PROGRAM

2nd St. Petersburg Symposium on Tuberculosis and Mycobacteria: Molecular Approach

St. Petersburg, Russia
5-6 December 2018
WELCOME ADDRESS

Tuberculosis is both ancient and re-emerging disease and its impact on the global health and economy is serious and adverse. The causative agent, Mycobacterium tuberculosis is not only medically important pathogen that accompanied humans since their early evolution but an interesting biological species. The recent years continue to witness an impressive advance in molecular studies of M. tuberculosis and other mycobacterial species through implementation and wide use of new generation and omics approaches. This helped to better understand and revisit certain theories on phyllogenomics of M. tuberculosis, its evolutionary paradigm and adaptive strategies, role of clinical relevance of its genetic diversity.

Back in the history, in September 2014, within St. Petersburg Ecological forum organized by Institute of Experimental Medicine, a Symposium on Tuberculosis and Mycobacteria took place. It was a one-day event organized by St. Petersburg Pasteur Institute and Institute of Phthisiopulmonology. It was attended, along with Russian participants, by six renowned experts from Germany, UK, France, Sweden, and Japan. In my unhumble opinion, it was the first event on molecular tuberculosis research with such a visible international component ever hold in Russia.

More than three years later, I am pleased to announce that 2nd St. Petersburg Symposium on Tuberculosis and Mycobacteria: Molecular Approach will be hold on 5-6 December 2018. It will be a stand-alone part of the regular anniversary conference of St. Petersburg Pasteur Institute. International conference «Molecular aspects of epidemiology, diagnosis, prevention and treatment of infectious diseases» will be dedicated to the 110 years since establishment of the institute and 95 years since its naming after Louis Pasteur.

An extensive program of the Symposium will consist of invited lectures, as well as short oral presentations and poster sessions based on the abstracts received. The official language of all oral and poster presentations will be English (simultaneous Russian translation will be provided).

I cordially welcome all interested in the most recent advances in molecular research on tuberculosis and other mycobacteria, willing to acquire new knowledge, to share ideas and to network on future collaborations, to the beautiful city of St. Petersburg on 4-6 December 2018.

Igor MOKROUSOV
Symposium Chairman
# 2nd St. Petersburg Symposium on Tuberculosis and Mycobacteria: Molecular Approach

St. Petersburg, Russia, 5-6 December 2018

## 5 December 2018

<table>
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<th>Time</th>
<th>Event</th>
<th>Speaker</th>
<th>Institution/Location</th>
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<tbody>
<tr>
<td>9:00-9:15</td>
<td><strong>Opening of the Symposium</strong></td>
<td>Igor Mokrousov, Symposium Chairman</td>
<td>St. Petersburg Pasteur Institute</td>
</tr>
<tr>
<td>9:15-9:40</td>
<td><strong>Evolution and phylogenomics</strong></td>
<td>Iñaki Comas (Spain), Igor Mokrousov (Russia)</td>
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<tr>
<td>9:40-10:05</td>
<td><strong>Whole-genome sequencing and personalized medicine</strong></td>
<td>Maoš Šitikov (Russia)</td>
<td>Federal Research and Clinical Centre of Physical-Chemical Medicine, Moscow, Russia</td>
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<tr>
<td>10:05-10:25</td>
<td><strong>Molecular epidemiology and molecular diagnostics</strong></td>
<td>Prasad Palittapongarpim (Thailand)</td>
<td>Mahidol University and the National Science and Technology Development Agency, Bangkok, Thailand</td>
</tr>
<tr>
<td>10:25-10:45</td>
<td><strong>Molecular epidemiology and molecular diagnostics</strong></td>
<td>Egor Šitikov (Russia)</td>
<td>Federal Research and Clinical Centre of Physical-Chemical Medicine, Moscow, Russia</td>
</tr>
<tr>
<td>10:45-11:05</td>
<td><strong>Molecular epidemiology and molecular diagnostics</strong></td>
<td>Margo Diricks (Belgium)</td>
<td>Applied Maths</td>
</tr>
<tr>
<td>11:05-11:30</td>
<td><strong>Molecular epidemiology and molecular diagnostics</strong></td>
<td>Andrei Gabrielian (USA)</td>
<td>TB Portals Program: Data-driven multi-national consortium against drug-resistant tuberculosis</td>
</tr>
<tr>
<td>11:30-11:55</td>
<td><strong>Molecular epidemiology and molecular diagnostics</strong></td>
<td>Margo Diricks (Belgium)</td>
<td>Applied Maths</td>
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<tr>
<td>11:50-12:10</td>
<td><strong>Molecular epidemiology and molecular diagnostics</strong></td>
<td>Yuriy Skiba (Kazakhstan)</td>
<td>Aitkhozhin Institute of Molecular Biology and Biochemistry; Almaty Branch of National Center for Biotechnology at Central Reference Laboratory, Almaty, Kazakhstan</td>
</tr>
<tr>
<td>12:10-12:30</td>
<td><strong>Molecular epidemiology and molecular diagnostics</strong></td>
<td>Andrey Gabrielyan (USA)</td>
<td>National Institute of Allergy and Infectious Diseases, National Institutes of Health, Rockville MD, USA</td>
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<tr>
<td>12:30-13:00</td>
<td><strong>Molecular epidemiology and molecular diagnostics</strong></td>
<td>Silva Tafaj (Albania)</td>
<td>University Hospital &quot;Shefqet Ndroqi&quot; Tirana, Albania</td>
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**Satellite event:** 2nd meeting of the Consortium “Fight Against TB in Central and Eastern Europe” (FATE)

