALA VELIKO INFRASTRUKTURNO OPREMO IC PLANTA
PEDAGOGIC WORK THAT WERE USING CENTER PLANTA EQUIPMENT IN 2011

- Individualno delo pri predmetu Dinamičnost celične arhitekture na doktorskem študiju Bioznanosti, področje Znanosti o celici, Univerza v Ljubljani, Biotehniška fakulteta / University of Ljubljana, Biotechnical faculty / Individual work of Dynamics of Cell Architecture at interdisciplinary doctoral study programme in Biosciences, University of Ljubljana, Biotechnical Faculty, Jasna Štrus
- Individualno delo pri predmetu Mikroskopija in analiza slike bioloških vzorcev na doktorskem študiju Bioznanosti, področje Znanosti o celici, Univerza v Ljubljani, Biotehniška fakulteta / University of Ljubljana, Biotechnical faculty / Individual work of Microscopy and Image Analysis at interdisciplinary doctoral study programme in Biosciences, University of Ljubljana, Biotechnical Faculty, Rok Kostanjšek in Jasna Štrus
- Vaje pri predmetu Funkcionalna biologija celice na MSc študiju Strukturna in funkcionalna biologija in Molekulska biologija, Univerza v Ljubljani, Biotehniška fakulteta / University of Ljubljana, Biotechnical faculty / Practical course of Funkcionalna biologija celice at MSc study in Molecular Biology and Structural and functional Biology, University of Ljubljana, Biotechnical Faculty, Jasna Štrus
- Vaje pri predmetu Biomolekule v industriji na Magistrskem študiju molekulske biologije, Univerza v Ljubljani, Biotehniška fakulteta / University of Ljubljana, Biotechnical faculty / Practical course of Biomolecules in Industry at MSc study in Molecular Biology, University of Ljubljana, Biotechnical Faculty, Nina Gunde Cimerman
- Vaje pri predmetu Splošna zoologija na BSc študiju Biologije, Univerza v Ljubljani, Biotehniška fakulteta / University of Ljubljana, Biotechnical faculty / Practical course of General Zoology at BSc study in Biology, University of Ljubljana, Biotechnical Faculty, Jasna Štrus in Primož Zidar
- Vaje pri predmetu Biologija celice in histologija na BSc študiju Biologije, Univerza v Ljubljani, Biotehniška fakulteta / University of Ljubljana, Biotechnical faculty / Practical course of Biologija celice in histologija at BSc study in Biology, University of Ljubljana, Biotechnical Faculty, Jasna Štrus in Rok Kostanjšek
- Vaje pri predmetu Biologija na BSc Biotehnologija, Univerza v Ljubljani, Biotehniška fakulteta / University of Ljubljana, Biotechnical faculty / Practical course of Biology at BSc study in Biotechnology, University of Ljubljana, Biotechnical Faculty, Jasna Štrus
- Vaje pri predmetu Biologija na BSc študiju Živilstva in Prehrane, Univerza v Ljubljani, Biotehniška fakulteta / University of Ljubljana, Biotechnical faculty / Practical course of Biology at BSc study in Food Science and Nutrition, University of Ljubljana, Biotechnical Faculty, Jasna Štrus
- Vaje pri predmetu Splošna Biologija na BSc študiju Biokemije, 0103 Univerza v Ljubljani, Fakulteta za kemijo in kemijsko tehnologijo / Practical course of General Biology at BSc study in Biochemistry, University of Ljubljana, Faculty of Chemistry and Chemical Technology, Jasna Štrus
- Vaje pri predmetu Biotehnologija in okolje na Študijskem programu I. stopnje Okolje, 1540 Univerza v Novi Gorici / Practical course of Biotechnology and Environment at Bachelor's programme in Environment, University of Nova Gorica, Maruša Pompe Novak
- Vaje pri predmetu Rastlinska fiziologija in biotehnologija na Študijskem programu I. stopnje Vinogradništvo in vinarstvo, 1540 Univerza v Novi Gorici / Practical course of Plant Physiology and Biotechnology at Bachelor's programme in Viticulture and Enology, University of Nova Gorica, Maruša Pompe Novak



7.0

Oddelek za Genetsko toksikologijo in biologijo raka – GEN

Department of Genetic Toxicology and Cancer Biology – GEN

0105-007

VODJA HEAD

prof. dr. Metka Filipič, univ.dipl.ing. živilske tehnol., znanstvena svetnica

NASLOV ADDRESS

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RAZISKOVALCI
SCIENTIFIC STAFF

1. dr. Mihael Bricelj, univ.dipl.biol., višji znanstveni sodelavec
2. dr. Tina Eleršek, univ.dipl.mikrobiol., znanstvena sodelavka
3. dr. Gorazd Kosi, univ.dipl.biol., strokovno – raziskovalni svetnik
4. prof. dr. Tamara Lah Turnšek, univ.dipl.ing.kemije, znanstvena svetnica
5. dr. Helena Motaln, univ.dipl. biol., asistentka z doktoratom
6. dr. Jana Petković, univ.dipl.mikrobiol., asistentka z doktoratom
7. dr. Uroš Rajčević, dr. vet. med, znanstveni sodelavec *
8. prof. dr. Bojan Sedmak, univ.dipl.biol., znanstveni svetnik
9. Ana Torkar, mag. farmacije, višja asistentka
10. dr. Irena Zajc, univ.dipl.biol., višja strokovno - raziskovalna sodelavka
11. dr. Bojana Žegura, univ.dipl. biol., znanstvena sodelavka

MLADI RAZISKOVALCI
YOUNG RESEARCHERS

1. Anja Bubik, univ.dipl.biokem.
2. Marko Pezdirc, univ.dipl.biol.
3. Neža Podergajs, mag. farmacije
4. Alja Štraser, univ.dipl.mikrobiol.
5. Urška Tajnšek, univ.dipl.bioteh.

MLADI RAZISKOVALCI IZ GOSPODARSTVA
YOUNG RESEARCHERS FROM INDUSTRY

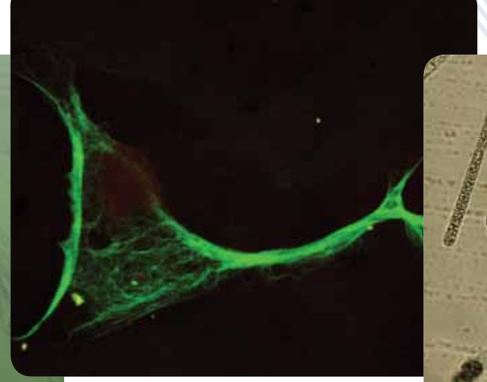
1. Polona Bergoč, univ. dipl. biol., Inštitut za ekološki inženiring d.o.o.
2. Monika Primon, univ. dipl. biol., BIA d.o.o.

STROKOVNO TEHNIČNI SODELAVCI
TECHNICIANS

1. Katja Kološa, samostojna strokovna sodelavka
2. Ana Koren, samostojna strokovna sodelavka*
3. Martina Mršnik, dr. med. samostojna strokovna sodelavka
4. Matjaž Novak, samostojni strokovni sodelavec
5. Karmen Stanič, koordinatorka področij

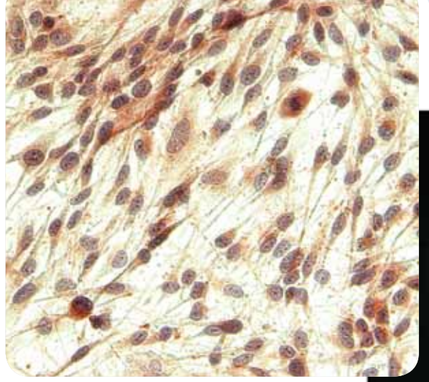
* delovno razmerje prenehalo v letu 2011/ employment ended in 2011

Površinski cvet cianobakterij
Surface cyanobacterial bloom

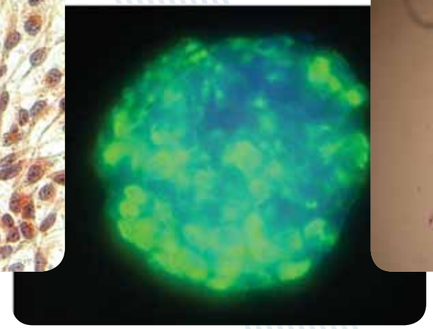


Človeške astrocite
Human astrocytes

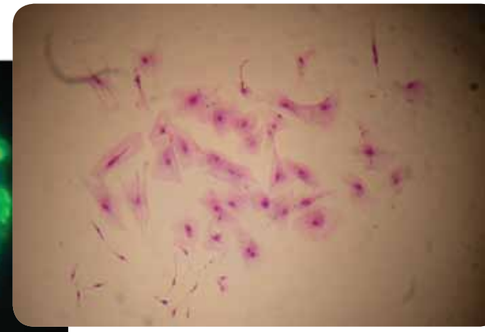
Cianobakterije
Cyanobacteria



Glioblastomska celična linija
Glioblastoma cell line



Sferoid glioblastomskih matičnih celic
Spheroid of glioblastoma stem cells



Mezenhimske matične celice
Mesenchymal stem cells

Raziskovalna dejavnost

Raziskave GEN potekajo na treh med seboj povezanih področjih: genetski toksikologiji, biologiji raka in ekotoksikologiji.

Na področju ekotoksikologije proučujemo regulacijo cianobakterijskih združb, dejavnike odgovorne za produkcijo cianobakterijskih toksinov in vlogo teh toksinov pri vzdrževanju ravnovesij v vodnih ekosistemih. Na osnovi razumevanja teh procesov razvijamo nove metodologije za napovedovanje in karakterizacijo cianobakterijskih cvetov in metode za njihovo preprečevanje.

V okviru genetske toksikologije raziskujemo molekularne mehanizme genotoksičnega delovanja cianobakterijskih toksinov in različnih antropogenih onesnaževal okolja (npr. prehranski karcinogeni, pesticidi, kovine, ostanki zdravil, nanomateriali). Proučujemo tudi mehanizme zaščitnega delovanja naravnih snovi (npr. ksantohumol, eterična olja) proti raku. Pridobljena nova spoznanja doprinašajo k razvoju ustreznih ukrepov za preprečevanje in zmanjševanje vpliva genotoksičnih onesnaževal okolja na zdravje ljudi in druge organizme v okolju.

Vsi ti dejavniki lahko povzročijo raka. Temeljne raziskave na področju biologije raka so usmerjene v proučevanje mehanizmov razvoja raka, predvsem v proučevanje vloge proteolitičnih sistemov. Razen tumorskih celic in tumorskih matičnih celic je pomembno raziskovati tudi mikrookolja tumorjev in tako imenovane stromalne celice, med katerimi so tudi vrste tkivnih oz. mezenhimskih matičnih celic. Namen teh raziskav je prenos izsledkov temeljnih raziskav v klinično uporabo, kot je razvoj novih diagnostičnih in prognostičnih pokazateljev razvoja raka, razvoj možnih terapevtskih inhibitorjev proteaz ter razvoj novih možnosti za klinično in diagnostično uporabo matičnih celic v regenerativni medicini in zdravljenju raka.

