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EVROPSKÁ UNIE



MINISTERSTVO ŠKOLSTVÍ,
MLÁDEŽE A TĚLOVÝCHOVY



OP Vzdělávání
pro konkurenceschopnost

INVESTICE
DO ROZVOJE
VZDĚLÁVÁNÍ

Konzervační genetika

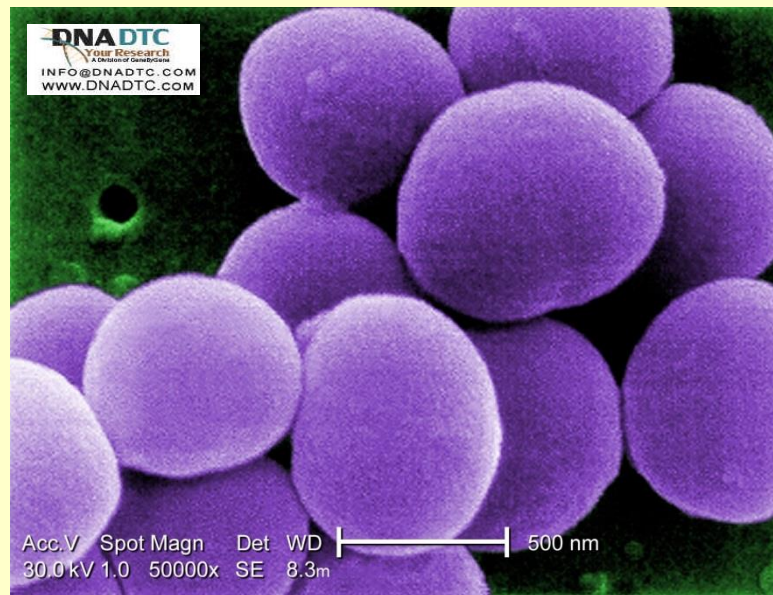
MIKROORGANISMY

Milan Navrátil

Katedra buněčné biologie a
genetiky

Univerzita Palackého, Olomouc

OPVK (CZ.1.07/2.2.00/28.0032)



Mikroorganismy ?

- Mikroorganismus (mikrob) je jednobuněčný, jen mikroskopicky pozorovatelný organismus. Často tvoří různé kolonie, shluky, případně i symbiotická společenstva s jinými organismy. Řadí se mezi ně převážně prokaryota (bakterie, archebakterie), ale patří k nim také např. plísně, kvasinky, některé řasy, prvoci.
- Viry

Mikroorganismy v průmyslu

- Výroba sýrů (*Lactobacillus*, *Streptococcus*, *Penicilium*)
- Pivo, víno, destiláty, chleba (*Saccharomyces*)
- Jogurt (*Lactobacillus*)
- Degradace biomasy (*Clostridium*, *Trichoderma*)
- Fermentované potraviny (*Pedicoccus*, *Monascus*, *Neurospora*, *Penicilium*)
- Produkce aminokyselin, vitamínů, org. kyselin (*Bacillus*, *Aspergillus*, *Candida*)
- Produkce paliv – líh, bioplyn (*Clostridium*, *Saccharomyces*)
- Výroba biopolymerů
- Výroba enzymů (*Aspergillus*, *Trichoderma*)

Mikroorganismy v zemědělství

- Fixace dusíku (*Cyanobacteria*, *Rhizobium*, *Frankia*)
- Bakterie podporující růst rostlin (*Bacillus*, *Pseudomonas*, *Streptomyces* produkce fytohormonů, ACC deaminázy, rozpustnost fosforu)
- Biokontrola
 - *B. thuringiensis* kurstaki – larvy motýlů
 - *B. thuringiensis* israelensis – komáři, *Eusimulium latipes* (přenašeč Trypanozóm)
 - *B. thuringiensis* san diego – některé larvy brouků
 - *Microsporidium moscema* – sarančata
- Pesticidy (*Colletotrichum*, *Bacillus*, *Baculoviridae*)
- Fytoremediace