**Co-chairs:** Tomasz Jagielski (Poland), Igor Mokrousov (Russia)

**15:00-15:25**

**Dario García De Viedma (Spain)**

Simplifying NGS approaches to optimize tracing of transborder spread of Mycobacterium tuberculosis

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**12:45-13:00**

**Anzaan Dippenaar (South Africa)**

Whole genome sequencing sheds light on the transmission dynamics of a multi-drug resistant Mycobacterium tuberculosis outbreak over 23 years in a high incidence setting

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**13:00-14:00**

**LUNCH**

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**14:00-15:00**

**POSTER SESSION**

**13:00-15:00**

**Satellite event:** 2nd meeting of the Consortium “Fight Against TB in Central and Eastern Europe” (FATE)

**Co-chairs:** Tomasz Jagielski (Poland), Igor Mokrousov (Russia)

**15:00-15:25**

**Dario García De Viedma (Spain)**

Simplifying NGS approaches to optimize tracing of transborder spread of Mycobacterium tuberculosis
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<tr>
<td>18:00-18:15</td>
<td>Anna Vyazovaya (St. Petersburg Pasteur Institute, Russia)</td>
<td></td>
<td>Population structure of Mycobacterium tuberculosis in Russian regions bordering EU countries</td>
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<tr>
<td>18:15-18:30</td>
<td>Tatiana Umpeleva (Ural branch of National Medical Research Center of Tuberculosis and Infectious Diseases, Ekaterinburg, Russia)</td>
<td></td>
<td>Molecular features of Mycobacterium tuberculosis strains from patients living in closed city in the Ural region, Russia</td>
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<tr>
<td>18:30-18:45</td>
<td>Imane Chaoui (Centre National de l’Energie, des Sciences et Techniques Nucléaires, Rabat, Morocco)</td>
<td></td>
<td>Genotyping of multidrug and pre-extensively drug-resistant Mycobacterium tuberculosis isolates from a high TB incidence area in Morocco</td>
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<tr>
<td>18:45</td>
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<td></td>
<td>Discussion</td>
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**6 December 2018**