RAZISKOVALNI PROGRAM: P1-0245. »EKOTOKSIOLOGIJA, TOKSIKOLOŠKA GENOMIKA IN KARCINOGENEZA«

Vodja: prof. dr. Tamara Lah Turnšek

- Na področju EKOTOKSIKOLOGIJE smo nadaljevali z raziskavami vplivov različnih cinaobakterijskih toksinov na razgradnjo cvetov v akseničnih in neakseničnih pogojih. Ugotovili smo, da v akseničnih pogojih povzročijo programirano smrt, v neakseničnih pa se poleg programirane celične smrti sproži tudi razgradnja cveta s cianofagi.
- Pri raziskavah vplivov cianobakterijskih toksinov na človeka in predvsem na tumorske celice v primerjavi z normalnimi, smo v tumorskih celicah ugotovili značilne vplive na organizacijo intermendiarnih filamentov. Ti izsledki predstavljajo osnovo za nadaljnje raziskave morebitne uporabnosti teh učinkovin kot protitumorskih zdravil.

Research Activity

Our research is conducted in three interrelated fields: genetic toxicology, cancer biology and ecotoxicology.

In the field of ecotoxicology we study the regulation of cyanobacterial communities, factors responsible for the production of cyanobacterial toxins, and the role of these toxins in maintaining the balance of aquatic ecosystems. Based on the understanding of these processes we are developing new methods for prediction and characterization of toxic cyanobacterial blooms and methods for their prevention.

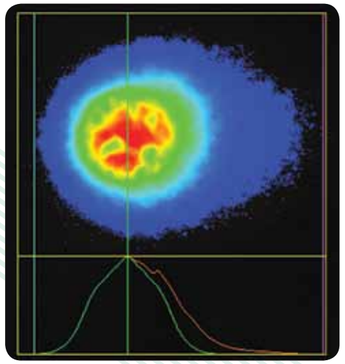
In the field of genetic toxicology we are studying the molecular mechanisms of genotoxicity of cyanobacterial toxins in addition to different types of environmental contaminants (i.e. food borne carcinogens, metals, residues of pharmaceuticals, nanomaterials). We are also investigating the cancer preventive effects of natural substances and the respective mechanisms of action. This new knowledge contributes to the development of preventive and protective measures for reducing the impact of genotoxic environmental contaminants on humans and other organisms.

All these agents can cause cancer. The basic research in the field of cancer biology is focused on the mechanisms of cancer development, in particular on the role of proteolytic systems. Besides the tumour and tumour stem cells, it is important to investigate the tumor microenvironment and the so called stromal cells. Among them are also the tissue e.g. the mesenchymal stem cells. The aim of this research is to translate the basic research into clinical applications such as development of new diagnostic and prognostic markers of cancer development, development of therapeutic protease inhibitors, and development of novel medical application of stem cells such as diagnostics and novel drug delivery systems in regenerative medicine and cancer.

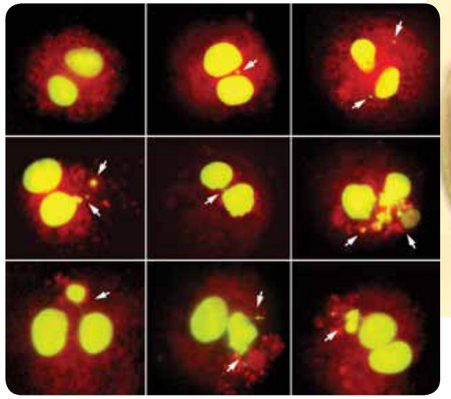
RESEARCH PROGRAMME: P1-0245. "ECOTOXICOLOGY, TOXICOGENOMIC AND CARCINOGENESIS"

Principal Investigator: Prof. Dr. Tamara Lah Turnšek

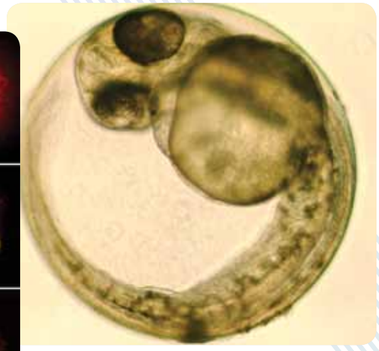
- In the field of ECOTOXICOLOGY we continued the studies of the influence of different cyanobacterial toxics on degradation of the blooms in axenic and nonaxenic conditions. We found that in axenic conditions cyanotoxins induce programmed cell death, whereas in non-axenic conditions in addition to programed cell death cyanophage mediated bloom degradation is triggered. The studies of the effects of cyanobacterial toxins on human tumour cell lines in comparsion to normal cells showed that in tumour cells they specifically affect organisation of intermediate filaments. These findings are the basis for further studies on potential use of these compounds as antitumour drugs.



Jedro humane celice s poškodovano DNK (test komet)
Human cell nucleus with damaged DNA (comet assay)



Test mikrojeder na celicah raka jeter
Micronucleus test on hepatic cancer cells



Zarodek ribe cebrice (*Danio rerio*)
Zebrafish (*Danio rerio*) embryo

- Na področju TOSKIKOGENOMIKE smo se osredotočili na raziskave mehanizmov genotoksičnega in potencialno karcinogenega delovanja cianobakterijskega toksina cilindrospermopsina (CYN). Izsledki kažejo, da ima višji genotoksični potencial od mikrocistina-LR, ki velja za enega najnevarnejših cianobakteriskih toksinov.
- V okviru raziskav mehanizmov genotoksičnega delovanja heterocikličnih aminov (HCA) in njihovih kompleksnih zmesi v pečenem mesu smo pokazali, da imajo ekstrakti pečenega mesa večjo genotoksično aktivnost kot čisti HCA ali njihove zmesi pri enakih koncentracijah. To pomeni, da je lahko ocena tveganja za zdravje ljudi pri uživanju pečenega mesa na osnovi toksikoloških podatkov za čiste HCA podcenjena.
- Raziskave potencialnega antikancerogenega delovanja ksantohumola (XN) pa so pokazale, da zavira genotoksično delovanje HCA prek modulacije njihove presnove, ki jo usmeri v učinkovitejšo detoksifikacijo.
- Na področju raziskav genotoksičnega delovanja nanodelcev smo prvi dokazali večjo citotoksičnost in genotoksičnost anataznih delcev TiO2, ki so bili predhodno obsevani z UV. To novo spoznanje bo pomembno prispevalo k ocenjevanju varnosti uporabe nanomaterialov.
- Na področju KARCINOGENEZE smo razvili nove selektivne sintetske inhibitorje in sonde za katepsina L, ki so potencialno uporabni tako za raziskave procesov karcinogeneze, kot tudi za razvoj terapevtskih učinkovin.
- Pokazali smo tudi, da je arzenit (As2O3) citotoskično zdravilo za levkemije, selektiven inhibitor CatB, ki povzroča avtofagijo in apoptozo glioblastomskih (GBM) celic, kar nakazuje novo terapevtsko uporabo arzenita.
- Naše raziskave vloge mikrookolja tumorjev pri razvoju rakavih obolenj so pokazale, da so v tem okolju pomembne mezenhimske matične celice (MSC), ki v teh modelnih, indirektnih kokulturah (in vitro) inhibitorno vplivajo na GBM celice preko ključnega citokina MCP1/CCL2, podobno kot v imunskemu odzivu. Pri direktnih kokulturah smo identificirali vpliv prek nekaterih novih genov celičnega cikla, ki povzroči povečano invazivnost MSC in glioblastomskih celic.
- Ugotavljali smo tudi kvaliteto in uporabnost MSC za zdravljenje in ugotovili njihovo relativno varnost tudi po več pasažah, saj se ne transformirajo. Zato ustvarjamo banko adipoznih MSC.

Glavni dosežki v letu 2011

KOORDINATORSTVO EU PROJEKTA CYTOTHREAT

V letu 2011 se je pričelo izvajanje raziskovalnega projekta 7. Okvirnega programa CYTOTHREAT (Fate and Effects of Cytostatic Pharmaceuticals in the Environment and the Identification of Biomarkers for an Improved Risk Assessment on Environmental Exposure Collaborative Project), ki ga koordinira dr. Metka Filipič. Cilji projekta so ugotoviti pojavljanje in usodo

- In the filed of TOXICOGENOMIC we focused our studies on the mechanisms of genotoxic and potential carcinogenic activity of the cyanobacterial toxin cylindrospermopsin (CYN). The results indicate that CYN has higher genotoxic potential than microcystin-LR, which is currently considered as one of the most dangerous toxins.
- In the frame of the studies of the genotoxicity of heterocyclic aromatic amines (HCA) and their complex mixtures in grilled meat we found that grilled meat extracts have higer genotoxic potential than pure HCA or their mixtures at the same concentrations. This means that the risk assessment for human health due to the consumption of grilled meat based on toxicological data for pure HCA might be underestimated.
- Our studies of potential cancer preventive activity of xanthohumol (XN) showed that it suppressed genotoxic activity of HCA via modulation of their metabolic transformation, favouring the detoxification pathway.
- With our studies of genotoxic potential of nanoparticles we were the first who showed higher cytotoxicity and genotoxicity of UV pre-irradiated anatase TiO2 particles that was not particle size dependent, which should be taken into account in safety assessment of the use of nanomaterials.
- In the field of CARCINOGENESIS we developed new selective synthetic inhibitors and activity based probes of cathepsin L that may be potentially used in cancer research as well as for the development of therapeutic compounds.
- We also showed that arsenite (As2O3), a cytotoxic therapeutic for leukemia, selectively inhibits CatB and induces autophagy and apoptosis in glioblastoma (GMB) cells, indicating new therapeutic application of arsenite.
- Our studies of the role of tumour microenviroment in cancer development showed that in indirect co-cultures the mesenchymal stem cells (MSC) from bone marrow inhibit GMB cells via key cytokine MCP1/CCL2, while in direct co-cultures we identified the effect was mediated by several genes regulating cell to cell contact that has not been published before. We also explore the quality and potential use of MSC for medical treatment and confirmed their relative safety as even after several passages they did not transform.

Important Achievements in 2011

COORDINATION OF THE EU PROJECT CYTOTHREAT

In 2011 the FP7 project CYTOTHREAT (Fate and effects of cytostatic pharmaceuticals in the environment and the identification of biomarkers for an improved risk assessment on environmental exposure Collaborative project), coordinated by Assoc prof. Metka Filipič has been initiated. The goals of the project are establishment of the occurrence and fate of cytostatic drug residues in the environment, their effect on aquatic organisms and humans and identification of early biomarkers of delayed effects of long-term exposure to environmental concentrations of these pollutants.