Mikroorganismy v medicíně

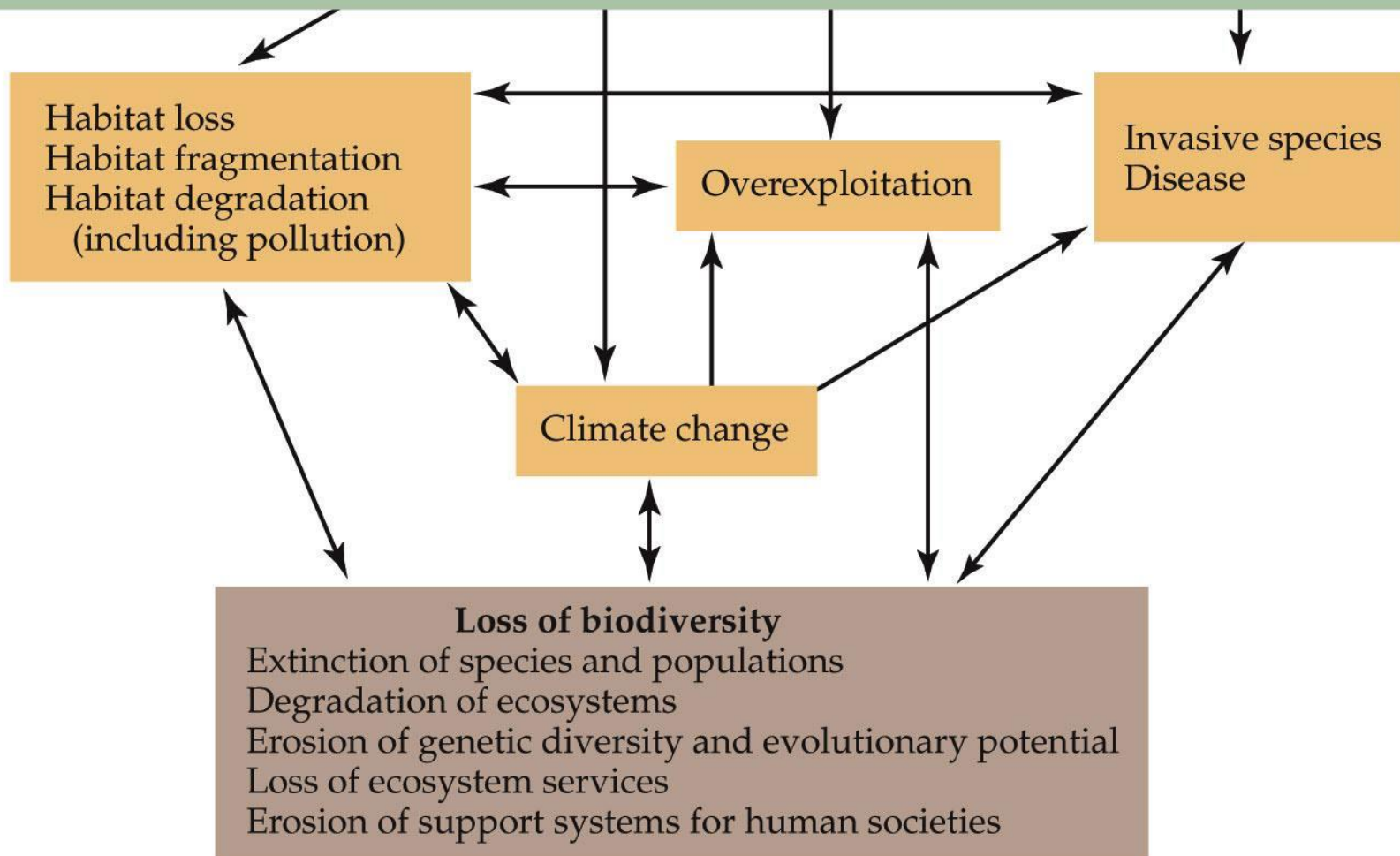
- Antibiotika (*Streptomyces*, *Penicillium*)
- Protinádorové látky
- Imunomodulátory

Mikroorganismy jako patogeny

- *Streptococcus pyogenes*
- *Neisseria meningitidis*
- *Mycobacterium tuberculosis*
- *Escherichia coli*
- *Yersinia pastis*
- *Plum pox virus*

Increasing human population and consumption

Agriculture Logging Fisheries Industry and fossil fuel use Urbanization and road construction International trade



Počet druhů

Table 4. Known and estimated total number of species on Earth (WCMC, 1992).