**Section: Nontuberculous mycobacteria**
**Co-chairs: Alexander Apt (Russia), Tomotada Iwamoto (Japan)**

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<tr>
<td>9:30-9:55</td>
<td>Alexander Apt (Central Institute for Tuberculosis, Moscow, Russia)</td>
<td></td>
<td>Mycobacterial avium triggered disease: host genetics and immunity in mouse models</td>
</tr>
<tr>
<td>9:55-10:20</td>
<td>Tomotada Iwamoto (Kobe Institute of Health, Japan)</td>
<td></td>
<td>Genomics and local adaptation of Mycobacterium avium</td>
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<tr>
<td>10:20-10:40</td>
<td>Vlad Nikolayevskyy (Imperial College, London UK)</td>
<td></td>
<td>Development of the External Quality Assessment scheme for non-tuberculous Mycobacteria drug susceptibility testing in European Union</td>
</tr>
<tr>
<td>10:40-11:00</td>
<td>Syntol Vera Ustinova (Central Tuberculosis Research Institute &amp; Syntol, Moscow, Russia)</td>
<td></td>
<td>Prevalence and diversity of nontuberculous mycobacteria in different regions of the Russian Federation</td>
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<tr>
<td>11:00-11:30</td>
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<td>COFFEE-BREAK</td>
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<tr>
<td>11:30-11:55</td>
<td>Tomasz Jagielski (University of Warsaw, Poland)</td>
<td></td>
<td>Molecular typing of Mycobacterium kansasii - a global perspective</td>
</tr>
<tr>
<td>11:55-12:10</td>
<td>Sara Truden (University Clinic of Respiratory and Allergic Diseases Golnik, Slovenia)</td>
<td></td>
<td>Emerging opportunistic pathogen Mycobacterium abscess in Slovenia: molecular analysis of resistance genes compared to MIC method</td>
</tr>
<tr>
<td>12:10-12:30</td>
<td>Laura Rindi (University of Pisa, Italy)</td>
<td></td>
<td>Genetic diversity and drug resistance of Mycobacterium avium in Italy</td>
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**Section: Virulence and resistance 1**
**Co-chairs: Margarida Saraiva (Portugal), Roland Brosch (France)**

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<tr>
<td>14:30-14:55</td>
<td>Roland Brosch (Institut Pasteur, Paris, France)</td>
<td></td>
<td>Update on virulence factors in Mycobacteria</td>
</tr>
<tr>
<td>15:20-15:45</td>
<td>Margarida Saraiva (Instituto de Investigação e Inovação em Saúde; Universidade do Porto, Portugal)</td>
<td></td>
<td>Functional relevance of Mycobacterium tuberculosis diversity: from genotypes to immune responses and disease severity</td>
</tr>
<tr>
<td>15:45-16:00</td>
<td>An Van den Bossche (Sciensano, Brussels, Belgium)</td>
<td></td>
<td>RNA-based drug susceptibility testing of Mycobacterium tuberculosis</td>
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<td>16:00-16:30</td>
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<td>COFFEE-BREAK</td>
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**Section: Virulence and resistance 2**
**Co-chairs: Danila Zimenkov (Russia), Scott Heysell (USA)**

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<th>Title</th>
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<tr>
<td>16:55-17:15</td>
<td>Maria Alvarez Figueroa (Central Research Institute for Epidemiology, Moscow, Russia)</td>
<td></td>
<td>Analysis of gene mutations associated with MDR among Mycobacterium tuberculosis strains isolated in Moscow region</td>
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<td>17:15-17:35</td>
<td>Richard Anthony (National Institute for Public Health and the Environment Bilthoven, The Netherlands)</td>
<td></td>
<td>Could the new insights into PZA resistance provide route to shorter more effective TB therapy?</td>
</tr>
<tr>
<td>17:35-17:55</td>
<td>Danila Zimenkov (Engelhardt Institute of Molecular Biology, Russian Academy of Sciences, Moscow, Russia)</td>
<td></td>
<td>Advances in the study of molecular basis of resistance to new anti-TB drugs</td>
</tr>
<tr>
<td>17:55-18:15</td>
<td>Scott Heysell (University of Virginia, Charlottesville, USA)</td>
<td></td>
<td>M. tuberculosis drug resistance mutations and understanding of pharmacokinetics/ pharmacodynamics: treatment and care implications</td>
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<tr>
<td>18:15</td>
<td></td>
<td></td>
<td>Concluding remarks</td>
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</table>
2.1. **Performance of GeneXpert MTB/RIF in the diagnosis of extrapulmonary tuberculosis in Morocco**

Aainouss A,1,2, G. Momen2, K. Bennani1, A. Lamaammal1, F. Chtioui2, M. Messaoudi2, J. Mousslim1, M. Khyatti1, M.D. El Messaoudi2

1 Faculté des Sciences Ben M’Sk, Casablanca, Morocco; 2 Institut Pasteur du Maroc, Casablanca, Morocco

2.2. **Genetic diversity of multidrug-resistant *Mycobacterium tuberculosis* isolates in Pakistan**

Bakula Z,1, M. Plen1, H. Javed1, H.J. Hashmi2, Z. Tahir3, K. Roese4, N. Jamil2, T. Jagielski6