COORDINATION OF INTERREG PROJECT SLOVENIA-ITALY

Contract signing and beginning of the project GLIOMA (Identification of new glioma biomarkers as potential diagnostic and therapeutic targets) coordinated by Prof. Dr. Tamara Lah Turnšek. The project is part of the Slovenian – Italian overboard collaboration program 2007-2013. Its goals are improvement of competitiveness and social development that is based on knowledge with establishment of international network of hospitals and research centres in the field of biotechnology and oncology.

PUBLICATION OF THE MANUAL CYNOBACTERIA AND THEIR TOXINS: WHAT ARE THEY, WHERE WE FIND THEM AND HOW THEY WORK?

In the series of manuals “Vse Živo”, published by NIB Assoc prof. dr. Bojan Sedmak published a manual that informs the reader with the most recent knowledge related to the worldwide problematic of cyanobacteria occurrence. The manual is useful for environmentalists, fishermen, lay ecologists, students of different natural sciences, as well as for those involved in public health.

ostankov citotstatikov v okolju, razviti nove analitske metode za njihovo zaznavanje, ugotoviti njihov vpliv na vodne organizme in ljudi ter razviti zgodnje biomarkerje za zaznavanje in napovedovanje zakasnelih učinkov pri dolgodobni izpostavljenosti okoljskim koncentracijam teh onesnažil.

VODENJE IN KOORDINACIJA INTERREG PROJEKTA SLOVENIJA – ITALIJA

Sklenitev pogodbe in pričetek izvajanja projekta GLIOMA (Določanje novih biomarkerjev možganskih tumorjev – gliomov za diagnozo in kot nove tarče zdravljenja), ki ga koordinira prof. dr. Tamara Lah Turnšek. Projekt poteka v okviru programa čezmejnega sodelovanja Slovenija – Italija 2007-2013, njegov cilj pa je povečanje konkurenčnosti in razvoja družbe, ki temelji na znanju in predvideva oblikovanje mednarodnega omrežja, ki ga sestavljajo bolnišnice in raziskovalna središča, ki se ukvarjajo z uvajanjem biotehnologij na področju onkologije.

IZDAJA PRIROČNIKA CIANOBAKTERIJE IN NJIHOVI TOKSINI : KDO SO, KJE JIH NAJDEMO IN KAKO DELUJEJO?

V zbirki priročnikov »Vse Živo«, ki jih izdaja NIB, je dr. Bojan Sedmak izdal priročnik, ki bralca seznanja z najnovejšimi dognanji na področju problematike cianobakterij v svetovnem merilu. Priročnik je vsestransko uporaben za okoljevarstvenike, ribiče, amaterske ekologe, študente naravoslovja različnih smeri, kakor tudi za tiste, ki se ukvarjajo z javnim zdravstvom.

CERTIFIKAT ZA DOLOČANJE FITOPLANKTONSKIH VRST

Implementacija vodne direktive (EU, 2000) zahteva redno sledenje fitoplanktona, ki je pomemben pokazatelj kakovosti voda. Pridobili smo certifikat »External Quality Assessment Trials in Phytoplankton« (EQAT), ki ga vsaki dve leti za celotno Evropo podeljujeta »Landestalsperrenverwaltung des Freistaates Sachsen« (LTV) in The »Arbeitsgemeinschaft Trinkwassertalsperren e.V.« (ATT).

PATENT

Urad za intelektualno lastnino RS nam je podelil patent za celični sistem za hitro zaznavanje in določanje genotoksičnosti kemikalij in drugih vzorcev. Vložen je tudi evropski patent.

MLADA ZNANSTVENICA DOBITNICA KRKINE NAGRADE IN NAGRADE NIB

Dr. Jana Petković je za svoje doktorsko delo prejela Krkino nagrado za posebne dosežke na področju raziskovalnega dela ter nagrado NIB za izjemno doktorsko delo na področju raziskovalne dejavnosti inštituta. Mlada doktorica je v okviru svoje doktorske disertacije proučevala mehanizme genotoksičnega delovanja nanodelcev titanovega dioksida.

Sodelovanje z različnimi uporabniki

UPORABNOST NAŠIH RAZISKAV IN POVEZAVE Z GOSPODARSTVOM

V okviru sodelovanja s podjetjem BIA d.o.o. v Ljubljani se pri nas izobražuje doktorska študentka na področju biologije raka.

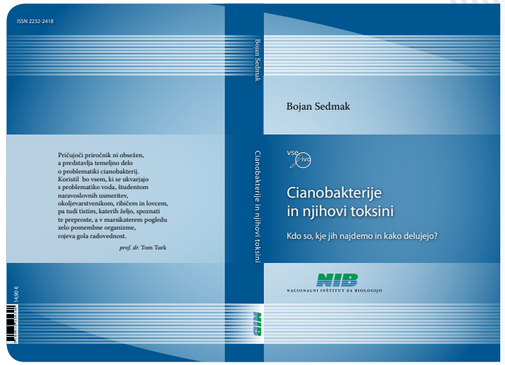
Vzpostavili smo sodelovanje z Inštitutom za ekološki inženiring iz Maribora, ki se ukvarja z razvojem in projektiranjem čistilnih naprav, sistemov za pripravo pitne vode, odlagališči odpadkov ter presojo vplivov na okolje. Pri nas se na področju ekotoksikologije izobražuje pri njih zaposlena doktorska študentka.

V okviru Kompetenčnega centra za razvoj in inovacije – BRIN sodelujemo s podjetjem Vitiva d.o.o. iz Markovcev ki razvija dodatke živilom na osnovi naravnih učinkovin.

Za potrebe naročnikov iz gospodarstva smo izvajali ekotoksikološka testiranja odpadnih vod (toksikološki test na zarodkih rib cebric) in genotoksikološka testiranja novih substanc in proizvodov (bakterijski test povratnih mutacij, *in vitro* indukcija mikrojeder in poškodb DNA).

POSEBEN POMEN NAŠIH DEJAVNOSTI ZA DRŽAVO IN POLITIKO

Za potrebe Ministrstva za okolje in prostor RS izvajamo redno letno sledenje ekološke kakovosti rečnih in jezerskih voda. Pri tem je pomemben pridobljeni mednarodni certifikat za določanje fitoplanktonskih vrst.



Naslovnica knjige, dr. Bojan Sedmak: "Cianobakterije in njihovi toksini"
Cover of the book, Dr. Bojan Sedmak: »Cyanobacteria and Their Toxins«

Certifikat EQAT za določanje fitoplanktonskih vrst
EQAT certificate fordetermination of phytoplankton species

Dobitnica Krkine nagrade za posebne dosežke dr. Jana Petković
Winner of KRKA award for significant research achievements dr. Jana Petković

CERTIFICATE FOR DETERMINATION OF PHYTOPLANKTON SPECIES

The implementation of EU Water Directive (EU, 2000) requires regular phytoplankton monitoring, which is an important indicator of water quality. We obtained the certificate »External Quality Assessment Trials in Phytoplankton« (EQAT), that is every two years conferred for the whole Europe by "Landestalsperrenverwaltung des Freistaates Sachsen" (LTV) and The "Arbeitsgemeinschaft Trinkwassertalsperren e.V." (ATT).

PATENT

The Office for Intellectual Property RS conferred to us the patent for cell system for rapid detection and determination of genotoxic chemicals and other samples. Also an European patent has been filed in.

YOUNG SCIENTIST WINNER OF KRKA AND NIB AWARDS

The microbiologist dr. Jana Petković was in the frame of her doctor dissertation studying the mechanisms of genotoxic activity of titanium dioxide nanoparticles. For her thesis she won Krka award for significant research achievements and the award of NIB for an outstanding PhD thesis in the field of the research activities of the Institute.

Collaboration with Various Users

OUR RESEARCH APPLICATIONS AND COLLABORATION WITH COMMERCIAL ENTITIES

In the frame of the collaboration with the company BIA Ltd. from Ljubljana, a doctoral student is educated in the field of cancer research at our department.

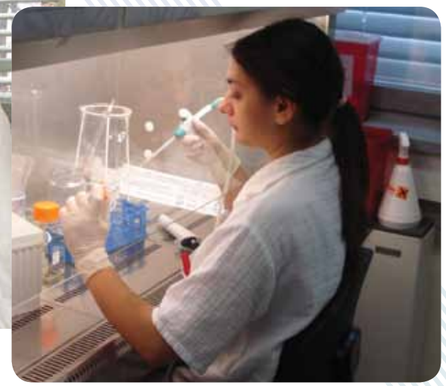
We established the collaboration with the company Institute for ecologic engineering Ltd., from Maribor that develops and designs waste water treatment plants, systems for drinking water preparation, waste landfills and also conducts assessment of the environmental impacts of human activities. At our institute we are educating their doctoral student in the field of ecotoxicology.

In the competence center for biological research and innovation – BRIN we are collaborating with the company Vitiva Ltd from Markovci that develops food additives based on natural compounds.

For different clients from industry we conduct ecotoxicological testings (zebrarafish embryo toxicity test) of waste waters and genotoxicological testings (bacterial reverse mutation assay, in vitro micronucleus assay and comet assay) of new substances and products.

Vzorčenje cianobakterijskega cvetenja
Sampling of cyanobacterial bloom

Delo v laboratoriju 1
Laboratory work 1



Delo v laboratoriju 2
Laboratory work 2

Za Upravo za zaščito in reševanje pri Ministrstvu za obrambo RS smo redno zadolženi za strokovno svetovanje in ukrepanje v primeru napada z orožji in sredstvi za množično uničevanje ter s klasičnimi terorističnimi sredstvi.

Raziskovalna infrastruktura

Oddelek za genetsko toksikologijo in biologijo raka ima najsodobneje opremljene laboratorije za celično biologijo, molekularno biologijo in biokemijo. Razpolaga z opremo za pretočno citometrijo, fluorescentno mikroskopijo, spektrofluorimetrijo, kvantitativno reverzno transkripcijo in verižno reakcijo s polimerazo v realnem času (QRT-PCR) ter ima dostop do konfokalne in elektronske mikroskopije. Skupaj z visoko usposobljenim raziskovalnim kadrom zagotavlja vrhunske raziskovalne rezultate in storitve.

Mednarodno sodelovanje

Oddelek za genetsko toksikologijo in biologijo raka je v letu 2011 sodeloval s številnimi mednarodnimi partnerji. V okviru raziskovalnega projekta 7.OP CYROTHREAT formalno sodelujemo s partnerji iz petih evropskih držav. V okviru INTERREG projekta GLIOMA sodelujemo s partnerji iz sosednjih pokrajin Italije. Prek bilateralnih projektov sodelujemo s partnerji iz Brazilije na področju ekotoksinologije in biologije raka, Francije in Norveške na področju biologije raka, Madžarske na področju ekotoksikologije ter ZDA na področju nanotoksikologije.