Groups	Known number of species	Estimated total number of species	% known species
Insects	950,000	8,000,000	11.9
Fungi	70,000	1,000,000	7.0
Arachnids	75,000	750,000	10.0
Nematodes	15,000	500,000	3.0
Viruses	5,000	500,000	1.0
Bacteria	4,000	400,000	1.0
Plants	250,000	300,000	83.3
Protozoans	40,000	200,000	10.0
Algae	40,000	200,000	10.0
Molluscs	70,000	200,000	35.0
Crustaceans	40,000	150,000	26.7
Vertebrates	45,000	50,000	90.0
World Total	1,700,000	12,500,000	13.6

Počet eukaryotních druhů

- When applied to all five known eukaryote* kingdoms of life on Earth, the approach predicted:
 - 1) ~7.77 million species of animals (of which 953,434 have been described and cataloged)
 - 2) ~298,000 species of plants (of which 215,644 have been described and cataloged)
 - 3) ~611,000 species of fungi (moulds, mushrooms) (of which 43,271 have been described and cataloged)
 - 4) ~36,400 species of protozoa (single-cell organisms with animal-like behavior, eg. movement, of which 8,118 have been described and cataloged)
 - 5) ~27,500 species of chromists (including, eg. brown algae, diatoms, water moulds, of which 13,033 have been described and cataloged)
- Total: 8.74 million eukaryote species on Earth.

Proč konzervovat mikroorganismy?

● Konzervace mikroorganismů jako biologických zdrojů má nesmírný význam pro život lidí a jejich aktivity. Zahrnuje globální snahy o identifikaci, konzervaci a generování dat o jejich ekosystémech, společenstvech a populacích.

Proč konzervovat mikroorganismy?

- Většina biomasy a diverzity na Zemi je tvořena mikroorganismy
- Mikroorganismy hrají klíčovou úlohu v biogeochemických cyklech
- Poskytují nové metabolity pro průmyslové využití



- Proto je nutné zachovat mikrobiální ekosystémy, společenství a druhy mimořádného významu, jejich přirozené prostředí a gene pool (genofond)

Cíl konzervace mikroorganismů

Konzervovat mikroorganismy v životaschopném stavu, bez morfologických, fyziologických a genetických změn s možností využití v budoucnosti (důležité kmeny pro výzkum a průmysl).

Úloha konzervační genetiky

- Minimalizovat inbreeding a **ztrátu genetické diversity**
- **Vybrat a charakterizovat zájmové populace**
- Objasnit strukturu populace
- **Objasnit taxonomické nejasnosti**
- Definovat management pro daný druh
- Způsob rozmnožování (genetic pollution)
- **Detekovat a definovat invazivní druhy**
- Definovat místa a genotypy vhodné pro reintrodukci
- Využití ve forenzní konzervační genetice
- Odhadnutí velikost populací a poměru pohlaví
- Odhadnutí příbuzenských vztahů; analýza rodokmenů
- **Poznání mezipopulačních vztahů**
- **Využití v managementu populací v zasetí nebo kultuře**
- **Poznání genových center druhů a vztahů v nich**
- Zahrnutí genotoxických studií
- Zvýšit reprodukční kapacitu

Mikroorganismy a konzervační biologie

● Infekční choroby

- hrozba pro druh
- životaschopnost populace
- ovlivňuje chovy, reintrodukci
- vyžaduje ozdravné programy
- *In-situ* konzervace mikroorganismů
- *Ex-situ* konzervace mikroorganismů



Convention on
Biological Diversity

Úmluva o biologické rozmanitosti

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The Convention

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Strategic Plan

UN Decade for Biodiversity

International Day for Biological
Diversity



> Convention

The Convention on Biological Diversity

What's new

4 June 2013

Message of the CBD Executive Secretary, Bráulio Ferreira de Souza Dias, on the occasion of World Environment Day, 5 June 2013

9 May 2013

Message from the CBD Executive Secretary, Mr. Bráulio F. de Souza Dias, on the occasion of World Migratory Bird Day 11-12 May 2013: Raising Awareness for Migratory Birds

19 April 2013

Press Release: New report highlights growing biodiversity awareness worldwide - UEBT launches 2013 Biodiversity Barometer

7 February 2013

Biodiversity at the centre of sustainable development: CBD Executive Secretary Bráulio Ferreira de Souza Dias briefs UN Secretary General, senior UN officials

What is the Convention?