1 Department of Applied Microbiology, Institute of Microbiology, Faculty of Biology, University of Warsaw, Poland; 2 Department of Microbiology and Molecular Genetics, University of the Punjab, Lahore, Pakistan; 3 Provincial TB Control Program, Lahore, Pakistan

2.3. **The correlation between levels of phenotypic resistance and genotypic mutations of *Mycobacterium tuberculosis***

Ciobanu N1, S. Alexandru1, D. Chesev1, A. Codreanu1, C. Lange2, V. Crudu1

1 Phthisiopneumonie Institute, Chisinau, Moldova; 2 Research Center Borstel, Germany

2.4. **Emergence of bedaquiline resistance after completion of bedaquiline-based drug-resistant TB treatment: a case study from South Africa**

de Vos M1, S Ley1, B Derendinger1, A Dippenaar1, M Grobbelaar2, A Reuter1, J Daniels1, S Burns1, G Theron1, J Posey1, R Warren1, H Cox1

1 DST/NRF Centre of Excellence in Biomedical Tuberculosis Research / SAMRC

2.5. **A 15-year spatiotemporal analysis of *Mycobacterium tuberculosis* lineages 1 and 2 in Chiang Rai, Thailand**

A. Disratthakit1, P. Palitappongarnpin2, P. Ajawatanawong2, N. Smittipat1, S. Mahasirimongkol1, R. Miyahara1, H. Yani1, N. Yamada1, S. Nedsuwan2, W. Imasanguan3, P. Kantipong4, B. Chaiyasirinroje1, S. Bupachat1, P. Ananpradit1, P. Piboonsiri1, W. Ruengchai2, T. Juthayothin1, J. Phelan1, J. Parkhill2, T.G. Clark2, M.L. Hibberd2, K. Tokunaga4

1 Department of Medical Sciences, Ministry of Public Health, Thailand; 2 Department of Microbiology, Faculty of Science, Mahidol University, Thailand; 3 National Centre for Genetic Engineering and Biotechnology, National Science and Technology Development Agency, Thailand; 4 Department of Human Genetics, Graduate School of Medicine, the University of Tokyo, Japan; 5 TB-HIV Research Foundation, Thailand

2.6. **Molecular-genetic methods of detection of tuberculosis and its drug resistance in Arkhangelsk region in 2017**

Eliseev PL1, 1.I. Tarasova2, A.O. Mariandyshev3

1 Northern State Medical University, Arkhangelsk, Russia; 2 Arkhangelsk Regional Antituberculosis Dispensary, Arkhangelsk

2.7. **Detection of extracellular *Mycobacterium tuberculosis* small RNAs**

Fursow M.V, T.I. Kombarova, I.A. Dyatlov, V.D. Potapov

State Research Center for Applied Microbiology and Biotechnology, Obolensk

2.8. **Genotypes of *Mycobacterium tuberculosis* isolates from different organs of patients with generalized TB and HIV-coinfected**

Gerasimova A1, A. Vyazovaya1, M. Mayskaya1, I. Krokousov1, O. Narvskaia1

1 St. Petersburg Pasteur Institute, St. Petersburg, Russia; 2 City Pathoanatomical Bureau, St. Petersburg, Russia; 3 Research Institute of Phthisiopneumonology, St. Petersburg

2.9. **In vitro activity of Bedaquiline against non-tuberculous mycobacteria**

Godino I.T.1, F. Bouthachkourt2, D.A. Aguilar-Ayal1, V. Mathys3, E. Tortoll3, J.C. Palomino7, N. Lounis8, H. Rodriguez Villalobos2, A. Martin1

1 Talentum Jaén Program, Jaén, Spain; 2 Laboratory of Medical Microbiology, Université Catholique de Louvain (UCL) & Cliniques Universitaires Saint-Luc, Brussels, Belgium; 3 Departamento de Microbiologia, Escuela Nacional de Ciencias Biologicas, Instituto Politecnico; Nacional, Mexico, D.F., Mexico; 4 Laboratoire des Hôpitaux universitaires de Bruxelles (LHUB-ULB), Brussels, Belgium; 5 Belgian Reference Laboratory for Tuberculosis and Mycobacteria, Sciensano, Brussels, Belgium; 6 Emerging Bacterial Pathogens Unit, IRCCS San Raffaele Scientific Institute, Milan, Italy; 7 Independent mycobacteriology expert, Antwerp, Belgium; 8 Janssen Infectious Diseases, Beerse, Belgium