Izobraževalne dejavnosti in promocija znanosti

Sodelavci Oddelka za genetsko toksikologijo in biologijo raka sodelujejo v študijskih programih Univerze v Ljubljani, Univerze v Novi Gorici, Univerze na Primorskem in Visoke šole za varstvo okolja Velenje. Kot predavatelji in mentorji smo vključeni tudi v delo Mednarodne podiplomske šole Jožef Stefan.

Z namenom popularizacije znanosti smo v letu 2011 posneli oddajo v TV seriji *Ugriznimo znanost* na temo globalne problematike cianobakterjskega cvetenja (http://tvslo.si/predvajaj/cianobakterije-oddaja-o-znanosti/ava2.118167561/). O našem delu in pomembnih dosežkih obveščamo javnost tudi preko objavljanja poljudnih člankov za dnevni tisk in poljudno-znanstvene revije, intervjujev za različne medije ter poljudno znanstvenih predavanj na različnih simpozijih.

RELEVANCE OF OUR ACTIVITIES FOR THE STATE AND POLITICS

For the purposes of the Ministry of Environment and Spatial Planning RS we are conducting regular monitoring of the ecological quality of surface waters. For this monitoring the obtained international certificate for determination of phytoplankton species is of particular importance.

In a long-term contract with the Administration for Civil Protection and Disaster Relief of the Ministry of Defense RS we are responsible for expert advice and action in a case of an attack with weapons for mass destruction or classical terroristic weapons.

Research Infrastructure

The Department for Genetic Toxicology and Cancer Biology has the most up-todate equipped laboratories for cell biology, molecular biology and biochemistry. We have equipment for flow cytometry, fluorescence microscopy, spectrofluorometry, real time quantitative reverse transcription polymerase chain reaction (QRT-PCR) as well as access to confocal and electron microscopy. Together with highly qualified research stuff we guarantee excellent research results and services.

International Collaboration

In 2011 the Department for Genetic Toxicology and Cancer Biology collaborated with numerous international partners. In the frame of the FP7 project CYTOTHREAT we formally collaborate with partners from five European countries. In the frame of the INTERREG project GLIOMA we collaborate with partners from Italy. In bilateral projects we collaborate with partners from Brazil in the field of ecotoxinology and cancer biology, France and Norway in the filed of cancer biology, Hungary in the field of ecotoxicology and USA in the field of nanotoxicology.

Educational Activities and Promotion of Science

Members of the Department for Genetic Toxicology and Cancer Biology are actively involved in educational programs of the University Ljubljana, University in Nova Gorica, University of Primorska and Visoke šole za varstvo okolja Velenje. As lecturers and mentors we are also engaged in the International Graduate School Jožef Stefan.

Main Publications in 2011

GENOTOXICITY AND POTENTIAL CARCINOGENICITY OF CYANOBACTERIAL TOXINS

In this review article prepared upon invitation of the editor of the prestigious Mutation Research-Reviews we presented current scientific knowledge on the genotoxic and carcinogenic potential of cyanobacterial toxins, particularly microcystin-LR, nodularin and cylindrospermopsin that are most often occurring in surface and drinking water. We also stressed out the major knowledge gaps and propose future research priorities.

ŽEGURA, Bojana, ŠTRASER, Alja, FILIPIČ, Metka. Genotoxicity and potential carcinogenicity of cyanobacterial toxins-a review. Mutat. Res., Rev. Mutat. Res., 2011, vol. 727, issues 1-2, 16-41. doi: 10.1016/j.mrrev.2011.01.002. [JRC IF 8.741]

PREIRRADIATION OF TIO2 PARTICLES WITH UV POTENTIATES THEIR CYTOTOXIC AND GENOTOXIC POTENTIAL

In this study we have shown that cytotoxic and genotoxic potential of UV preirradiated TiO2 anatase particles drastically increases, irrespective of the particle size. This is the first study, which showed that toxicity of TiO2 particles remaines increased also after the discontinuation of UV irradiation, which should be taken into account in the assessment of the safety.

Najpomembnejše objave v 2011

GENOTOKSIČNOST IN POTENCIALNA KARCINOGENOST CIANOBAKTERIJSKIH TOKSINOV

V tem preglednem članku, ki smo ga pripravili na povabilo urednika prestižne revije Mutation Research-Reviews smo predstavili trenutno poznavanje genotoksičnega in karcinogenega potenciala cianobakterijskih toksinov, predvsem mikrocistina-LR, nodularina in cilindrospermopsina, ki se najpogosteje pojavljajo v površinskih in pitnih vodah. Izpostavili smo pomembnejše vrzeli v poznavanju teh mehanizmov in predlagali usmeritve nadaljnjih raziskav.

ŽEGURA, Bojana, ŠTRASER, Alja, FILIPIČ, Metka. Genotoxicity and potential carcinogenicity of cyanobacterial toxins--a review. Mutat. Res., Rev. Mutat. Res., 2011, vol. 727, issues 1-2, str. 16-41. doi: 10.1016/j.mrrev.2011.01.002. [JRC IF 8.741]

PREDHODNO OBSEVANJE TIO_2 DELCEV Z UV POVEČA NJIHOV CITOTOKSIČNI IN GENOTOKSIČNI POTENCIAL

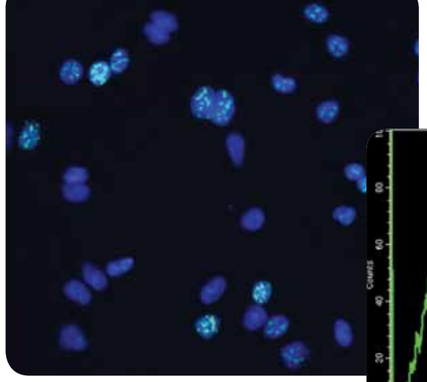
V tej raziskavi smo ugotovili, da se citotoksičnost in genotoksičnost z UV predobsevanih delcev titanijevega oksida drastično poveča ne glede na velikost delcev. To je prva študija, ki je pokazala, da se toksično delovanje delcev TiO2 po obsevanju z UV poveča tudi po prenehanju obsevanja, kar bo potrebno upoštevati pri ocenjevanju varnosti njihove uporabe.

PETKOVIĆ, Jana, KÜZMA, Tadeja, RADE, Katja, NOVAK, Saša, FILIPIČ, Metka. Pre-irradiation of anatase TiO2 particles with UV enhances their cytotoxic and genotoxic potential in human hepatoma HepG2 cells. J. Hazard. Mater., 2011, vol. 196, str. 145-152. doi: 10.1016/j.jhazmat.2011.09.004. [JRC IF 3.723]

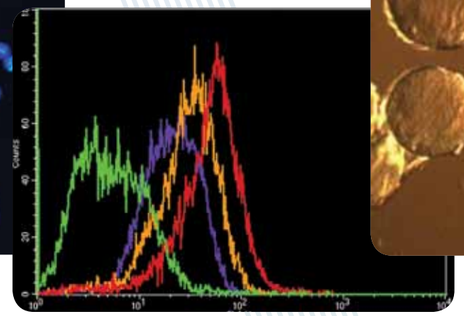
RESVERATROL ZNIŽUJE INVAZIVNO RAST IN PRISPEVA K DEDIFERENCIACIJI ČLOVEŠKIH GLIOBLASTOMSKIH CELIC

Članek opisuje delovanje resveratrola, ki je sestavina grozdja in vina, na ustavitev celičnega cikla, zmanjšano gibljivost in invazivnost rakavih glioblastomskih celic ter pospeševanje trajnih morfoloških sprememb, ki vodijo v diferenciran, manj odporen fenotip. Dobljene ugotovitve podpirajo koristnost uporabe pulznega dodajanja resveratrola v kemoterapevtskih režimih zdravljenja gliomov.

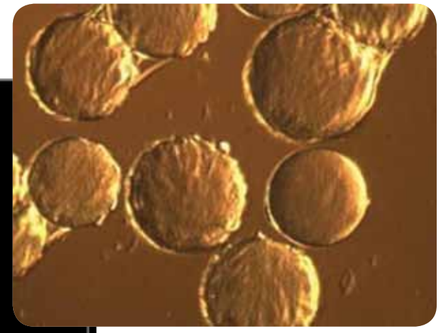
CASTINO, Roberta, PUCER, Anja, VENERONI, Roberta, MORANI, Federica, PERACCHIO, Claudia, LAH TURNŠEK, Tamara, ISIDORO, Ciro. Resveratrol reduces the invasive growth and promotes the acquisition of a long-lasting differentiated phenotype in human glioblastoma cells. J. Agric. Food Chem., 2011, vol. 59, no. 8, str. 4264-4272. doi: 10.1021/jf104917q. [JRC IF 2.816]



Jedra celic človeškega hepatoma
Cell nuclei of human hepatoma



Analiza celičnih populacij s pretočno citometrijo
Cell population analysis with flow cytometry



Mezenhimske matične celic na mikronosilcih
Mesenchymal stem cells on microcarriers

PETKOVIĆ, Jana, KÜZMA, Tadeja, RADE, Katja, NOVAK, Saša, FILIPIČ, Metka. Pre-irradiation of anatase TiO2 particles with UV enhances their cytotoxic and genotoxic potential in human hepatoma HepG2 cells. J. Hazard. Mater., 2011, vol. 196, str. 145-152. doi: 10.1016/j.jhazmat.2011.09.004. [JRC IF 3.723]

RESVERATROL REDUCES THE INVASIVE GROWTH AND PROMOTES THE ACQUISITION OF DIFFERENTIATED PHENOTYPE IN HUMAN GLIOBLASTOMA CELLS

This article describes the effect of resveratrol, that is present in grapes and wine, on cell cycle arrest, limiting migration and invasion of human glioblastoma cells and promoting long-lasting morphological changes reminiscent of a more mature phenotype. The findings support the introduction of pulsed administration of resveratrol in the chemotherapy regimen of glioma.