Signed by 150 government leaders at the 1992 Rio Earth Summit, the Convention on Biological Diversity is dedicated to promoting sustainable development. Conceived as a practical tool for translating the principles

<http://www.cbd.int/>

Úmluva o biologické rozmanitosti

Article 9. Ex-situ Conservation

Each Contracting Party shall, as far as possible and as appropriate, and predominantly for the purpose of complementing in-situ measures:

- (a) Adopt measures for the ex-situ conservation of components of biological diversity, preferably in the country of origin of such components;
- (b) Establish and maintain facilities for ex-situ conservation of and research on plants, animals and micro- organisms, preferably in the country of origin of genetic resources;
- (c) Adopt measures for the recovery and rehabilitation of threatened species and for their reintroduction into their natural habitats under appropriate conditions;
- (d) Regulate and manage collection of biological resources from natural habitats for ex-situ conservation purposes so as not to threaten ecosystems and in-situ populations of species, except where special temporary ex-situ measures are required under subparagraph (c) above; and
- (e) Cooperate in providing financial and other support for ex-situ conservation outlined in subparagraphs (a) to (d) above and in the establishment and maintenance of ex- situ conservation facilities in developing countries.

Sbírky mikroorganismů

Bacterial Culture collections 139



Professor Frantisek Kral (1846–1911) of Prague was the first to realize the importance of Culture Collections: he collected cultures which he made available for a fee to other workers (*Figures 1a,b*). This Collection was later transferred to the University of Vienna in 1915 by Professor Ernst Pribram. The next oldest Collection, Centraalbureau voor Schimmelcultures (CBS), was founded in 1906 and still exists at Baarn, The Netherlands.

Typy genových zdroj

Table 8. Types of genetic resources collection

Plant genetic resource collections	Animal genetic resource collections	Microbial genetic resource collections
- Seed samples - Spore samples - Pollen samples - Field gene banks - Embryos - Tissues - Cell suspensions etc.	- Embryos and semen under cryogenic storage - Groups of living animals kept under supervision in an exclusive area - Networks of breeding groups	- Cultures of algae, bacteria, fungi - Protozoa and viruses as well as materials derived from them in the form of cDNA, plasmids, vectors, cell lines etc.

Sbírky mikroorganismů

- Typové kmeny – referenční kmeny
- Modelové organismy
- Mikroorganismy v zemědělství, průmyslu ,
medicině

World Federation for Culture Collections



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→ WFCC Guidelines

WFCC Executive Board

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EX-OFFICIO MEMBERS

WFCC Events

ICCC13

ICCC12

ICCC11

ICCC10



Aspergillus terreus Photographed by BCC, BIOTEC

1 2 3 4 5

News from WFCC

[more](#)

- WFCC Newsletter No.52 (Dec. 2012) Mar 13, 2013
- WDCM has been approved by CODATA as its Task Group on Advancing Informatics for Microbiology... Mar 13, 2013
- EBRCN International Regulations for Packaging and Shipping of Microorganisms Dec 18, 2012
- WFCC Newsletter No.51 (Apr. 2012) Apr 12, 2012

News from Culture Collections Worldwide

[more](#)

- The 10th International Mycological Congress Oct 29, 2013
- FORDA Culture Collection NEWSLETTER Dec 05, 2012
- Algaculture for Biotechnology Course Aug 13, 2012
- International course "Computational genomics" Feb 04, 2012



About WFCC

WFCC Bylaws

WFCC Task Forces and Activities

Microbiological sites

[A](#) [B](#) [C](#) [D](#) [E](#) [F](#) [G](#) [H](#) [I](#) [J](#) [K](#) [L](#) [M](#) [N](#) [O](#) [P](#) [Q](#) [R](#) [S](#) [T](#) [U](#) [V](#) [W](#) [X](#) [Y](#) [Z](#)

[Canada](#) [Chile](#) [China](#) [Colombia](#) [Cuba](#) [Czech](#)