2.10. **Physiological impact of the evolution of the rpoB mutation**

Grobbelaar M1, SL Sampson1, GE Louw2, PD van Helden1, A Van Rie3 and RM Warren1

1 DST-NRF Centre of Excellence for Biomedical Tuberculosis Research; South African Medical Research Council Centre for Tuberculosis Research; Division of Molecular Biology and Human Genetics, Faculty of Medicine and Health Sciences, Stellenbosch University, Cape Town; 2 Institute of Infectious Diseases and Molecular Medicine, University of Cape Town, Cape Town, South Africa; 3 Global Health Institute, Epidemiology and Social Medicine, Faculty of Medicine, University of Antwerp, Antwerp, Belgium

2.11. **Utility of whole genome sequencing of *Mycobacterium tuberculosis* complex isolates in practice**

Jaiou R1, A. de Neeling1, S. Lipworth1, T. Walker1, R. Anthony1, D. van Soolingen1

1 National Institute for Public Health and the Environment (RIVM), Bilthoven, The Netherlands; 2 Nuffield Department of Medicine, University of Oxford, John Radcliffe Hospital, Oxford, UK

Fukujyuji Hospital, Japan Antituberculosis Association (JATA), Japan; 2 Research Institute of Tuberculosis, JATA, Japan; 3 Chiangrai Prachanukroh Hospital, Ministry of Public Health, Thailand; 4 London School of Hygiene and Tropical Medicine, UK; 5 Welcome Trust Sanger Institute, Hinxton, UK
2.12. Minor genetic determinants of second-line injection drugs resistance in Mycobacterium tuberculosis
Jou R.1,2, E.V. Kulagina3, W.T. Lee.1,2, E.Yu. Nosova3, J.Y. Weng1,2, O.V. Antonova4, W.H. Lin1,2, A.I. Isakova5, M.H. Wu1,2, D.V. Zimenkov 4
1Tuberculosis Research Center, Taiwan Centers for Disease Control, Taipei, Taiwan; 2Diagnostics and Vaccine Center, Taiwan Centers for Disease Control, Taipei, Taiwan; 3Institute of Microbiology and Immunology, National Yang Ming University, Taipei, Taiwan; 4Engelhardt Institute of Molecular Biology, Russian Academy of Sciences, Moscow, Russia; 5The Moscow Research and Clinical Center for Tuberculosis Control of the Moscow Government Health Department, Moscow, Russia

2.13. Prevalence of nontuberculous Mycobacterium spp. strains isolated from clinical specimens at North Estonia Medical Centre in 2001-2017
Levina K.
The North Estonia Medical Centre, Tallinn, Estonia

2.14. The influence of the H2 complex on Mycobacterium avium infection in mice
Linge L.1, A.2, E. S. Petrova, E. V. Kondratieva1, A. S. ApT1, 2
1Central Institute for Tuberculosis, Moscow, Russia; 2Lomonosov Moscow State University, Moscow

2.15. Epidemiological of Extrapulmonary Tuberculosis in Albania 2010-2016
Mema D.1, P.Kapiszyl1, S.Tafaj1, D.Mema2, S.Bala, H.Hafzi1
1University Hospital “Shefqet Ndroqi” Tirana; 2Center of primary healthcare nr.2, Tirana, Albania

2.16. Genetics and Social Determinants of TB related death from tuberculosis patients in the Northern Thailand
Miyahara R.1, H. Yana1, S. Mahasirimongkol1, L. Toyo-oka1-K. Tokunaga1
1Department of Human Genetics, Graduate School of Medicine, The University of Tokyo, Japan; 2Fukui University, Japan Anti-Tuberculosis Association, Kiyose, Japan; 3Medical Genetics Center, Medical Life Sciences Institute, Department of Medical Sciences, Ministry of Public Health, Nonthaburi, Thailand

2.17. Analysis of secondary resistance of Mycobacterium tuberculosis to second-line anti-tuberculosis drugs in Casablanca
Momen G.1, A. Aainoussi2, A. Lamaammar2, F. Chtioui1, M. Messaoudi2, M Blaghen1, M.D. El Messaoudi1, M. Khayti1
1Faculté des Sciences Ain Chok, Casablanca, Morocco; 2Institut Pasteur du Maroc, Casablanca, Morocco