CASTINO, Roberta, PUCER, Anja, VENERONI, Roberta, MORANI, Federica, PERACCHIO, Claudia, LAH TURNŠEK, Tamara, ISIDORO, Ciro. Resveratrol reduces the invasive growth and promotes the acquisition of a long-lasting differentiated phenotype in human glioblastoma cells. J. Agric. Food Chem., 2011, vol. 59, no. 8, 4264-4272. doi: 10.1021/jf104917q. [JRC IF 2.816]

RAZISKOVALNI PROGRAM, KI GA FINANCIRA JAVNA AGENCIJA ZA RAZISKOVALNO DEJAVNOST REPUBLIKE SLOVENIJE
RESEARCH PROGRAM FINANCED BY SLOVENIAN RESEARCH AGENCY

- Ekotoksiologija, toksikološka genomika in karcinogeneza/ *Ecotoxicology, Toxicogenomic and Carcinogenesis* (P1-0245), vodja programa / *the research programme leader* prof. dr. Tamara Lah Turnšek

RAZISKOVALNI PROJEKTI, KI JIH FINANCIRA JAVNA AGENCIJA ZA RAZISKOVALNO DEJAVNOST REPUBLIKE SLOVENIJE
RESEARCH PROJECTS FINANCED BY SLOVENIAN RESEARCH AGENCY

- Antikancerogeno delovanje bioaktivnih spojin cianobakterijskega izvora v napredovanju možganskih tumorjev-gliobastomov / *Anticarcinogenic Activity of Bioactive Compounds from Cyanobacterial Source in the Progression of Brain Tumours - Glioblastoma* (J1-0848), nosilka projekta/*principal investigator* prof. dr. Tamara Lah Turnšek.
- Uporaba mezenhimskih izvornih celic za zdravljenje gliomov: ocena tveganja in uporabnosti mezenhimskih izvornih celic iz popkovnične krvi za vnos terapevtikov na mesto tumorja / *Use of Mesenchymal Stem Cells to Target Gliomas: Risk Assessment and Evaluation of Umbilical Cord Blood-derived Mesenchymal Stem Cells as new Cellular Vectors for Therapy* (L1-0055), nosilka projekta/*principal investigator* dr. Irena Zajc.
- Kemično in biološko kroženje snovi, ki povzročajo motnje v endokrinem sistemu med postopkom čiščenja odpadnih vod / *Chemical and Biological Cycling of Endocrine Disrupting Compounds in Wastewater Treatment* (J1-0005), (NIB – prof. dr. Metka Filipič), pridruženi / *joint partners*.
- Apoptoza tumorskih celic kot tarča kemoterapevtikov / *Apoptosis of Tumor Cells as Therapeutic Target* (J1-2095), nosilka projekta/*principal investigator* prof. dr. Tamara Lah Turnšek.
- Molekularni mehanizmi sinergističnih in antagonističnih toksičnih učinkov heterocikličnih aminov v kombinaciji z bioaktivnimi prehranskimi onesnažili in naravnimi sestavinami / *Molecular Mechanisms of Synergistic and Antagonistic Toxic Effects of Heterocyclic Amines in Combination with Bioactive Dietary Contaminants and Natural Constituents* (J1-2054), nosilka projekta/*principal investigator* prof. dr. Metka Filipič.
- Dvojna narava matičnih celic v raku in njihova uporaba v zdravljenju / *Dual Nature of Stem Cells in Cancer and Their Application in Therapy* (J1-4247), nosilka projekta/principal investigator prof. dr. Tamara Lah Turnšek.
- Hipoksična neaktivnost: implikacije za odpoved srca, pljučno insuficienco in prekomerno težo / *Hypoxic Inactivity: Implications for Heart Failure, Respiratory Insufficiency and Obesitas* (L3-4328), (NIB – prof. dr. Tamara Lah Turnšek), pridruženi / *joint partners*.
- Strupene kovine in organokovinske spojine v kopenskem okolju / *Toxic Metals and Organometallic Compounds in the Terrestrial Environment* (J1-4140), (NIB – prof. dr. Metka Filipič), pridruženi / *joint partners*.
- Apoptotično delovanje alkilpiridinijevih spojin na celice pljučnega adenokarcinoma / *Apoptotic Effects of Alkylpyridinium Compounds on Lung Adenocarcinoma Cells* (J1-4044), (NIB – prof. dr. Metka Filipič), pridruženi / *joint partners*.
- Priprava in validacija terapevtskih plazmidov brez selekcije gena za antibiotično rezistenco za gensko terapijo raka z inducibilnimi in tkivno specifičnimi promotorji / *Preparation and Validation of Therapeutic Plasmids without Selection Gene for Antibiotic Resistance for Cancer Gene Therapy Using Inducible and Tissue-Specific Promoters* (J3-4259), (NIB – prof. dr. Metka Filipič), pridruženi / *joint partners*.

MEDNARODNI RAZISKOVALNI PROJEKTI
INTERNATIONAL RESEARCH PROJECTS

- EU projekt 265264, CytoThreat, Učinki citostatikov v okolju in identifikacija biomarkerjev za izboljšanje ocene tveganja v okolju / *Fate and Effects of Cytostatic Pharmaceuticals in the Environment and the Identification of Biomarkers for an Improved Risk Assessment on Environmental Exposure-CytoThreat, koordinator* / coordinator NIB, prof.dr. Metka Filipič.
- Mednarodni projekt (INTERREG) GLIOMA, Določanje novih biomarkerjev možganskih tumorjev – gliomov za diagnozo in kot nove tarče zdravljenja/ *Determination of New Brain Tumor Biomarkers – Gliomas for Diagnosis and as new Therapeutic Targets, koordinator* / coordinator NIB, prof.dr. Tamara Lah Turnšek
- Mednarodni projekt 4302-38/2006/4, INREMOS-SYSTHER, Orodja sistemske biologije pri raziskavah celične terapije in zdravil / *Systems Biology Tools Development for Cell Therapy and Drug Development - SYSTHER*, Mio Knežević.

BILATERALNI RAZISKOVALNI PROJEKTI
BILATERAL RESEARCH PROJECTS

- BI-HU/10-11-008: Raziskave genotoksičnih učinkov flouridnih snovi s komet testom po mikroinjeciranju zarodkov rib cebric / *Genotoxic Effects of Fluoride Compounds in Microinjected Zebrafish Embryos with the use of the Comet Assay*, nosilka projekta/*principal investigator* prof. dr. Metka Filipič.
- BI-US/09-12-030: Genotoksični odzivi celic človeškega hepatoma HepG2 in drobnih epitelijskih celic dihal SEAC na izpostavljenosti nanodelcem titanijevega dioksida / *Genotoxic Responses of Human Hepatoma HepG2 and Small Airway Epithelial SEAC cells Exposed to Titanium Dioxide Nanoparticles,* nosilka projekta/*principal investigator* prof. dr. Metka Filipič.
- BI-FR/CEA/10-12-002: Izboljšanje načinov za boljšo diagnozo in zdravljenje glioblastomov, najbolj malignih možganskih tumorjev / *Development of Tools for Better Diagnosis and Therapy of Glioblastoma, the most Malignant Type of Brain Tumours,* nosilka projekta/*principal investigator* prof. dr. Tamara Lah Turnšek.
- BI-BR/11-13-004: Prenos in izvedba metod za monitoring produkcije toksinov in razkroja cianobakterijskih cvetenj na vzorce iz tropskega okolja /*Transfer and Implementation of Methods for Toxin Production and Cynobacterial Bloom Degradation Monitoring in Samples from Tropical Environment*, nosilec projekta/*principal investigator* prof. dr. Bojan Sedmak.

RAZVOJNI PROJEKTI
DEVELOPMENT PROJECTS

- MOP, Spremljanje ekološkega stanja jezer v letu 2011/ *Monitoring of the Ecological Status of Lakes in 2011*, dr. Mihael Bricelj
- MOP, Spremljanje ekološkega stanja površinskih vodotokov v letu 2011/ *Monitoring of the Ecological Status of Rivers in 2011*, dr. Gorazd Kosi
- MORS, Strokovno svetovanje in ukrepanje v primeru napada z orožji ali sredstvi za množično uičevanje ter s klasičnimi sredstvi./ *Expert Advising and Action in Case of an Attack by Weapons of Mass Destruction and by Classical Means.*, NIB, FITO in GEN dr. Bojan Sedmak, Marina Dermastia.

DRUGI RAZISKOVALNI PROJEKTI
OTHER RESEARCH PROJECTS

- KC BRIN, Kompetenčni center za biološki razvoj in inovacije / *Center of Competence for the Biological Development and Inovations*.

OBISKI IN ŠTUDIJSKA IZPOLNJEVANJA NA TUJIH RAZISKOVALNIH INŠTITUCIJAH
VISITS AND SCIENTIFIC STUDIES AT INSTITUTIONS ABROAD

- SEDMAK Bojan, BUBIK Anja, Federalna Univerza Rio de Janeiro (UFRJ), Brazilija, 14. - 28. 11. 2011: Obisk v okviru bilaterale z Brazilijo
- KOLOŠA Katja, Federalna Univerza Rio de Janeiro (UFRJ); laboratorij LaNCE (skupina dr. Stevensa Rehen Kastrupa), 15.3.-19.5.2011, študijski obisk.
- TORKAR Ana, Inštitut CEA, Pariz, Francija Maj-Junij 2011 in September 2011, Raziskovalno delo v okviru bilateralnega sodelovanja s CEA Francija.
- PODERGAJS Neža, Univerza v Bergnu, Oddelek za biomedicino, Bergen, Norveška, 1.4.- 1.8. 2011; raziskovalno delo.

OBISKI IZ TUJINE
VISITORS FROM ABROAD

- prof. dr. Henning Ulrich, Departamento de Bioquímica, Instituto de Química, Universidade de S o Paulo, S o Paulo, Brazil.
- Dr. Balázs Kovács, Szent Istvan University, Gödöllő, Madžarska, v okviru bilaterale z Madžarsko, 17. – 22. 10. 2011
- dr. Czolt Csenki, Robert Kovács, Katalin Bakos, Szent Istvan University, Gödöllő, Madžarska, v okviru bilaterale z Madžarsko, 14. – 17. 12. 2011.

ČLANSTVA V ODBORIH MEDNARODNIH ORGANIZACIJ, DELOVNIH TELES, EKSPERTNIH SKUPINAH
MEMBERSHIP OF INTERNATIONAL BOARDS AND EXPERT GROUPS

- FILIPIČ Metka: Članica programskega odbora Okolje (vključno s klimatskimi spremembami) 7. Okvirnega programa EU
- FILIPIČ Metka: Članica znanstvenega odbora za kontaminate v prehranski verigi pri Evropski agenciji za varno hrano (EFSA).
- ŽEGURA Bojana: predstavnica Slovenije v svetu Evropske zveze za mutagenezo okolja=*European Environmental Mutagen Society*

ČLANSTVA V ODBORIH SLOVENSKIH ORGANIZACIJ, DELOVNIH TELES, EKSPERTNIH SKUPIN
MEMBERSHIP OF SLOVENIAN BOARDS AND EXPERT GROUPS

- LAH TURNŠEK Tamara: KORIS- Koordinacija raziskovalnih institutov
- LAH TURNŠEK Tamara: Komisija za uveljavitev vloge žensk v znanosti pri MVZT – predsednica
- FILIPIČ Metka: članica znanstvenega odbora za namerno sproščanje GSO v okolje in dajanje izdelkov na trg vladi RS
- ŽEGURA Bojana: članica znanstvenega odbora za delo z GSO v zaprtem sistemu pri vladi RS

SODELUJOČE ORGANIZACIJE
COOPERATING INSTITUTIONS

Domače
National

- ARRS – Agencija za raziskovalno dejavnost RS
- Ministrstvo za okolje in prostor
- Ministrstvo za obrambo, Uprava RS za zaščito in reševanje
- Biotehniška fakulteta, Univerza v Ljubljani
- Fakulteta za farmacijo, Univerza v Ljubljani
- Veterinarska fakulteta, Univerza v Ljubljani
- Inštitut Jožef Stefan
- Onkološki inštitut, Ljubljana
- Univerza na Primorskem
- Univerza v Novi Gorici
- Educell doo
- Klinični oddelek za nevrokirurgijo UKC,
- BIA d.o.o.
- Vitiva, d.d.
- RR & CO. RAZISKAVE RAZVOJ IN PRENOS ZNANJA d.o.o.