There are **13** collections in Czech

Acronym	WDCM Number	Collection	Region
CAPM	WDCM 181	Collection of Animal Pathogenic Microorganisms	Europe
CAUP	WDCM 486	Culture Collection of Algae of Charles University in Prague	Europe
CCALA	WDCM 905	Culture Collection of Autotrophic Organisms	Europe
CCBAS	WDCM 558	Culture Collection of Basidiomycetes	Europe
CCC	WDCM 959	Culture Collection of Clavicipitaceae	Europe
CCDM	WDCM 878	Culture Collection of Dairy Microorganisms Laktoflora	Europe
CCF	WDCM 182	Culture Collection of Fungi	Europe
CCM	WDCM 65	Czech Collection of Microorganisms	Europe
CCMAC	WDCM 645	Culture Collection of Macromycetes (Basidiomycotina and Ascomycotina)	Europe
CNCTC	WDCM 130	Czech National Collection of Type Cultures	Europe
DBM	WDCM 654	Department of Biochemistry and Microbiology	Europe
DMUP	WDCM 658	Microbiology and Biophysics Charles University	Europe
RIBM	WDCM 655	Research Institute for Brewing and Malting	Europe

MICRENS

MIRCEN (Microbial Resources Centres) program of UNESCO is a network of existing academic and/or research institutes in developed and developing countries.

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<http://www.wdcm.org/>

<http://gcm.wfcc.info/>

Nomenclatura x barcoding

- International Committee on Taxonomy of Viruse (ICTV)
- International Committee on Systematics of Prokaryotes (ICSP)

International Committee on Systematics of Prokaryotes (ICSP)

[The Role of the ICSP](#), by H. G. Trüper and B. J. Tindall.

The ICSP, formerly the International Committee on Systematic Bacteriology (ICSB), is the body that oversees the nomenclature of prokaryotes, determines the rules by which prokaryotes are named and whose Judicial Commission issues Opinions concerning taxonomic matters, revisions to the Bacteriological Code, etc.

Because of the increasing problem of unsolicited email, the ICSP web pages have been redesigned to try to prevent spammers from obtaining email addresses from the site. Click on a name for contact details, including email addresses. A full list of contact details for ICSP officers and members of those ICSP subcommittees for which information is available can be found on the [Contacts page](#). To obtain an email address from this page, simply highlight the two parts of the address (together with the @ sign) and copy and paste the text into your email program. Then, remove any spaces from around the @ sign.

Last modified 16 January 2013

Taxonomic subcommittees

Some subcommittees have home pages listing their current membership (together with information on meetings, minutes, minimal standards papers and other subcommittee activities) and lists of taxa covered.

Aeromonadaceae, Vibrionaceae and related organisms	Subcommittee home page	Taxa covered
Genera <i>Agrobacterium</i> and <i>Rhizobium</i>	Independent web page	
<i>Bacillus</i> and related organisms	Subcommittee home page	Taxa covered
<i>Bifidobacterium</i> , <i>Lactobacillus</i> and related organisms	Subcommittee home page	Taxa covered
Genus <i>Brucella</i>	Subcommittee home page	Taxa covered
<i>Burkholderia</i> , <i>Ralstonia</i> and related organisms	Subcommittee home page	Taxa covered
<i>Campylobacter</i> and related bacteria	Subcommittee home page	Taxa covered
Clostridia and <i>Clostridium</i> -like organisms	Subcommittee home page	Taxa covered
<i>Comamonadaceae</i> and related organisms	Subcommittee home page	Taxa covered
Family <i>Enterobacteriaceae</i>	Subcommittee home page	Taxa covered

<http://www.the-icsp.org/>



International Committee on Taxonomy of Viruses

VIROLOGY DIVISION - IUMS

[The ICTV](#) | [Taxonomy](#) | [ICTV Files](#) | [ICTV Discussions](#) | [News and Information](#) | [ICTV Directory](#)

Taxa name search:

☒ Select to search across all ICTV releases

Virus Taxonomy: 2012 Release

[? How do I use the taxonomy tree?](#)

EC 44, Leuven, July 2012;

Email ratification 2013 (MSL #27)

☐ Order: <i>Caudovirales</i>	(3 Families) ← →
☐ Order: <i>Herpesvirales</i>	(3 Families) ← →
☐ Order: <i>Ligamenvirales</i>	(2 Families) ← →
☐ Order: <i>Mononegavirales</i>	(4 Families) ← →
☐ Order: <i>Nidovirales</i>	(4 Families) ← →
☐ Order: <i>Picornavirales</i>	(5 Families) ← →
☐ Order: <i>Tymovirales</i>	(4 Families) ← →
☐ Virus families not assigned to an order	(71 Families) ← →

<http://ictvonline.org/virusTaxonomy.asp?bhcp=1>



Development of a new
diagnostic tool using DNA
barcoding to identify
quarantine organisms in
support of plant health

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QBOL project has come to an end

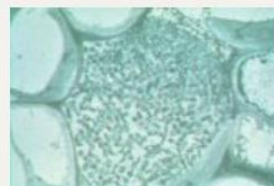
On 21 September 2012 the QBOL project ended officially.
Many results were obtained in the different work
packages.