2.18. Population structure of Mycobacterium tuberculosis isolates from TB-HIV coinfected patients in Omsk region, West Siberia, Russia
Pasechnik O. 1, A. Vyazovaya2, A. Mokrausov2
1Omsk State Medical University, Omsk, Russia; 2St. Petersburg Pasteur Institute, St. Petersburg

2.19. The implementation of next-generation sequencing for epidemiological studies and drug resistance investigations in micro-epidemics involving pediatric tuberculosis patients
Pole I.1, I. Ozere2, I. Norvaisa2, R. Ranka1, 3
1Latvian Biomedical Research and Study Centre; 2Riga East University Hospital, Centre of Tuberculosis and Lung Diseases; 3Riga Stradiņš University, Riga, Latvia

2.20. NGS determination of mycobacterial trans-renal DNA as potential tool of clinical diagnostic
Sinkov V.1, O. Ogarkov1,2, A. Plotnikov1, S. Zhdanova1, N. Belkova1, M. Koscheev1, S. Heysell1
1SC FHHRP, Irkutsk, Russia; 2ISMAC, Irkutsk, Russia; 3ICIS UD RAS, Orenburg, Russia; 4LIN SB RAN Irkutsk, Russia; 5RTBH, Irkutsk, Russia; 6UVA, Charlottesville, VA, USA

2.21. Next-generation sequencing of drug resistant Mycobacterium tuberculosis strains – first Slovenian experience
Sodja E.1, N. Toplak1, S. Koren2, M. Kovač2, S. Truden1, M. Žolnir-Dovč1
1University Clinic of Respiratory and Allergic Diseases Golnik, Golnik, Slovenia; 2Omega doo., Ljubljana, Slovenia

2.22. Single nucleotide polymorphisms in hsp65 and MACPPE12 genes of Mycobacterium avium subsp. hominisuis
Starkova D.1, T. Iwamoto2, A. Vyazovaya1, V. Molchanov1, V. Zhuravlev3, B. Vishnevsky4, O. Narvskaya1, 4
1St. Petersburg Pasteur Institute, St. Petersburg, Russia; 2Department of Infectious Diseases, Kobe Institute of Health, Kobe, Japan; 3St. Petersburg State Chemical Pharmaceutical University, St. Petersburg, Russia; 4St. Petersburg Research Institute of Phthisiopulmonology, St. Petersburg

2.23. Molecular characterization of Mycobacterium bovis isolates from cattle in Bulgaria
Valcheva V.1, T. Savova-Lalkovska2, A. Dimitrova2, H. Najdenski1, M. Bonovska1
1The Stephan Angeloff Institute of Microbiology, BAS, Sofia, Bulgaria; 2National Diagnostic and Research Veterinary Medical Institute, Sofia, Bulgaria

2.24. Molecular epidemiology of tuberculosis in Eastern Siberia and Far East Zhdanova S.N.1, M.K.Vinikurova1, A.A. Yakovlev 3, O.B. Ogarkov1, 4
1Scientific Center of Family Health and Human Reproduction, Irkutsk, Russia; 2Phthisiatry Research and Practice Center, Yakutsk, Russia; 3Vladivostok State Medical University, Vladivostok, Russia; 4Branch of the Educational Institution of Further Professional Education «Russian Medical Academy of Continuing Professional Education», Irkutsk

2.25. Molecular epidemiology of tuberculosis in Mongolia: sources and pathways of MDR Mycobacterium tuberculosis strains
Zhdanova S.N.1, T. Oyuntuya1, M.V. Badleeva2, O.B. Ogarkov1, 4
1Scientific Center of Family Health and Human Reproduction, Irkutsk, Russia; 2National Center for Infectious Diseases, Ulaanbaatar, Mongolia; 3Buryat State University, Ulan-Ude, Russia; 4Branch of the Educational Institution of Further Professional Education «Russian Medical Academy of Continuing Professional Education», Irkutsk

2.26. Prevalence of extensively drug-resistant tuberculosis: a descriptive study in the Omsk region
Yarushova I.V.1, A.I. Blokh2, O.A. Pasechnik2
1Clinical Antituberculosis Dispensary (Omsk), 2Omsk State Medical University, Omsk, Russia
The 2nd St. Petersburg Symposium on Tuberculosis and Mycobacteria: Molecular Approach is organised with support from Russian Foundation for Basic Research (grant № 18-04-20102\18)