Tuje
International

- Komisariat za atomsko energijo – Commissariat a l'Eneregie Atomique (CEA) – Oddelek za molekulski inženiring proteinov, Francija
- Institut for Biomedisin, University of Bergen, Norway;
- Inštitut za medicinska istraživanja, Zagreb, Hrvaška
- Szent Istvan University, Department of Aquaculture Gödölö, Hungary
- Medical University of Vienna, Institute of Cancer Research, Austria
- Dipartimento Scienze della Vita of The Second University of Naples, Caserta, Italy
- Spanish Council for Scientific Research, Institute of Environmental Assessment and Water Research (IDAEA), Barcelona, Spain
- Institut za multidisciplinarna istrazivanja Beograd, Srbija
- Institute of Technical Sciences of Serbian Academy of Sciences and Art, Belgrade, Serbija

UREDNIŠKI ODBORI
EDITORS

- ISRN Toxicology (Print). FILIPIČ, Metka (član uredniškega odbora 2011-). Cairo: Hindawi Publishing Corporation. ISSN 2090-6188.
- Pathology oncology researc.h LAH, Tamara,. (član uredniškega odbora 1997-). Budapest: Tud. Kiadó. ISSN 1219-4956.
- Radiology and oncology. FILIPIČ, Metka, LAH TURNŠEK, Tamara (član uredniškega odbora 2007-). Ljubljana: Slovenian Medical Society - Section of Radiology; [Zagreb]: Croatian Medical Association - Croatian Society of Radiology, 1992-.
- Raziskovalec. LAH, Tamara (član uredniškega odbora 1993-). Ljubljana: Ministrstvo za znanost in tehnologijo Republike Slovenije, 1971-2000. ISSN 0351-0727.
- Review of hydrobiology. KOSI, Gorazd (član uredniškega odbora 2008-). Ankara: Yincilik Egitim Hizmetleri, 2008-.

NAGRADE IN PRIZNANJA
AWARDS

- PETKOVIĆ, Jana, Krkina nagrada za posebne dosežke 2011
- PETKOVIĆ, Jana, Nagrada Nacionalnega inštituta za biologijo za izjemno doktorsko delo na področju raziskovalne dejavnosti inštituta

PREDAVANJA IN SEMINARJI
LECTURES AND SEMINARS

- LAH TURNŠEK, Tamara. Gibanje za ženske v znanosti in za znanost o ženskah v Sloveniji : posvet Ženske na vodilnih položajih v visokem šolstvu v Sloveniji: premostitev resničnih ali namišljenih ovir, SAZU, Ljubljana, 11. april 2012. Ljubljana, 2012.
- LAH TURNŠEK, Tamara. *Stem cell markers in prognosis of glioblastoma : International Meeting Adriatic Society of Pathology, Duino-Trieste, June 25-26, 2011. Duino, 25. Jun. 2011.*
- LAH TURNŠEK, Tamara, MOTALN, Helena. *Tumour stem cells : International Scientific Symposium »Stem cells, umbilical cord blood and placenta in regenerative medicine«, Ljubljana, May 27th, 2011. Ljubljana, 27. May 2011.*
- LAH TURNŠEK, Tamara. *Modern methods in tumour markers determination. 5th International Summer School ISS Piran: Advanced Molecular Biology Methods in Biotechnology, Piran, 26.8.-3.9.2011.*
- LAH TURNŠEK, Tamara, *Cancer associated stem cells in glioblastoma and their clinical relevance.* Simpozij z mednarodno udeležbo ob 40. obletnici Inštituta za biokemijo in 20. obletnici Medicinskega centra za molekularno biologijo, Ljubljana, 27-29 June 2012.
- LAH TURNŠEK, Tamara. *Nuclear activity of cathepsin L in brain tumors is dependent on P53 and relevant for therapy resistance. 7th General Meeting of the International Proteolysis Society, San Diego, California, USA, October 16-20, 2011.*
- LAH TURNŠEK, Tamara. *Stem cells in glioma tumors* : Biotecnologie mediche, Seminari 2012, Azienda Ospedaliero Universitaria, Santa Maria della Misericordia di Udine. Udine, 23. feb. 2012.
- LAH TURNŠEK, Tamara. *Cancer stem cells* : [predavanje v okviru Spinoza lectures v Academic Medical Center, *Dept. Cell Biology and Histology, University of Amsterdam, June 7 2011.*
- SEDMAK, Bojan. *Hepatotoxic and non-hepatotoxic cyclic cyanopeptides : biological activities and ecotoxicological effects :* [predavanje na Wuhan University, Wuhan, 15.4.2011]. [Wuhan], 2011.
- SEDMAK, Bojan. *Temperate cyanophages and cyanobacterial bloom collapse : [predavanje na Institute of Hydrobiology, Chinese Academy of Sciences, Wuhan, 14.4.2011]. [Wuhan], 2011*
- FILIPIČ, Metka. *The view of EFSA on viruses in food supply chains* : [predavanje na konferenci Advances in monitoring and control of viruses in food supply chains, Biotehniška fakulteta, Ljubljana, 5.-7.9.2011
- PETKOVIĆ, Jana, FILIPIČ Metka. *Genotoxic hazard of nanomaterials: many questions and some answers: Workshop BioTiNet* , Ljubljana, Slovenija, 27.10.2011.
- PETKOVIĆ, Jana. *Toxicology of nano powders* : [predavanje na Inštitutu Jožef Stefan, 2. 6. 2011]. 2011.
- ŠTRASER Alja. *Genotoxicity And Potential Carcinogenicity Of Cyanobacterial Toxins (vabljeno predavanje), 16th Academy of Studenica, Cyanobacteria and Human Health*, Novi Sad, Srbija, 1.-3. 6. 2011
- TANJŠEK Urška, *Microarrays In Cancer Research And Emerging Issues, 5th International Summer School ISS Piran: Advanced Molecular Biology Methods in Biotechnology*, Piran, 26.8.-3.9.2011.
- MOTALN, Helena. *Omics tools to study tumour (stem) cell interactions . 5th International Summer School ISS Piran: Advanced Molecular Biology Methods in Biotechnology,* Piran, 26.8.-3.9.2011.
- MOTALN, Helena, *Glioma heterogeneity reflected in vitro in the co-cultured glioma (stem) cell lines.* Simpozij Raziskave in razvoj na področju sistemske biologije in naprednih zdravljenj v Sloveniji, 17.2.2011, Kongresni center Hotel Mons, Ljubljana

PEDAGOŠKA DEJAVNOST IN MENTORSTVA
TEACHING AND MENTORSHIP

Diplomska dela
Graduate Theses

Tamara Lah Turnšek, mentorica

- MAJDIČ, Timotej. Vpliv endotelijskih celic in makrofagov na apoptozo glioblastomskih celic: diplomsko delo. Ljubljana: [T. Majdič], 2011. V, 46 f., ilustr.
- VIVOD, Janja. Vpliv resveratrola na diferenciacijo glioblastomskih matičnih in nevroepitelijskih matičnih celic : diplomsko delo. Ljubljana: [J. Vivod], 2011.

Metka Filipič, komentorica

- KÜZMA, Tadeja. Citoksični in genotoksični učinki delcev TiO[spodaj]2 podmikronske in nanovelikosti na celice HepG2 v prisotnosti in odsotnosti UVA-sevanja : diplomsko delo. Ljubljana: [T. Küzma], 2011. VIII, 67 f., graf. prikazi.

Bojana Žegura, komentorica

- KOPČAVAR, Ana. Mutageno in genotoksično delovanje izvlečkov, izoliranih iz pečenega piščančjega mesa : diplomsko delo : univerzitetni študij = *Mutagenic and genotoxic activity of the extracts isolated from roasted chicken meat : graduation thesis : university studies.* Ljubljana: [A. Kopčavar], 2011. IX, 61 f., pril., graf. Prikazi.
- NOVAK, Matjaž. Zaščitno delovanje ksantohumola zoper genotoksično delovanje heterocikličnega amina MeIQx : diplomsko delo : univerzitetni študij = *Protective activity of xanthohumol against genotoxic activity of heterocyclic amine MeIQx : graduation thesis : university studies.* Ljubljana: [M. Novak], 2011. XI, 91 f., graf. prikazi.