› Read more

Areas of expertise



Barcoding of Arthropods



Barcoding of Bacteria



Barcoding of Fungi



Barcoding of Nematodes

<http://www.qbol.org/en/qbol.htm>



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Identifying Species with DNA Barcoding

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Want to get involved?

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◀ 3 of 4 ▶

PUBLICATIONS



The Protist Ribosomal Reference database (PR2): a catalog of unicellular eukaryote Small Sub-Unit rRNA sequences with curated taxonomy

Guillou L, Bachar D, Audic S, Bass D, Berney C, Bittner L, Boute C, Burgard C, de Vargas C, Decelle J, Del

RECENT ACTIVITY



[Ryan Kaldari](#) and [Khela ram soren](#) joined Connect.BarcodeofLife.net

19 hours ago

[Simone Behrens-Chapuis](#) joined [Robert](#)

<http://www.barcodeoflife.org/>

Metody konzervace bakterií

In-vivo, často vysoké nároky na podmínky kultivace

- Vysušení (silikagel, CaCl_2 , lyofilizace)
- Cryopreservation $-70\text{ }^{\circ}\text{C}$, **tekutý dusík $-196\text{ }^{\circ}\text{C}$**

Fenotypová charakterizace

Phenotypic Characterization

When bacterial strains are initially received by ATCC, they are analyzed for characteristic colony and bacterial morphology; this is observed via colonial growth and Gram staining, respectively. Additionally, samples are tested for culture purity on blood agar plates. The presence of more than one colony type is often, but not always, indicative of a mixed culture.

In addition to purity and morphology, strains are also examined for consistency in sugar metabolism, antibiotic susceptibility, and/or broad-spectrum biochemical reactivity. To confirm the bacterial species identity based on these associated phenotypic traits, ATCC commonly uses appropriate API® strip tests and Vitek® cards. Both aforementioned techniques employ over 20 different biochemical tests in reaction cells to assess the growth and viability of the bacterial strain³⁰. The API® strip test characterizes bacterial identity through a manual, micro-method that generates a seven-digit code based upon the reaction of the individual biochemical assays. This generated code is the identifier number linked to a specific bacterial species. In contrast, the Vitek® system provides an automated, computer-based method of species identification via the measurement of light attenuation associated with each biochemical reaction^{30, 31}. For this latter system, ATCC requires a $\geq 90\%$ probability of organism identification.



Genotypová charakterizace

Genotypic Characterization

ATCC genotypically confirms bacterial species through both ribotyping and 16S ribosomal RNA (rRNA) sequencing. Ribotyping is a method of bacterial identification that is based upon differences in genomic material. This method is possible through the use of the RiboPrinter® system, which analyzes discrete-sized genome fragments generated by restriction digestion of rRNA operons^{32, 33}. To confirm the identity of the bacterial strain, the respective riboprint is compared against a database of known organisms. ATCC requires a ribotype match of ≥ 0.85 for species confirmation.



In addition to ribotyping, ATCC also examines bacterial identity through 16S rRNA gene sequencing. These sequences are commonly used to analyze bacterial phylogeny and taxonomy as they are highly conserved and universal among prokaryotic species. In general, the 16S rRNA gene sequence is composed of both variable and conserved regions, the comparison of these sequences can allow for differentiation at the genus level^{34, 35}.

Ribotyping. A method of identification involving the fingerprinting of genomic DNA restriction fragments.

Informace o mikroorganismech

- Mikrofotografie
- Fotografie příznaků choroby
- HPLC
- MALDI TOF
- Metabolické profily
- Informace o genomu, informace o sekvencích

Genetická charakterizace

Genetická diversita

- Genetická variabilita mezi jedinci v populaci
- Genetická variabilita v rámci druhu
- Genetická variabilita mezi druhy
- Zdrojem genetických dat jsou vzorky biologických materiálů
- Genetická data jsou shromažďována s cílem zachovat genetickou diverzitu pro budoucnost

Kontrola kvality

Metody biochemie, bakteriologie, mykologie, ekologie a
molekulární genetiky



Získání anatomicko-morfologických, fyziologických,
biochemických a genetických dat

Molekulárně-genetické metody

- PCR (Polymerase Chain Reaction)
- RAPD (Random Amplified Polymorphic DNA)
- AFLP (Arbitrary Fragment Length Polymorphism)
- ARDRA (Amplified Ribosomal DNA Restriction Analysis)
- SSCP (Single Strand Conformation Polymorphism)
- Analýza mikrosatelitů
- Sekvencování
- RFLPs (Restriction Fragment Length Polymorphism)
- Karyotypizace velikost a počet chromozómů

Kvalita izolované DNA!?

Metagenomika

- Struktura mikrobiálních společenství
 - druhové složení
 - reakce na stres
- Nové poznatky o procesech v ekosystémech
 - fyziologický stav
 - tok energií
 - tok látek



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Author Manuscript

Science. Author manuscript; available in PMC 2011 January 27.

Published in final edited form as:

Science. 2006 June 2; 312(5778): 1355–1359. doi:10.1126/science.1124234.

Metagenomic Analysis of the Human Distal Gut Microbiome

Steven R. Gill^{1,*}, Mihai Pop^{1,†}, Robert T. DeBoy¹, Paul B. Eckburg^{2,3,4}, Peter J. Turnbaugh⁵, Buck S. Samuel⁵, Jeffrey I. Gordon⁵, David A. Relman^{2,3,4}, Claire M. Fraser-Liggett^{1,6}, and Karen E. Nelson¹

Databáze sekvencí

- NCBI, EMBL
- BLAST
- **16S a 18S rRNA**

National Center for Biotechnology Information



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DSMZ



Leibniz-Institut DSMZ-Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH
Leibniz Institute DSMZ-German Collection of Microorganisms and Cell Cultures

We would like to inform you that during the winter break
(23rd December 2013 to 3rd January 2014)
the DSMZ will be closed for business.
We apologise for any inconvenience.

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News

DSMZ – kontrola kvality

- Příslušnost k druhu – podobnost NT sekvence 16/18S rRNA je mezi 99,8 a 100%
- Pokud je podobnost sekvencí nižší (99%) porovnává se struktura RNA
- Pokud je podobnost pod 99 %, je opakováno sekvencování, případně požadováno zaslání nového kmene
- Specifické genomické a metabolické vlastnosti musí být identické

DSMZ - kontrola

● RiboPrint technology (Qualicon, Dupont, Wilmington)

ATCC

American Type Culture Collection

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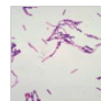
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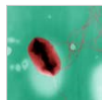
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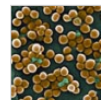
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Zdroje variability a proměnlivosti virů

- Mutace
- Rekombinace
- Reasortment

Hostitelská adaptace virů

Interakce virus – hostitel je klíčový mechanismu udržující genetickou diverzitu patogena i hostitele

Multihost Experimental Evolution of a Plant RNA Virus Reveals Local Adaptation and Host-Specific Mutations

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Abstract

For multihost pathogens, adaptation to multiple hosts has important implications for both applied and basic research. At the applied level, it is one of the main factors determining the probability and the severity of emerging diseases. At the basic level, it is thought to be a key mechanism for the maintenance of genetic diversity both in host and pathogen species. Using *Tobacco etch potyvirus* (TEV) and four natural hosts, we have designed an evolution experiment. Host strength and novelty are the use of complex multicellular host organism as hosts and a high level of replication.