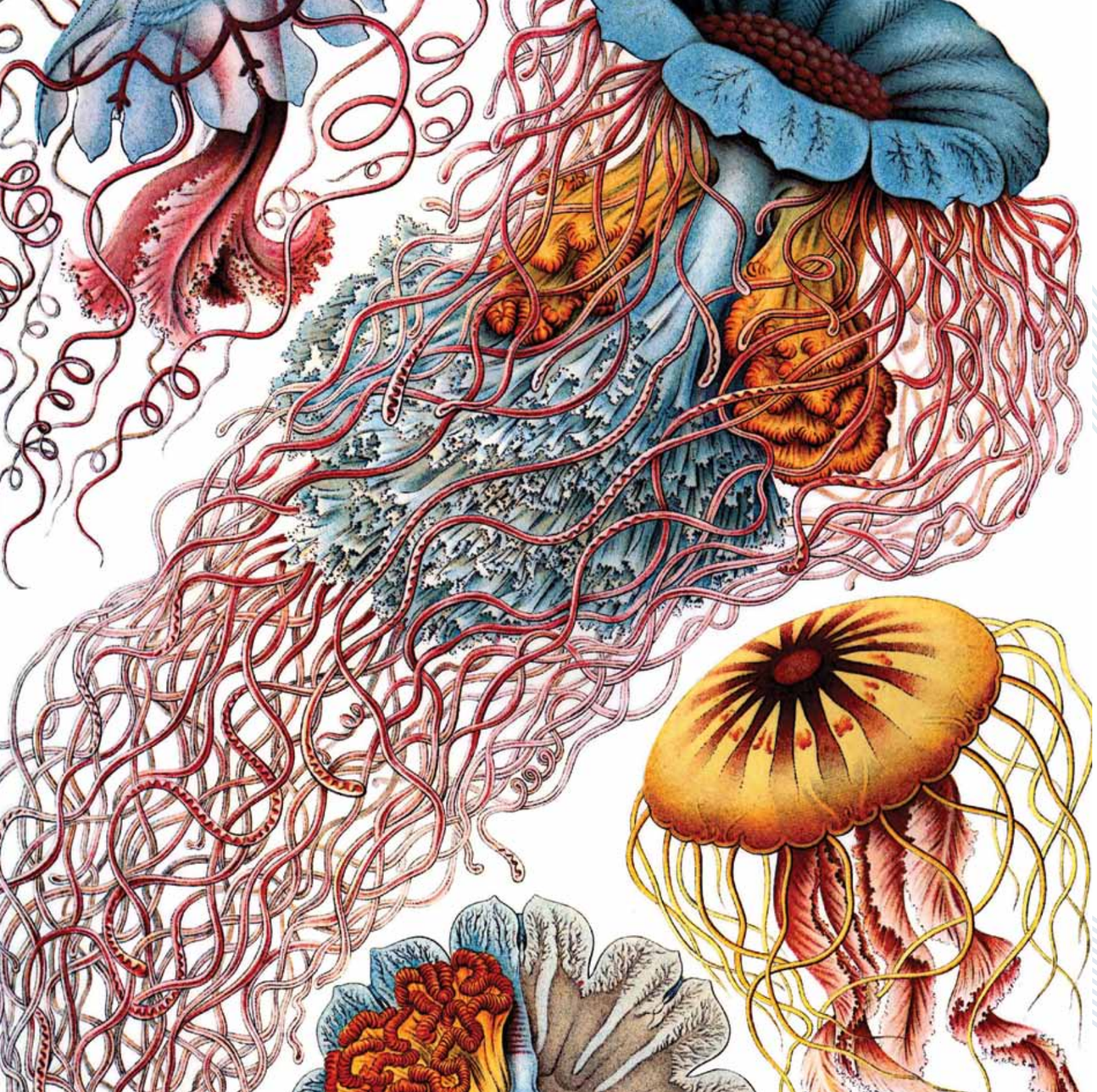
Helena Motaln, komentorica

- NEMET, Irina. Opredelitev lastnosti mezenhimskih matičnih celic in njihovega vpliva na izolacijo celic CD133+ iz primarne kulture glioblastoma : diplomsko delo = *The study of mesenchymal stem cell properties and their impact on CD133+ cell isolation from primary GBM cultures : graduation thesis*, (Biotehniška fakulteta, Študij biotehnologije, Diplomska dela, 51). Ljubljana: [I. Nemet], 2011. XVII, 77 f., ilustr., preglednice
- HVALA, Petra. Primerjava fenotipskih lastnosti mezenhimskih matičnih celic in glioblastomskih celičnih linij v indirektni ko-kulturi : diplomsko delo, univerzitetni študij = *Comparison of phenotypic characteristics of mesenchymal stem cells and glioblastoma cell lines in indirect co-culture : graduation thesis, university studies.* Ljubljana: [P. Hvala], 2011. XIV, 82 f., ilustr.

Doktorska dela
Doctoral Theses

Metka Filipič, mentorica

- PETKOVIĆ, Jana. Mehanizmi toksičnega in genotoksičnega delovanja nanodelcev TiO_2: doktorska disertacija. Ljubljana: [J. Petković], 2011. XVII, 138, 13 f., ilustr.
- BALABANIČ, Damjan. *Determination of endocrine disrupting compounds in paper mill wastewaters, comparison of different wastewater treatments for their removal and potential genotoxic activity of paper mill wastewaters : dissertation.* Nova Gorica: [D. Balabanič], 2011. X, 113 str., ilustr.
- ŽAGER, Valerija. *Development of whole cell biosensor systems for detection of genetic damage : dissertation. Nova Gorica:* [V. Žager], 2011. XII, 117 str., ilustr.



8.0
Biološka knjižnica
The Biology Library

VODJA HEAD
Barbara Černač, univ. dipl. biol.

NASLOV ADDRESS
Nacionalni inštitut za biologijo
Večna pot 111
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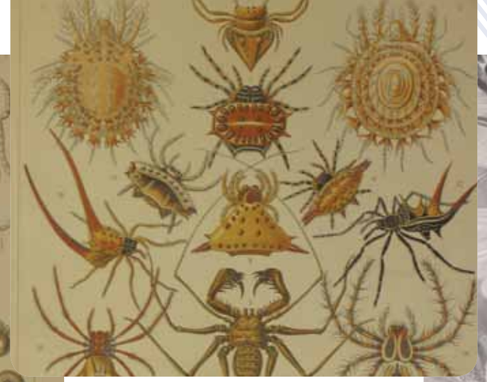
URL: www.nib.si

SODELAVCI
STAFF

1. Mira Horvat, višja knjižničarka, Biološka knjižnica*
2. Lučka Glavač, višja knjižničarka, Biološka knjižnica
3. Vlado Bernetič, knjižničar, Biološka knjižnica - Knjižnica Morske biološke postaje Piran

* upokojena v decembru 2011 / retired in december 2011

Gamochonia - Trichterkraken. Tafel 54 - Octopus. Haeckel, Ernst. Kunstformen der Natur. Leipzig, Wien : Bibliogr. Institut, 1904



Arachnida. Spinnentiere. Tafel 66 - Epeira. Haeckel, Ernst. Kunstformen der Natur. Leipzig, Wien : Bibliogr. Institut, 1904

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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. Naši tipični uporabniki so raziskovalci, univerzitetni predavatelji in študentje s področja biologije in sorodnih ved. Na voljo pa 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 na 595 m2 s 67 čitalniškimi mesti.

V letu 2011 smo z nakupom, kot obvezni izvod, z izmenjavo publikacij ali z donacijami pridobili 317 knjig, 114 diplomskih, magistrskih in doktorskih del, 261 letnikov revij in 39 enot neknjižnega gradiva.

Trenutno je v knjižnici skupaj 77.810 enot knjižničnega gradiva. V to številko je všteta zbirka 44.021 znanstvenih in strokovnih knjig, ki so večinoma razdeljene med uporabnike, zbirka 3254 diplomskih, magistrskih in doktorskih del študentov Oddelka za biologijo, 307 tekoče naročenih naslovov znanstvenih in strokovnih revij, ki se v glavnem v prostem pristopu hranijo v sami knjižnici in jih deloma nabavljamo s finančno pomočjo Javne agencije za raziskovalno dejavnost Republike Slovenije (ARRS) ter 1551 enot neknjižnega gradiva (zemljevidi, literatura na elektronskih medijih...). Polnopravni člani sistema Cobiss smo od leta 1992.

V letu 2011 smo v Biološki knjižnici nadaljevali z vnosom našega knjižničnega gradiva v sistem COBISS, kar služi potrebam gradnje knjižničnega kataloga in vodenju avtomatizirane izposoje. V letih 2011 smo na dom izposodili 11.023, v čitalnico pa 10.641 fizičnih enot gradiva.

Medknjižnična izposoja je storitev, ki uporabnikom omogoča naročanje in dostop do gradiva iz lokacijsko oddaljenih knjižnic. Naši uporabniki lahko naročajo želeno gradivo iz drugih knjižnic, te pa lahko naše knjižnično gradivo naročajo pri nas. V letu 2011 smo tako naročili ali odposlali skupaj 439 člankov, knjig in drugih dokumentov.

Obsežno področje našega dela je informacijska, referalna in referenčna dejavnost oz. posredovanje najrazličnejših informacij našim uporabnikom: po elektronski pošti, telefonu ali v osebnem stiku dnevno nudimo pomoč in podajamo odgovore na vprašanja o knjižničnem gradivu, iz vsebine knjižničnega gradiva, o uporabi servisov COBISS, o uporabi in načinu dostopa do elektronskih virov, o bibliografijah raziskovalcev, sistemu SICRIS...skratka o vseh področjih delovanja knjižnice. Svoje uporabnike obveščamo o novostih in jih sproti izobražujemo v samostojnem iskanju informacij po naši knjižnični zbirki in elektronskih informacijskih virih. V ta namen pripravljamo tudi zgibanke in letake za naše obiskovalce z navodili za uporabo posameznih segmentov ponudbe naše knjižnice. Zelo obiskane so tudi naše spletne strani na http://www.nib.si/knjiznica.html.

Melethallia - Gesellige Algetten. Tafel 34 - Pediastrum. Haeckel, Ernst. Kunstformen der Natur. Leipzig, Wien : Bibliogr. Institut, 1904

Bilder - Atlas zum Conversations - Lexicon. Ikonographische Encyklopädie ihr Wissenschaften und Künsten. Entworfen und auch den vorzügsten Quellen bearbeitet von Jochann Georg Heck. Erster Abtheilung: Mathemathische und Naturwissenschaften. Mit 141 Tafeln. - Leipzig : F. D. Brockhaus, 1849. - 8°

Bilder - Atlas zum Conversations - Lexicon. Ikonographische Encyklopädie ihr Wissenschaften und Künsten. Entworfen und auch den vorzügsten Quellen bearbeitet von Jochann Georg Heck. Erster Abtheilung: Mathemathische und Naturwissenschaften. Mit 141 Tafeln. - Leipzig : F. D. Brockhaus, 1849. - 8°

The Biology Library is special (research) and academic library. We work for National Institute of Biology and Department of Biology, Biotechnical Faculty, University of Ljubljana like the support service. In this way the Library participates in all the functions, research and educational processes of both institutions. Our tipical users are researchers , profesors and students from the field of biology and related scientific fields. But we are also open to wide public (researchers and students from other scientific fields, journalists, translators...). The Library spreads out in two locations: in Ljubljana, The Biology Centre Building and in Piran, The Marine Biology Station on 595 m2 of usable area with 67 places in reading room.

In 2011 the increase of our library collection was 317 monographs, 114 graduation theses, M. Sc. theses and doctoral dissertations, 261 volumens of scientific and professional journals and 39 units of non-book matherial by purchease, publicatin exchange, donations....

The Library holds over 77.810 scientific and professional books, graduation theses, M. Sc. theses , doctoral dissertations, scientific and professional journals and non-book matherial (maps, literature on DVDs, CD-ROMs...). Books are mainly distributed among users, but journals are archived in the Library. The purchease of serials is partially supported by Slovenian Research Agency.

We have been members of the COBISS system since 1992.

In 2011 one of our main tasks was entering information about monographs, serials and non-book materials in the Slovene union bibliographic database and catalogue COBIB/COBISS for the needs of Library catalog and computerized loan. In 2011 11.023 units of books, journals and non-book matherial was loaned to users‘ home and 10.641 to reading room.

Interlibrary loan is a service which enables ordering and access to literature from other and remote libraries. Our users can order materials from other libraries and those can order materials in our Library. In 2011 we were ordering or sending 439 articles, books and other documents.

A extensive part of our work is the collection and distribution of information: we enable our users to ask questions and receive answers daily about all fields of our work by e-mail, telephone or in personal contact. We inform staff and students about the use and information searching in library collection and electronic information sources. For this purpose we prepare leaflets with instuctions for our users.

Our web site (http://www.nib.si/index.php/knjiznica.html) is also visited very well.

In cooperation with libraries of the main Slovenian institutes and four Sloveian universities we established an information website about open access in Slovenia. (http://www.openaccess.si/).

V letu 2011 smo skupaj s knjižnicami največjih slovenskih inštitutov in štirih slovenskih univerz sodelovali pri vzpostavitvi informativnega spletnega mesta o odprtem dostopu v Sloveniji Openaccess Slovenia (http://www.openaccess.si/).

V sodelovanju z Inštitutom za biomedicinsko informatiko Medicinske fakultete univerze v Ljubljani sproti dopolnjujemo bibliografske podatke naših raziskovalcev v nacionalni bibliografski zbirki Biomedicina slovenica in kot bibliografije raziskovalcev v sistemu Cobiss. Tako smo v letu 2011 v sistem COBISS vnesli preko 1400 bibliografskih zapisov naših raziskovalcev.

Z Osrednjim specializiranim informacijskim centrom za naravoslovje (OSIC N), Osrednjim specializiranim informacijskim centrom za biotehniko (OSIC BF) in Inštitutom informacijskih znanosti (IZUM) sodelujemo pri vrednotenju raziskovalne uspešnosti posameznikov in raziskovalnih skupin na osnovi njihovih bibliografij raziskovalcev v sistemu SICRIS.

Skupaj z ostalimi knjižnicami Biotehniške fakultete gradimo Digitalno knjižnico Biotehniške fakultete, v kateri objavljamo diplomska, magistrska in doktorska dela naših študentov v polnem besedilu. Trenutno zbirka vsebuje 201 digitalnih dokumentov.

V letu 2011 smo uvedli nov način oblikovnega pregledovanja diplomskih, magistrskih ali doktorskih del študentov Oddelka za biologijo: pred vezavo nalogo natančno pregledamo in študentu predložimo pisni seznam zahtevanih popravkov v skladu z veljavnimi pravili Biotehniške fakultete.

S številnimi slovenskimi in tujimi knjižnicami ter drugimi ustanovami sodelujemo v dolgoletni izmenjavi njihovih publikacij za revije **Acta Biologica Slovenica** (nekdanji Biološki vestnik), **Natura Sloveniae** in **Anthropological Notebooks**. Seznam naših partnerjev se iz leta v leto podaljšuje. Naše revije tako trenutno pošiljamo že na 193 naslovov po vsem svetu, v Biološko knjižnico pa po tej poti tekoče prejemamo 264 različnih naslovov revij in drugih publikacij.

V letu 2011 smo v stavbi Kazine v centru Ljubljane uredili in opremili prostor za novo skladišče starejše literature in tja preselili izbrane in še aktualne zbirke iz stare lokacije skladišča.

In cooperation with Institute of Biomedical Informatics of the Medical faculty, University of Ljubljana we keep the bibliography of publications of all the researchers employed in the National Institute of Biology and the Department of Biology in database Biomedicina slovenica and COBISS system. In 2011 for this purpose we were entering more then 1400 bibliographical records in COBISS system.

In cooperation with Central Specialised Information Center for Life Sciences, Ljubljana (OSIC N) , Central Specialised Information Center for Biotechnical Sciences, Ljubljana(OSIC BF) and Institute of Information Science (IZUM), Maribor in the database of Slovenian Current Research Information System (SICRIS) the evaluation of scientific efficiency of individual researchers and research teams is entered.

Together with other Biotechnical Faculty Libraries we keep the Digital Library of Biotechnical Faculty, Univerity of Ljubljana with full text graduation theses, M. Sc. theses and doctoral dissertations of our students. Now 201 digital documents are in the database.

In 2011 we introduced the new way of form checking of graduation theses, M. Sc. theses and doctoral dissertations of students of Department of Biology.

The Library has had exchange partners in Slovenia and abroad for our serials Acta Biologica Slovenica (formerly Biološki vestnik), Natura Sloveniae and Anthropological Notebooks for many years. The number of our exchange partners is increasing year by year. In 2011 our serials were sending on 193 addresses all over the world. In this way we were currently receiveing 264 titles of magazines and other literature.

In the center of Ljubljana (Kazina building) we established a new storage for older but also actual scientific library collection.

Seznam zaposlenih v letu 2011
List of Employees in 2011

AMBROŽIČ ŠPELA	EKO
AVČIN MIRA	MBP
BAEBLER ŠPELA	FITO
BAJT OLIVER	MBP
BERNETIČ VLADIMIR	MBP
BERTONCELJ IRENA	EKO
BEVK DANILO	ENTOMO
BLATNIK ALEŠ	FITO
BLEJEC ANDREJ	ENTOMO
BORDJAN DEJAN	EKO
BRANCELJ ANTON	EKO
BRICELJ MIHAEL	GEN
BRIŠAR OLGA	SKUPNE SLUŽBE
BUBIK ANJA	GEN
BUH GAŠPARIČ METI	FITO
CAMLOH MARJANA	FITO
COLL RIUS ANNA	FITO
ČEPIN URŠKA	FITO
ČERMELJ BRANKO	MBP
ČERNAČ BARBARA	SKUPNE SLUŽBE
ČOKL ANDREJ	ENTOMO
DEMŠAR TINA	FITO
DENAC DAMIJAN	EKO
DERLINK MAJA	ENTOMO
DERMASTIA MARINA	FITO
DOBNIK DAVID	FITO
DOBNIK SELMA	FITO
DREO TANJA	FITO
ELERŠEK TINA	GEN
ERJAVEC JANA	FITO
FAGANELI JADRAN	MBP
FILIPIČ METKA	GEN
FLANDER PUTRLE VESNA	MBP
FORTE JANEZ	MBP
FRANCÉ JANJA	MBP
GLAVAČ LUČKA	SKUPNE SLUŽBE
GLAVAŠ NELI	MBP
GORŠIČ DUNJA	SKUPNE SLUŽBE
GREGO MATEJA	MBP
GRUDEN KRISTINA	FITO
GUTIERREZ AGUIRRE JON	FITO
ISTINIČ IDA	FITO
JAKLIČ MARTINA	EKO
JEREBIC ANDREJA	EKO
KAPLA ANDREJ	EKO
KAVČIČ ANDREJA	ENTOMO
KLUN KATJA	MBP
KOCE URŠKA	EKO
KOGOVŠEK POLONA	FITO
KOGOVŠEK TJAŠA	MBP
KOLOŠA KATJA	GEN
KONČAR HELENA	SKUPNE SLUŽBE
KOREN ANA	GEN
KORON NEŽA	MBP
KOS MAJA	MBP
KOSI GORAZD	GEN
KOVAČ NIVES	MBP
KRALJ JASNA	ENTOMO
KRALL JANEZ	SKUPNE SLUŽBE
KUHELJ ANKA	ENTOMO
LAH TURNŠEK TAMARA	SKUPNE SLUŽBE
LAZAR ANA	FITO
LENARČIČ ROK	FITO
LESKOŠEK TINA	EKO
LIČER MATJAŽ	MBP
LIPEJ LOVRENC	MBP
LIU ALLEN WEI	EKO
MAKOVEC TIHOMIR	MBP
MALAČIČ VLADO	MBP
MALEC MAJA	SKUPNE SLUŽBE
MALEJ ALENKA	MBP
MATIČIČ LIDIJA	FITO
MAVRIČ BORUT	MBP
MEHLE NATAŠA	FITO
MEZEK TADEJ	EKO
MIHEVC ANA	FITO
MILAVEC MOJCA	FITO
MORI NATAŠA	EKO
MORISSET DANY	FITO
MOTALN HELENA	GEN
MOZETIČ PATRICIJA	MBP
MRŠNIK MARTINA	GEN
NIKOLIĆ PETRA	FITO
NOVAK MATJAŽ	GEN
NUNIĆ JANA	GEN
OBLAK MIRJANA	SKUPNE SLUŽBE
ORLANDO BONACA MARTINA	MBP
PAJK FRANJA	EKO
PENŠEK DARJA	SKUPNE SLUŽBE
PETEK MARKO	FITO
PETELIN BORIS	MBP
PEZDIRC MARKO	GEN
PIRC MANCA	FITO
PITACCO VALENTINA	MBP
PODERGAJS NEŽA	GEN
POLAJNAR GAŠPER	MBP
POLAJNAR JERNEJ	ENTOMO
POMPE NOVAK MARUŠA	FITO
POTOČNIK FRANC	SKUPNE SLUŽBE
PREZELJ NINA	FITO
PRIJATELJ NOVAK ŠPELA	FITO
RAČKI NEJC	FITO
RAJČEVIĆ UROŠ	GEN
RAK MARIJA	SKUPNE SLUŽBE
RAMŠAK ANDREJA	MBP
RAMŠAK ŽIVA	FITO
RASPOR DALL'OLIO LUCIJA	MBP
RAVNIKAR MAJA	FITO
RIGLER KAROLINA	SKUPNE SLUŽBE
ROGELJA MANJA	MBP
ROTTER ANA	FITO
RUPAR MATEVŽ	FITO
SEDMAK BOJAN	GEN
SIMČIČ TATJANA	EKO
STANIČ KARMEN	GEN
STARE KATJA	FITO
STARE TJAŠA	FITO
STOPAR KATJA	MBP
STRITIH NATAŠA	ENTOMO
SVENŠEK JELKA	SKUPNE SLUŽBE
ŠIŠKO MILIJAN	MBP
ŠTEBIH DEJAN	FITO
ŠTRASER ALJA	GEN
TADEJEVIĆ MARKO	MBP
TAJNŠEK URŠKA	GEN
TALABER IVA	MBP
TINTA TINKARA	MBP
TOME DAVORIN	EKO
TORKAR ANA	GEN
TURK VALENTINA	MBP
TURNŠEK NEŽA	FITO
TUŠEK ŽNIDARIČ MAGDA	FITO
VERDERBER IRENA	SKUPNE SLUŽBE
VIRANT DOBERLET META	ENTOMO
VODOPIVEC MARTIN	MBP
VOJVODA JANA	MBP
VREZEC AL	EKO
ZAJC IRENA	GEN
ZGONIK VERA	ENTOMO
ZOROVIĆ MAJA	ENTOMO
ŽEGURA BOJANA	GEN
ŽEL JANA	FITO
ŽIBRAT UROŠ	EKO
ŽUNIČ ALENKA	ENTOMO

LEGENDA LEGEND:

EKO	Oddelek za raziskovanje sladkovodnih in kopenskih ekosistemov *Department of Freshwater and Terrestrial Ecosystems Research*
FITO	Oddelek za biotehnologijo in sistemsko biologijo *Department of Biotechnology and Systems Biology*
GEN	Oddelek za genetsko toksikologijo in biologijo raka *Department of Genetic Toxicology and Cancer Biology*
ENTOMO	Oddelek za entomologijo *Department of Entomology*
KNJIŽNICA	Biološka knjižnica *The Biology Library*
SKUPNE SLUŽBE	Skupne službe *Joint Services*
MBP	Oddelek Morska biološka postaja *Department Marine Biology Station*