Journal of General Virology (2007), 88, 2839–2845

DOI 10.1099/vir.0.82814-0

Adaptation of plum pox virus to a herbaceous host (*Pisum sativum*) following serial passages

Christopher M. Wallis,¹ Andrew L. Stone,² Diana J. Sherman,² Vernon D. Damsteegt,² Fred E. Gildow³ and William L. Schneider²

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Plum pox virus (PPV) populations from peaches are able to adapt consistently to herbaceous hosts, characterized by a reduction in time to symptom development, increases in inoculation efficiency and increased titres. PPV adaptation was studied by using pea (*Pisum sativum*) as an alternative host. Two isolates of PPV from peaches were inoculated and passaged in peas ten

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Hostitelská adaptace virů

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Rapid Communication

Genetic diversity and purifying selection in West Nile virus populations are maintained during host switching

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ABSTRACT

To investigate differential evolutionary rates and selective forces of WNV in hosts and vectors, we measured the genetic diversity that arose during alternating passage in mosquitoes and birds. Within-host genetic diversity was monitored in each of three experimentally passed replicates, and the complete genome sequence of each WNV strain was determined after passage. The intrahost genetic diversity that arose during alternating passage was significantly greater than the diversity generated during chicken-only passage and

Zdroje genetické variability bakterií

- Mutace
- Rekombinace
- HGT (Horizontal Gene Transfer)
 - Transformace
 - Transdukce
 - Konjugace

Recipient obvykle špatně adoptuje nové geny

Adaptace bakterií

- Transformace DNA
- Patogeneze
 - Produkce toxinů
 - Rezistence
 - Virulence
 - Ztráta pohyblivosti
 - Clustered regularly interspaced short repeats system (CRISPR)
 - Komenzální kolonizační faktor (ccf)

Genetická stabilita bakterií

● Při uchovávání lyofilizované kultury bakterií v 5 °C po dobu jednoho roku klesla jejich životnost. Produkce bacteriocinu nebyla ovlivněna.



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Exploration and conservation of bacterial genetic resources as bacteriocin producing inhibitory microorganisms to pathogen bacteria in livestock

Chotiah S

Abstract

Exploration and conservation of microorganisms producing bacteriocin was done as the primary study towards the collection of potential bacteria and its application in improving livestock health condition and inhibit food borne pathogens. Diferent kinds of samples such as beef cattle rectal swab, rumen fluids, cow's milk, chicken gut content, goat's milk were collected at Bogor cattle slaughter houses, poultry slaughter houses, dairy cattle and goat farms. A total of 452 bacterial isolates consisted of 73 Gram negative bacteria and 379 Gram positive bacteria were isolated from samples collected and screened for bacteriocin activity. Determination of bacteriocin activity with bioassay using

Komenzální kolonizační faktor (ccf)

Ztráta ccf *Bacteroides fragilis* vede k narušení kolonizace střeva a omezuje se HGT.

LETTER

doi:10.1038/nature12447

Bacterial colonization factors control specificity and stability of the gut microbiota

S. Melanie Lee¹, Gregory P. Donaldson^{1*}, Zbigniew Mikulski^{2*}, Silva Boyajian¹, Klaus Ley² & Sarkis K. Mazmanian¹

Mammals harbour a complex gut microbiome, comprising bacteria that confer immunological, metabolic and neurological benefits¹. Despite advances in sequence-based microbial profiling and myriad studies defining microbiome composition during health and disease, little is known about the molecular processes used by symbiotic bacteria to stably colonize the gastrointestinal tract. We sought to define how mammals assemble and maintain the *Bacteroides*, one of the

to the same species (marked by an antibiotic resistance gene) are resistant to super-colonization and clear the challenging strain (Fig. 1c). This novel observation of 'colonization resistance' by the same species is conserved in three other *Bacteroides* (Supplementary Fig. 1b–d), regardless of the antibiotic resistance markers used (Supplementary Fig. 1e), but not in *Escherichia coli* (Supplementary Fig. 1f). As conventional mice typically harbour 10^{11} – 10^{12} c.f.u. per gram of caecal content¹⁴

Stabilita bakteriálního genomu

- Stabilita znaků nesených plazmidy je mnohem nižší
 - omezení replikace plazmidů
 - nerovnoměrná distribuce plazmidů
 - variabilita roste v neselekčním prostředí
- Opakované subkultivace mohou vést ke kontaminaci, ztrátě životaschopnosti, genotypovým a fenotypovým změnám
- ATCC nedoporučuje více než 5 pasáží dodaných originálních kultur
- Lyofilizace a kryogenní konzervace jsou preferovány

Stabilita bakteriálního genomu

- Mutace DNA mohou být vyvolány poškozením cytoplazmatické membrány při zamrazování a rozmrazování
- Poškození cytoplazmatické membrány při zamrazování a rozmrazování má vliv pouze na životnost